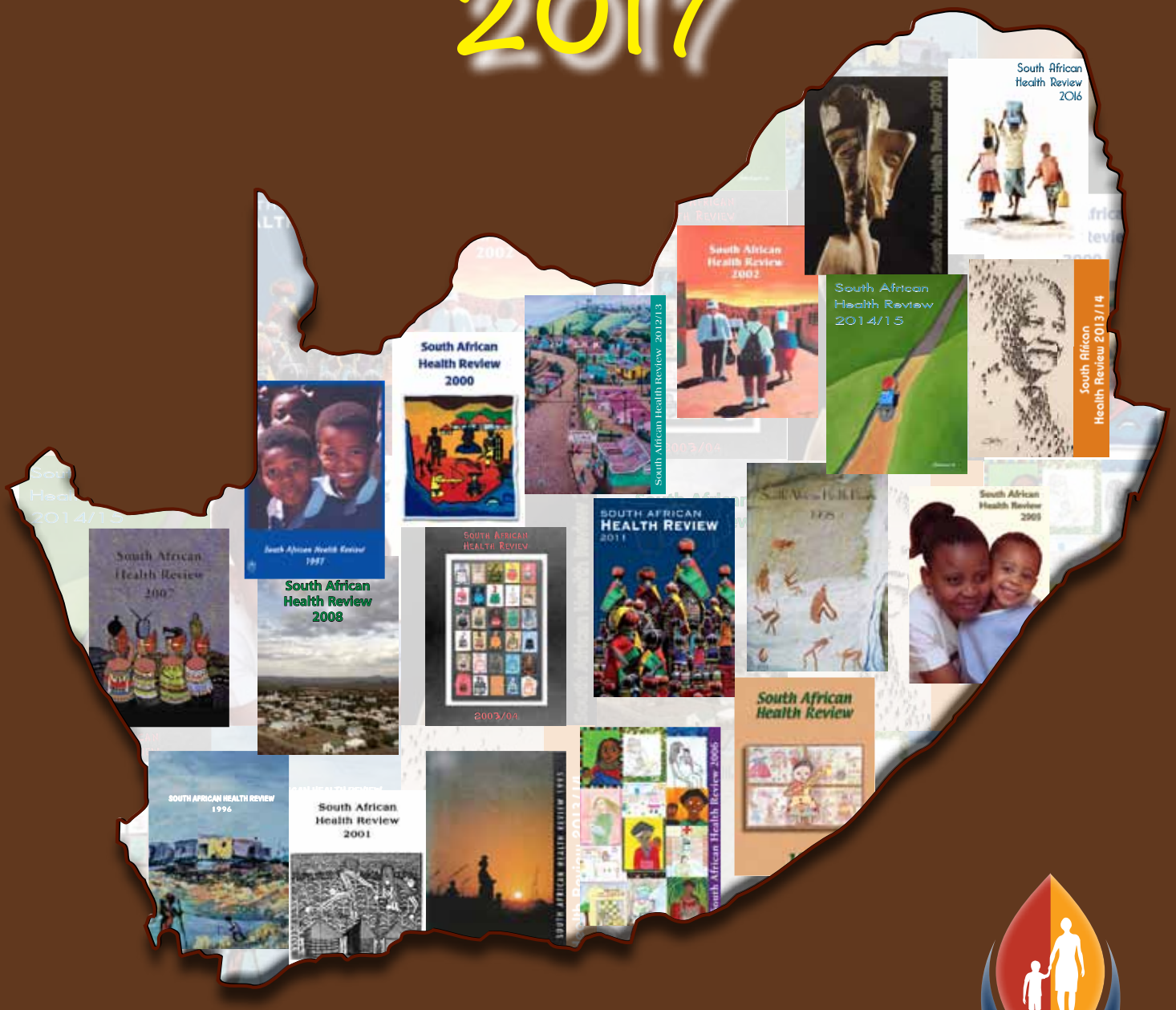
20th edition

South African Health Review 2017



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HEALTH SYSTEMS TRUST

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Foreword

I am delighted to introduce the 20th edition of the *South African Health Review*. In commemoration of this achievement, this edition considers the healthcare developments of the past 20 years, explores the current challenges faced by our healthcare system, and reflects on possible issues for South Africa in the years ahead.

Since its inception, the *South African Health Review* has had the ambitious goal of providing a comprehensive analysis of health and systems of health care, by which to map our transition from a nation divided by systemic inequality to one of equitable access to health care for all. Our aim has been to reflect on the progress achieved both in policy and in the lived realities of South Africans, and point to areas of shortfall where advances in policy have not translated into effective change. It is heartening to note that the *Review* has lived up to its initial ambitions and has become firmly entrenched in the public health landscape of our country.

On behalf of the Board of Health Systems Trust, I thank the authors, reviewers, Editorial Advisory Committee members, editorial team and administrative personnel who worked tirelessly to produce this *Review*. Your commitment and expertise have collectively produced another excellent edition of the *South African Health Review* and we value your contribution.

I also extend our sincere gratitude to the South African National Department of Health for supporting the production of this publication.

Flavia Senkubuge

Chairperson of the Board of Trustees,
Health Systems Trust

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Acknowledgements

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Ashnie Padarath and Peter Barron.

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Editorial Advisory Committee

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This publication was supported by a grant from the South African National Department of Health.

Cover art

In celebration of this, the 20th edition of the *South African Health Review*, the cover art for this year's edition presents the covers of the nineteen previous editions, and was designed by Lynda Campbell from The Press Gang.

Editorial

This 2017 edition of the *South African Health Review (SAHR)* comprises 21 chapters. In acknowledgement of the 20-year anniversary of the publication and the significant improvements to our health system over time, most of the chapters provide an overview of developments in their respective subject areas over the past two decades.

The first chapter offers a concise history of some of the major issues covered by the *SAHR* over the past 20 years. Peter Barron and Ashnie Padarath (who are also the editors of this year's edition), use the World Health Organization's six building blocks as a lens to contrast relevant chapters in the first (1995) edition of the *SAHR* with chapters on the same theme in subsequent editions.

In Chapter 2, Andy Gray and Yousuf Vawda provide a summary of health-related legislative instruments at national level that have been the subject of change since the 2016 *Review*. They note that despite significant gains, some legislative processes have stalled, such as the Certificate of Need, the introduction of compulsory Continuing Professional Development for pharmacists, the recognition of specialist nurses as prescribers, and the introduction of international benchmarking for medicine prices. While expressing concern at the lack of progress in the development of National Health Insurance (NHI) legislation and the yet-untested ability of the Office of Health Standards Compliance to issue and enforce compliance notices, they note encouraging progress towards creation of the South African Health Products Regulatory Authority to replace the Medicines Control Council.

In Chapter 3 on financing, Mark Blecher and colleagues show that expenditure has increased to R183 billion in the public sector alone. Despite this six-fold increase in nominal spending over the past 24 years, the increase in per capita expenditure has been static or negative since 2011/12. The health sector has responded to the slowed budget growth and rising costs in a number of ways: personnel numbers have been limited since 2012/13; greater savings have been sought on medicines tenders; a set of Ministerial 'non-negotiable' budget items has been developed that provinces must prioritise in budgets; savings have been sought in administration and expenditure; capital spending on buildings and medical equipment has been reduced; capital projects and equipment purchases have been delayed; and primary health care (PHC) has been prioritised.

There is currently no specific provision in the National Health Act for the establishment of a dedicated Health Technology Assessment (HTA) body and associated structures, and health technology is narrowly and incompletely defined within current legislation. In Chapter 4, Nandi Siegfried and colleagues take this into account and call for the National Department of Health (NDoH) to host a HTA summit in order to gain consensus on an acceptable and useful definition of HTA appropriate to the South African context, and to discuss the policy and legislative requirements for a national HTA agency or alternative mechanism in South Africa. They also suggest that consideration be given to the revision of relevant national legislation and policy in order to align with the NHI agenda and international developments in the field of HTA.

The fifth chapter critically examines the process of developing and implementing the National Drug Policy (NDP), from 1994 to date. In their overall assessment, Andy Gray and co-authors conclude that while there have been some achievements in the areas of medicine policy pricing, the NDP has not been implemented as originally envisaged. In particular, the authors lament the diminishing number of formal opportunities for public engagement and suggest that in the future, careful consideration should be paid to systems for delivering affordable, quality essential medicines in finalising the White Paper on NHI.

In Chapter 6, Lucy Gilson and a group of collaborators from the Western Cape describe and discuss the case of health system reform in that province. Adopting the view that the extensive revisions to the health system represent a 'whole-system change' (as opposed to piecemeal or programmatic change), they enumerate the lessons learnt in this process and make recommendations for the successful implementation of such an approach. Additionally, the authors highlight the importance of developing new forms of monitoring and evaluation that adopt a whole-system perspective and that extend beyond services and programmes to system functions; this draws in a wider range of perspectives and knowledge, and considers not only 'what' but also 'how' health system change is unfolding.

In Chapter 7, Susan van Schalkwyk and colleagues describe the development of Stellenbosch University's Rural Clinical School, which introduced a year-long training of final year medical students at a rural training site. Based on the findings of a five year evaluation, the authors suggest that all healthcare professions students in South Africa be exposed to training in rural and underserved areas through the course of their curriculum.

Chapter 8 interrogates the potential of South Africa's PHC Re-engineering Strategy and the National Development Plan to adequately address social determinants of health. Recommendations and suggestions are made for the health sector to take on a stronger advocacy role, within government and beyond, to support the broader international health and development agenda. Vera Scott and co-authors make use of a case study to illustrate how a social-determinant approach to a health problem such as obesity reveals a set of contributing factors beyond those acting at the immediate level of the individual (i.e. in the case of obesity, beyond dietary choices); the case study draws attention to the impact of population- and community-level factors, such as socio-cultural influences and the food environment created by local and global forces.

The ninth chapter unpacks the need for South Africa to develop an improved health-systems response to migration and health. Jo Vearey and colleagues observe that contrary to popular perception, the number of people moving internally within South Africa far exceeds

the number of cross-border migrants. They suggest that internal migration in fact presents greater governance, health system, and health equity challenges than cross-border migration.

In Chapter 10, Shivani Ranchod and colleagues provide an account of the stark divide between hospitals in the public and private sectors and suggest that a homogeneous approach to hospital processes, policies and systems could assist in minimising variations between these two sectors. They further speculate that changing the financing of the system alone is unlikely to be sufficient to achieve universal access to high quality of care. They recommend that institutions that focus on quality improvement and that work across both the public and private sectors are essential for quality improvement and improved accountability.

In Chapter 11, Jeanette Hunter and colleagues describe progress and challenges in the implementation phase of the Ideal Clinic Realisation and Maintenance programme. They report that 322 Ideal Clinics were accredited in 2016 and the number of clinics scoring over 70% increased from 139 to 445, but that there is still much to be done. The authors highlight the need for national and provincial health departments to speed up infrastructure and staffing improvements and correct the procurement processes that currently see many clinics functioning without the required medication, consumables, equipment and furniture.

In Chapter 12 on pharmacovigilance (PV), Ushma Metha and collaborators discuss the PV activities used to assess the impact of adverse drug reactions on public safety and health in South Africa. Despite the progression from passive regulatory reporting to active surveillance systems, the authors signal the urgent need to develop cohesive, sustainable systems to support evidence-based decisions on appropriate regimen choices, while minimising medicine associated risks. They further suggest that increased use of computerised clinical, laboratory and dispensing records, with unique patient identifiers facilitating data linkage, will increase PV surveillance capacity in South Africa.

In Chapter 13, Ameena Goga and colleagues suggest that the prevention of mother-to-child transmission (PMTCT) of HIV is one of the success stories of the 21st century in South Africa. They observe that "over the past 15 years the national risk of early (six weeks post-partum) MTCT in South Africa, plummeted from approximately 25–30% prior to 2001, to an estimated 1.4% in 2016". They credit national policy updates on PMTCT, supported by political will and congruence with latest scientific evidence as critical factors in this success. The authors draw on the bottlenecks listed in the Last Mile Plan to prioritise a set of eight game-changers to increase PMTCT effectiveness in the country.

The female condom programme has grown rapidly from a pilot phase to a national programme and represents one of the largest government funded female condom programmes worldwide. Despite this, the authors of Chapter 14, Mags Beksinska and colleagues, have found variation in access to female condoms across provinces. Crucial determinants of a successful female condom programme cited by them include male involvement and support for use of the female condom, and the attitude of providers.

Drug-resistant tuberculosis (DR-TB) is a significant threat to efforts to end TB in South Africa. In Chapter 15, authors Helen Cox et al. observe the need for access to drug-sensitivity testing among all TB patients and effective second-line TB treatment for all diagnosed patients. They note South Africa's strengthened response to DR-TB in recent years, for instance the implementation of new diagnostic tests such as the Gene-Xpert and the introduction of decentralised and de-institutionalised DR-TB treatment provision at lower levels of the health system. They suggest that important challenges moving forward are those of defining and piloting models of DR-TB care across different settings, and supporting patients throughout treatment.

The South African government has made great strides towards management and control of non-communicable diseases (NCDs), including the development of health promotion and prevention policies and guidelines intended to assist healthcare workers, facilities and communities with NCD care. In Chapter 16, Thandi Puoane and colleagues suggest that the facility-based component of NCD management and control has received more attention than the community level components, which is emphasised in the National Strategic Plan for NCDs.

In Chapter 17, Naomi Lince-Deroche and colleagues capitalise on the fact that a breast cancer diagnosis and treatment policy is currently being drafted by the National Department of Health; they provide an overview of the possible approach and strategies to be taken into account when crafting a comprehensive response. Suggestions include increasing the number of breast-specialist centres that are staffed with multi-disciplinary teams; re-training PHC nurses on how to perform clinical breast examinations; strengthening existing referral systems, including facilitated patient transport systems; maximising the use of mammography and ultrasound for diagnosis; and increasing support for and links to patient advocates and counsellors in communities and within breast-specialist centres to ensure comprehensive, full-spectrum care.

In Chapter 18, Lynette Denny and Louise Kuhn review the history of cervical cancer prevention. They suggest that while methods for prevention and early detection of cervical cancer have been well established since the 1960s, the implementation of appropriate policies and healthcare interventions has been suboptimal in many low- and middle-income countries. Their recommendations include updating and upgrading the National Cancer Registry to a population-based registry to enable more accurate data collection for planning, monitoring and evaluation; the consolidation of resources where cytology based programmes are functioning well; and alternative algorithms for cervical cancer prevention where these do not exist. They also suggest that cervical cancer screening in asymptomatic women should be free of charge and provided at the primary level of care, and that healthcare workers should be adequately skilled in all areas of cervical cancer control.

In Chapter 19, Andrew Scheibe and colleagues expound on the need to move away from a criminal justice approach to dealing with drug use. While some recent South African policy documents have called for an approach that is more medicalised and that conceptualises habitual drug use as a chronic disease requiring treatment, the authors recommend the development of a new, inclusive approach that aims to address the social determinants contributing to drug use and provides services that reduce drug-related harms.

This year's winner of the Emerging Public Health Practitioner Award is Candice Fick, who offers a review of the implementation of the Integrated Management of Childhood Illness (IMCI) strategy in

South Africa over the past 20 years (Chapter 20). She advocates for IMCI to be classified as a programme rather than an implementing strategy, and makes recommendations on how to improve the impact of IMCI in South Africa.

Chapter 21 on Health and Related Indicators is a consistent feature of the *SAHR*. Candy Day and Andy Gray, the regular contributors of this chapter, describe a wide range of healthcare indicators including socio-economic and demographic indicators; specific health programmes; diseases such as HIV and maternal and child health; and indicators related to health systems such as financing and human resources. These are usually presented at national and provincial level as well as by 'race', where relevant. The indicators have been updated from previous editions and the authors have comprehensively presented the sources thereof and why they have been updated.

The concluding paragraph of the Foreword to the first edition of the *South African Health Review* ended with the following vision: "Independent, reliable documentation of health and health care is an important form of support for health systems reform. We trust that this *Review* will be published annually, and will serve as a barometer of effective change". Twenty years later, we take pride in noting that – with the valued support of our collaborators and funding partners – we have continued to manifest this vision.

We owe our gratitude to the editors of previous editions of the *SAHR*: David Harrison, Antoinette Ntuli, Petrida Ijumba, David McCoy, Jane Edwards-Miller, Nicholas Crisp, Megan Nielson, Candy Day, Fatima Suleman, Elizabeth Lutge, Stephen Harrison, Rakshika Bhana, Josianne Roma-Reardon, Sharon Fonn, René English, Judith King, Emma-Louise Mackie, and Julia Casciola, all of whom have helped to ensure the publication's successful evolution and relevance.

Ashnie Padarath and Peter Barron
Editors

Twenty years of the South African Health Review

1

Authors:

Peter Barron[i]

Ashnie Padarath[ii]

The year 2017 marks the 25th anniversary of Health Systems Trust and the 20th edition of the Trust's flagship publication, the South African Health Review (SAHR). First published in 1995, the original intention of the SAHR (as it has commonly become known) was to systematically pull together information on health from as many sources as possible; to describe and critique policy initiatives to serve as a basis for gauging whether there has been successful implementation; and to help define a policy research agenda by highlighting policy thrusts.[1]

Over the past 20 years, the SAHR has assiduously chronicled developments in the South African health system. It has curated knowledge from a wide spectrum of sources in order to provide the necessary information to assess progress in transformation of the health system since 1994 and has reflected on successes, failures and missed opportunities. During this time, the focus of the SAHR has shifted from the need for policy development, to analysis of policy implementation and the health system's state of readiness to respond to policy reforms.

Over the past 20 years, the South African Health Review has assiduously chronicled developments in the South African health system.

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Introduction

The *South African Health Review* (SAHR) is now widely recognised as one of the most authoritative sources of commentary on the South African health system. It is widely used in teaching public health at undergraduate and postgraduate level in South Africa, and it is used by scholars, donors, journalists, policymakers and policy-implementers at various levels of the health system.

The initial edition of the *SAHR* was based on commissioned chapters relating to the most important health policies, reforms and priorities of the time. The chapters were reviewed first by an independent reviewer and the overall composite edition was reviewed by a committee. To a great extent, this initial publication created the framework for subsequent editions. However, there have been a number of important changes and improvements over the 20 editions.

There has been a move away from commissioned articles to an open request to all authors writing on themes pertinent to the health system in South Africa. The process of peer review has been improved, with at least two independent reviewers assigned to each article, as well as comment from an editorial advisory committee. In 2014, the *SAHR* was accredited as a peer-reviewed publication by the Department of Higher Education and Training. This has raised the profile of the *SAHR* and offers a particular incentive to academic contributors, as peer-reviewed publications are one of their key performance areas, and they can receive subsidy allocations for their contributions.

In 2012, Health Systems Trust (HST) introduced the Emerging Public Health Practitioner Award to commemorate the its 20th anniversary. This is a widely advertised open competition in which young health practitioners submit articles they have written. The article assessed by the Editorial Advisory Committee to be the best (against a set of criteria) is published as a chapter in the *SAHR*.[2–5]

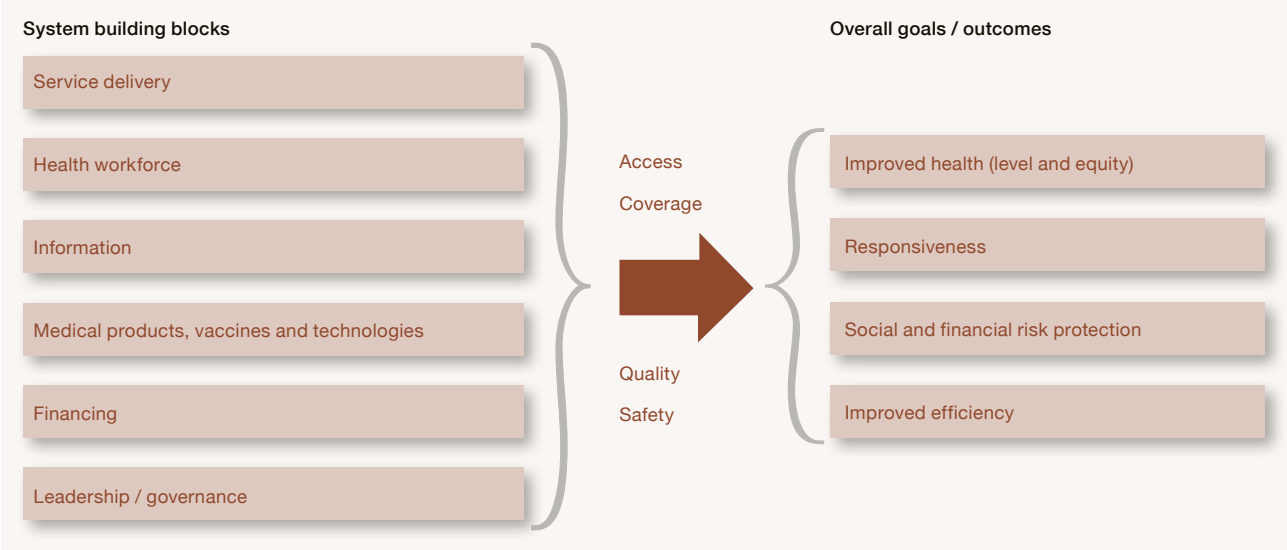
The *SAHR* has recorded the maturation of the health system through a series of reforms geared towards realisation of primary health care (PHC) as the primary mode of healthcare delivery;[6] the preparation of the health system for the introduction of National Health Insurance[7] (NHI), and the achievements towards attaining the Millennium Development Goals[8] and the current Sustainable Development Goals.[9] It has also documented many of the initiatives aimed at realising these reforms and goals.

In addition to providing information and discussion on the latest policy debates, over the years the *SAHR* has captured perspectives on a range of programmatic activities designed to consolidate health system strengthening. These include issues encapsulated in the Minister of Health's Negotiated Service Delivery Agreement[10] related to increasing life expectancy, decreasing maternal and child mortality, combating HIV and AIDS, and decreasing the burden of disease from TB. They also include exploring possibilities for collaboration with the private sector[11] and harvesting of promising models, good practices and lessons to inform further implementation and scale-up.

South Africa's commitment to re-engineering the health system has been driven by the country's quadruple burden of disease, which has been fuelled by a range of risk factors including unsafe sex and sexually transmitted infections;[12] interpersonal violence and alcohol abuse;[13] poor diets;[14] and maternal and childhood malnutrition.[15,16] The high prevalence of these and other risk factors, and the health sector's responses to them, have been captured in the *SAHR*. In many instances the *SAHR* has sought to apprise its readers regularly of progress in tackling these issues. Other significant themes covered recently include the social determinants of health,[17] reproductive health,[18] mental health,[19] disability,[20] climate change,[21,22] and occupational health.[23]

Due to the volume and complexity of information it is not possible to synthesise all the important issues addressed in the *SAHR* over the 20 years. However, the remainder of this chapter is devoted to covering the important touchstones featured in the *SAHR*, based on the World Health Organization's six 'building blocks' for an effective, efficient and equitable health system.[24] Selected examples have been chosen for each of the major building blocks (Figure 1) to illustrate how the *SAHR* has reported on these issues over the past two decades.

Figure 1: World Health Organization's Health Systems Framework



Source: World Health Organization, 2007.[24]

Leadership and governance

In the first edition of the *SAHR* in 1995, a number of important issues on leadership and governance were highlighted by Steve Tollman and Laetitia Rispel in their chapter titled "Organisation, planning and governance".[25] These issues included tension between the national and provincial Health Departments; the central importance of the district level in the health system; the relationship between local government and the district health system; and the danger that "preoccupation with organising … the provincial health office … will obstruct rather than facilitate a desperately needed, planned and sustained process of empowerment at district level". Another challenge identified was that policy formulation was distant from the sites of planning and delivery, with the authors calling for a process that "blends top-down expertise with bottom-up experience and expertise".

Twenty-one years later, in the 2016 *SAHR*, Rispel[26] suggested that notwithstanding progress made since 1994, the South African health system has seen relatively poor performance compared with countries of similar income level and given the country's quantum of healthcare spending. Problems similar to those described in 1995 are still being experienced, the major difficulty being a disconnection between progressive policies on the one hand – such as a PHC approach combined with legislation, policy and resource allocation aimed at achieving transformation and improved population health – and implementation on the other. Rispel identified three major fault lines in implementation: tolerance of ineptitude, as well as leadership, management and governance failures; lack of a fully functional district-health system as the main vehicle for PHC delivery; and inability or failure to deal decisively with the health-workforce crisis.

Over the years, several chapters in the *SAHR* have attempted to unpack the leadership implementation and operational challenges at district level.[27–29] For example, in 2014, Wolvaardt et al.[30] identified the key constraints and challenges that hamper district-management teams in effectively translating national policy into district-specific strategies, comprehensive work-plans and well-constructed budgets. According to the authors, some of the specific institutional design blockages are that district management has no influence over policy directives; strategy is designed at national and provincial level; district management has limited influence over the allocated budget; district management does not control workforce planning and appointment of staff; and there is no clear system whereby lessons learnt at district level are used to influence policy or strategy. In other words, the district health system is neither responsible nor accountable for performance. In addition, senior management fail to use evidence obtained from district level to modify policy to fit the reality on the ground. However, the authors also found that district managers conceded that "managers do not consistently and effectively use data for evidence-based decision-making, particularly with regard to planning and performance management".

Linked to this is the need to ensure that district management staff are supported. The *SAHR* has provided examples of local initiatives and in the 2014/15 edition Susan Cleary and colleagues[31] reported on the outcomes of a series of sub-district engagements to understand and strengthen community participation, and concluded that 'intangible software' such as values, power and communication, are important for enabling change and fostering better community participation.

Although not part of this *SAHR*, the Life Esidimeni tragedy of 2016 starkly highlights the governance and management failures in the Gauteng Department of Health, with the highest levels of management clearly shown to have ignored available evidence. In the words of the ombudsman, "The decision was unwise and flawed, with inadequate planning and a 'chaotic' and 'rushed or hurried' implementation process".[32] Most of the other provinces have also made the pages of the public press for reported mismanagement of their hospitals and finances.[33–36]

Health workforce

Over the years, human resources (HR) has been a perennial theme in the *SAHR* and every edition has featured at least one chapter on aspects of this topic. In the first edition of the *SAHR*, William Pick's analysis highlighted the maldistribution of health professionals between the private and public sectors, as well as the maldistribution of public-sector health professionals between the provinces.[37] It was estimated that in 1992/93, most of the highly trained professionals, including 93% of dentists, 89% of pharmacists and over 60% of all doctors, were working in the private sector. In the public sector, the Western Cape was found to have more than four times as many doctors per 100 000 population as Mpumalanga, and more than five times as many pharmacists per 100 000 population as Limpopo. The chapter also highlighted the need for greater support of health workers so that they would be "caring and compassionate", and the need for a patient's charter.

Since then, the *SAHR* has published numerous articles on issues as diverse as community service,[38] community health workers (CHWs), the Human Resources for Health Plan,[39] task-shifting, and mid-level health workers. Writing in 2005, Irwin Friedman[40] reported on the national CHW policy framework, which provided an outline of what was envisaged for a future national CHW programme. Today, CHWs are seen as a key component in the PHC Re-engineering Strategy[41] and feature prominently in the health chapter of the National Development Plan.[42] However, there remains a paucity of information on CHWs. For example, a chapter in the 2013/14 *SAHR*[43] pointed out that "despite the recognition that community health workers are a critical resource for comprehensive primary health care, there are few data available on their deployment in South Africa at present". While such official information remains incomplete, the *SAHR* has sought to feature examples of good practice and promising local interventions. Also in the 2013/14 *SAHR* for example, Padayachee and colleagues described a successful scale-up of the Ward-based Outreach Teams comprising CHWs in the North West Province,[44] with salutary lessons for other CHW scale-up initiatives in the country.

The 2016 *SAHR* featured a chapter on the potential of the public-health workforce to monitor the progress of NHI and the Sustainable Development Goals, to identify health-service priorities, and to implement effective delivery strategies. The chapter suggested that existing public-health units in the Western Cape and Gauteng, staffed with multi-disciplinary teams of public-health medicine

specialists and other public-health professionals, could be replicated across the country as a resource for health-system development and restructuring.[45]

The need to pay greater attention to HR data and information systems has also been identified as a key issue, with planning and monitoring of HR reflected in various editions of the *SAHR*. For example, as far back as 2010, Day and Gray[46] reported that "the registers of the various councils such as the Health Professions Council of South Africa, the South African Nursing Council and the South African Pharmacy Council include professionals who are retired, overseas, working part-time, working in other sectors or not working at all. In general, the registers do not have reliable information on how many people fall into these categories or on the proportion working in the public/private sectors, or on the distribution working part-time or across sectors". The authors reported that other poorly documented areas were the number and distribution of CHWs, allied health professionals and traditional healers.

Clinical associates have been used extensively in many sub-Saharan countries. Yet despite the chronic shortage of medical personnel in the public-health sector in South Africa, the number of clinical associates registered with the Health Professions Council of South Africa remains low, with only 130 of the 220 on the register employed in the public sector in 2013.[47] Mid-level health workers are ideally suited to 'task-shifting', which was described in relation to mental health in the 2014/15 *SAHR*.[47] Also known as 'task-sharing', this is defined as "involving the rational redistribution of tasks among health workforce teams. Specific tasks are moved, where appropriate, from highly qualified health workers to health workers with shorter training and fewer qualifications, in order to make more efficient use of the available human resources for health".

The 2014/15 edition of the *SAHR* sounded a warning bell on the state of nursing in South Africa. The chapter[48] noted that while nurses make up the largest single group of health-service providers, and their role in promoting health and providing essential health services is undisputed, there remain a number of concerns regarding South Africa's nursing profession, which is described as "being in peril and characterised by shortages", with declining interest in the profession, lack of a caring ethos, and an apparent disjuncture between the needs of nurses on the one hand and those of communities served on the other. The authors identified critical issues to be addressed by health policy-makers and practitioners in order to revitalise the nursing profession; these include nursing education reforms; the participation of nurses in policy-making; casualisation of the nursing profession; ethics; quality of care; and the work experiences of nursing managers at PHC clinics. The authors also suggested that the nursing practice environment is fraught with resource, administrative and quality-of-care problems. According to them, this is being compounded by workforce concerns, namely "suitability of new entrants, admission and selection of nursing students, training, competence, and work ethos". They found that the practice environment is also influenced directly by agency work and moonlighting, which in turn contribute to "poor staying-power, low energy levels, abuse of leave, suboptimal nursing care, split loyalties and accountability, and erosion of professionalism". Some of these issues have been highlighted again in 2017, with lack of leadership and governance from the Nursing Council making news in the popular press.[49]

Despite the many steps taken to improve the availability and distribution of human resources for health in South Africa, Rispel reminds us that there is still much to be achieved and suggests that one of the major fault lines in the health system has been precisely this failure to deal adequately with the health workforce.[49]

Information

According the World Health Organization, "the goal of a health information system is often narrowly defined as the production of good-quality data. However, the ultimate goal is more than this – it is to produce relevant information that health system stakeholders can use for making transparent and evidence-based decisions for health system interventions".[50]

In their 1995 chapter on 'Informatics Support', Debbie Bradshaw and Lulamo Mbobo found that "whilst much data are collected, these are mostly not processed or not used at an appropriate level and [tend] to be of an administrative nature".[51] Other information-related issues identified by the authors included lack of district and provincial synthesis of information; lack of utilisation of information for management; and lack of feedback of information, with the result that local staff do not routinely assess the efficiency and effectiveness of their work.

The *SAHR* has consistently noted and captured the developments and weaknesses of our unfolding health information system over the years. In 2011, the chapter on 'Health information systems in South Africa' highlighted the importance of being able to access good-quality data housed in a single, comprehensive data repository for monitoring and evaluating progress towards attainment of health related goals.[52] Key developments aimed at strengthening the health information system in South Africa were also presented, including the development of a District Health Management Information Systems policy and future steps for strengthening the health information system.

In the 2013/14 *SAHR*, Masilela, Foster and Chetty[53] reviewed the adoption and initial implementation of South Africa's eHealth Strategy. The authors noted the centrality of the strategy in achieving a well-functioning, patient-centred, electronic national health information system based on agreed scientific standards of interoperability, thus improving the efficiency of clinical care, producing the indicators required by management, and facilitating patient mobility. Important next steps were noted, such as the establishment of a unique identifier for each patient, and the installation of patient-based information systems at all healthcare facilities.

In the following (2014/15) edition, Wolmarans and colleagues[54] described the first steps in the roll-out of the health patient registration system in 700 primary care facilities in the 10 pilot NHI districts. They reported that the complexities and challenges in moving South Africa to a modern-day eHealth system were enormous, but were being overcome.

In 2014/15, Vera Scott and colleagues[55] echoed the themes highlighted in the 1995 *SAHR* when they explored the nature of PHC facility level decision making in human resources management and quality improvement. They noted that despite the increasing emphasis being placed on automation of data collection and information systems, informal information and experience-based knowledge remain crucial in local decision-making. The authors

highlighted the supportive and complementary role that the use of both formal and informal information can play in assisting operational managers by suggesting that local information and experience-based knowledge supports managers in adapting and innovating locally to ensure successful policy implementation, while the use of formal information supports greater accountability in service delivery.

The 1995 *SAHR* included an annexure on health and related indicators, with nine rudimentary tables showing demographic, socio-economic, mortality and morbidity rates.[1] Over the years, the chapter on health indicators has developed into the single most comprehensive and authoritative set of health indicators in the country and has for many years formed the backbone of the *SAHR*, with the rhyming of 'Day and Gray' (the two main authors), associated with this. The chapter on health indicators in the 2016 *SAHR* made up a third of the total review and extended over 100 pages, with detailed indicators covering demography, socio-economic factors, health status, health services and health financing.[56]

The South African health system, like all modern health systems, functions suboptimally if management decisions (at all levels) are not based on objective evidence and information. There have been wide-scale improvements in both the quality and quantity of information available over the past two decades. An example of this is HST's *District Health Barometer*,[57] which makes available a vast range of cross-sectional and longitudinal information, with comparisons among districts and provinces on key health performance indicators. Despite these data being available, the comments made in the first *SAHR* about the lack of use of information by managers is still apposite in most provinces, districts and facilities around the country.

Service delivery

During the life of the *SAHR*, HIV has been the highest-priority preoccupation of service delivery. The last two decades have seen the rise, and further rise, of HIV. With this came the reversal of the health gains of the previous 20 years. Life expectancy plummeted, while maternal, child and infant mortality rates soared. Instead of improving our key health indicators and moving towards achieving the Millennium Development Goals, South Africa succumbed to AIDS denialism and moved backwards. Up to the 2016 *SAHR*, at least 28 chapters dealt with HIV and AIDS, while a further nine chapters related to its terrible twin, tuberculosis. HIV is used as the tracer condition to gauge the building block of health service delivery.

HIV has been a black cloud dominating the health landscape over the past 25 years. In 1995, Quarraisha Abdool Karim described the early stages of the epidemic, including that it was affecting young women more than young men; that the prevalence was doubling on a yearly basis; that there was a gradient of infection from the Western Cape (1.2%) to KwaZulu-Natal (14.4%); and that there was a great deal of denialism regarding HIV.[58] In 1995, HIV was made one of the Presidential lead projects in the Reconstruction and Development Programme, and the budget was doubled to R42 million.

In 2017 there are now more than seven million people in South Africa infected with HIV, with over half of these on lifelong antiretroviral therapy (ART). The antenatal HIV prevalence rate has stabilised at 30% over the past decade, with higher rates among older pregnant women and lower rates among younger women aged 15 to 24 years.[59]

In the 2012/13 *SAHR*, Francois Venter[60] wrote in respect of HIV: "The programme is now internationally recognised as successful and is responsible for recent dramatic improvements in South African life expectancy. However, the scale and cost of the programme have presented many challenges to the healthcare system and to funders". He concluded that "the ART roll-out has been a complicated and qualified success teaching us much about public health programmes that have grand ambition. Maintaining and improving the roll-out in the context of complicated policy and operational challenges will, however, continue to challenge us if we are to maintain this success".

In addition to the success with treating people infected with HIV, there has also been success in components of prevention. The three mainstays of biomedical aspects of prevention are the three Cs: counselling and testing for HIV, condoms and circumcision. As was highlighted in the *SAHR* 2010 by Nesri Padayatchi and colleagues, the HIV counselling and testing campaign was launched in 2010. Since then, around 10 million tests are done annually, as well as half a million medical male circumcisions, and 750 million male condoms and 25 million female condoms are distributed.[57]

Medical products, vaccines and technology

Medicines, vaccines and technology are key health system building blocks and hardware. However, there has been a tendency to neglect the importance of these elements and supporting processes when key health-system success factors are under discussion. There have been 10 chapters on pharmaceuticals and four on traditional medicines in the *SAHR* up to 2016.

In 1995, Folb, Valentine and Eagles[61] reported on the findings of the Ministerial Drug Policy Committee, including a costing structure for medicines in the public sector; an essential drugs list and its importance in underpinning comprehensive treatment guidelines; encouragement of the use of generic medicines; the introduction of a pricing committee to review drug costs; an examination of the functioning of the Medicines Control Council; and the incorporation of traditional medicines into the formal health sector.

In the 2012/13 *SAHR*, Bada Pharasi and Jacqi Miot[62] showed how "medicine selection in both the public and private sectors in South Africa has undergone significant transformation in the past 16 years". In the public sector, medicine selection follows international best practice by being in line with an essential medicines list and standard treatment guidelines, and there are expert review committees that advise the ministerially appointed National Essential Medicines List Committee.

In 2016, Bangalee and Suleman[63] showed that South Africa is a world leader in pricing policies and "has instituted various mechanisms to render the pricing of pharmaceuticals more transparent including the single exit price that clarifies the price at which a manufacturer or importer may sell a medicine".

It is a basic function of the health system to have appropriate drugs available to treat patients. Yet in the 2013/14 *SAHR*, Seunanden and Day[64] reported that: "Over the past three years, drug stock-outs of TB and ARV drugs in public health facilities have been emphasised in media reports in South Africa. Recent media coverage highlights the inadequate supply of TB and ART drugs in healthcare facilities (including provincial depots) in all provinces, with the Eastern Cape, Gauteng and Free State receiving the most

criticism". They also note that "the reasons for TB drug stock-outs are multi-dimensional and range from a shortage of human resources to a lack of communication between suppliers, depots and health facilities".

It is clear that the fundamentals have been put in place to ensure that coherent drug and medical products procurement and distribution systems function appropriately. However, each incident of non-availability of drugs or vaccines for a particular patient represents a failure of the health system as a whole. A decrease in the number of such events will be a key marker of the effectiveness of the current health public health system and the future system based on NHI.

Financing

In her chapter on 'Financing and Expenditure' in the 1995 *SAHR*, Di McIntyre showed that in 1992/93 an estimated R30 billion (8.5% of GDP) was spent on health in South Africa, with 38.7% being public sector spending and 60.8% being private sector spending. The chapter also noted the hospicentric nature of public sector spending, with 55% of all spending going to secondary (11%), tertiary (14%) and academic hospitals (30%).[65] Challenges identified in the 1995 *SAHR* included overall maldistribution between the private and public sectors (relative to the populations being served); the overall under-resourcing of the public sector; maldistribution of spending between geographical areas with relatively affluent (urban) areas receiving a greater proportion than poorer areas (rural, ex-homeland); and maldistribution between levels of care. Many of these problems still exist in 2017 and the policy on NHI is aimed at dealing with many of these.[66]

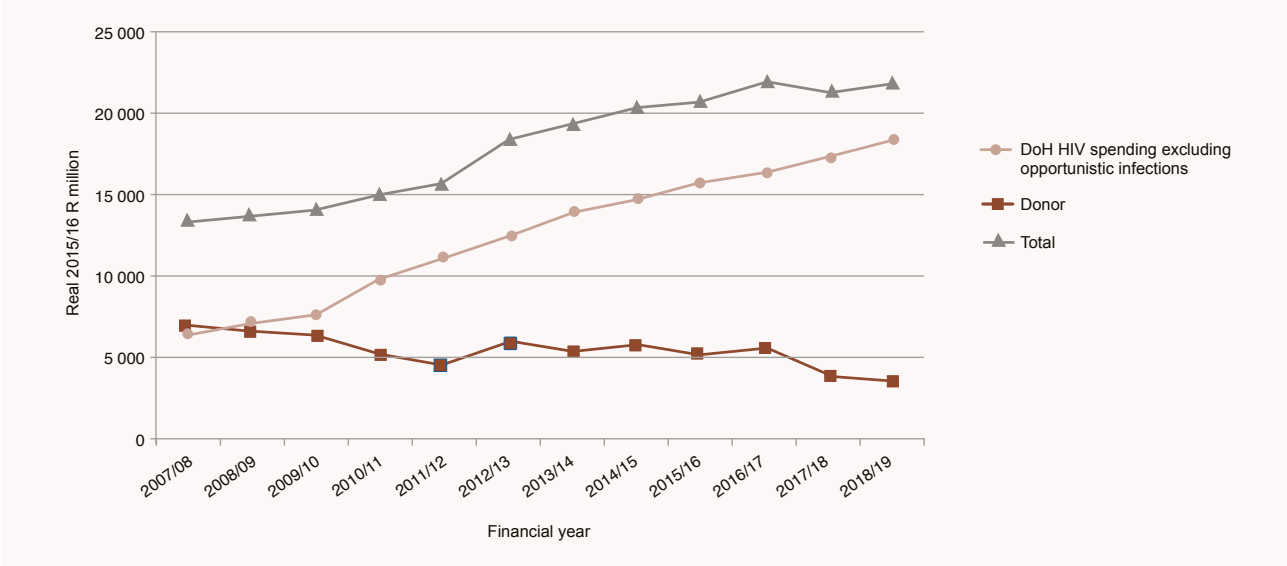
More recent editions of the *SAHR* have explored the implications of the introduction of NHI and PHC, among other things, on health financing. In the 2011 edition of the Review, Mark Blecher et al. noted that there was demonstrable commitment on the part of the South African government to increasing health funding levels to address the growing quadruple burden of diseases and to improve the quality and structure of health services, but cautioned that key priority areas, such as non-communicable disease and child health, required improved costing. In 2016, the authors investigated HIV financing in South Africa and probed whether there was sufficient fiscal space to afford and sustain the expanded and rapid roll-out of antiretroviral treatment and prevention interventions needed to reach the UNAIDS 90-90-90 targets in the context of declining economic growth, the monetary constraints announced in Budget 2016, and diminishing donor funding. They concluded that while there were indications that introducing the HIV 90-90-90 targets would be challenging, these were nonetheless likely to be affordable and cost-effective if implemented in a phased way and if annual increments to government AIDS budgets are sustained. There has been a significant change regarding what the money is spent on. This is illustrated in the 2016 edition of the *SAHR*[67] which shows that spending on HIV increased three-fold in real terms from 2009 to 2016, with spending on the HIV conditional grant projected to be more than R20 billion by 2018 (Figure 2). District health services have also benefited and the proportion of the total health budget spent on these has increased from around 35% in 1996/97 to more than 45% in 2016/17. Over the same period, spending on provincial hospitals (secondary and tertiary) has decreased from around 27% to 17%, with central hospital spending fluctuating around 20%.

Discussion

This chapter used selected examples linked to the World Health Organization building blocks to contrast what was documented in the first edition of the *SAHR* in 1995 with what has been presented subsequently.

Clearly, there have been a number of major successes in the health system. Probably the most important has been the response to HIV, which has been instrumental in improving the key health indicators relating to death rates, life expectancy, and maternal, child and

Figure 2: Government and donor funding for HIV/AIDS-dedicated programmes (R billion real 2014/15 prices)



Source: Blecher et al. 2016.[67]

infant mortality. Nonetheless, it is also very clear that challenges remain and that much needs to be done to improve governance, leadership and accountability at strategic, district and facility level, as well as in terms of the overall planning and implementation of the health workforce. The National Health Act was promulgated in 2004, and in 2015 the White Paper on National Health Insurance was published. Both of these wide policy documents aim to remedy many of the challenges facing the health system in South Africa. However, the overarching challenge is how to implement the key policies successfully.

The *SAHR* has consistently noted that when policies are not complemented by adequate resources, committed leadership and stewardship, and regular engagement with key stakeholders, they will remain mere aspirations. Apart from implementing new policies and developing fair financing arrangements, there is also a need to focus on softer issues such as leadership and management, and to ensure that we build and nurture a cadre of health managers who are capable, empowered and motivated. Equally, in contemplating health-sector reform, it will be necessary to ensure accurate data on health status and health services to inform policy decisions, and to ensure that they emanate from a sound evidence base and contain information for a single health system incorporating both the public and private sectors.

Evidence of impact

Generating information for planning, monitoring, evaluation and decision-making is one of HST's key activities. One of the ways in which we do this is to share and curate both the implicit and tacit knowledge acquired in the re-design of our health system.

However, translating evidence into policy and practice and the gap between what is known and what is done (the 'know-do gap'), persists to such an extent that it has been described as a "chasm".[68] For example, it has been pointed out that it took 200 years from the time that a cure for scurvy was found until the cure was adopted by the British Navy, to illustrate the challenges involved in moving knowledge from research into practice.[69] In addition, as pointed out by Senkubuge and Mayosi in the 2013 edition of the *SAHR*, there is "no nationally agreed-upon framework for the translation of research evidence into policy, programme and practice".[70] The National Health Research Council has signalled its intention to establish a National Health Research Observatory in South Africa which will function as an information and translation system that will integrate health information from the country's multiple research platforms, co-ordinate research processes, and serve to monitor, evaluate and support translation of essential health research; however there is no clear timetable for this process.[71]

One of the challenges facing publications such as the *SAHR* is how to provide evidence of impact, given the tendency to focus on the impact of the 'research' on policy rather than on the policy debate.[72] Encouragingly, there is also a move towards understanding the 'impact of research' to encompass how polices have both changed and influenced 'new ways of thinking'. Over the past five years, there have been 29 133 hits on the *SAHR* page on Health Systems Trust's website,[a] implying that the contents of the *SAHR* are being used to generate new ideas and approaches to challenges. Each year, approximately 1 500 hard-copies of the publication are printed and widely distributed to national, provincial and district management teams. It would be wishful thinking to imply that the entire body of *SAHR* recommendations filter into policy (and as pointed out earlier in this chapter, there are a number of important areas around leadership and governance, human resources planning and management of the district health system, where analyses and recommendations in the *SAHR* have not made an appreciable difference). However, the information contained in the *SAHR* has had both instrumental (where research is translated into usable forms) and conceptual (research that changes thinking but not necessarily action) value.[73]

Despite the absence of irrefutable evidence that there is a direct causal link between the recommendations of the *SAHR* and policy changes, there is some evidence to suggest that the various recommendations made in the approximately 20 chapters of each edition of the *SAHR* have percolated into the policy-making discourse and influenced discussions around policy.

Conclusion

Three factors have contributed to the successful production of the *South African Health Review* over the years:

- The role of funders who chose to support the need to document the successes and challenges of the health system rather than divert their funds to programmatic and service-delivery ventures. In particular, the support of the Henry J. Kaiser Family Foundation, The United Kingdom Department for International Development, The Atlantic Philanthropies, the Swedish International Development Cooperation Agency through the AIDS Foundation, and the South African National Department of Health, is acknowledged.
- There have been generous contributions from the broader public health community in South Africa. Over the past 20 editions, there have been more than 850 contributors to chapters, including those working in the formal public health sector, parastatal organisations, scientific councils, non-governmental organisations, academia, and bilateral and multilateral support agencies. In a spirit of collegiality and knowledge-sharing, they have contributed in the form of chapter submissions, peer review of chapters and the provision of oversight, and support as members of the Editorial Advisory Committee.
- The determination and foresight of the original developers of the *SAHR*, as well as the many editors and members of Health Systems Trust who have served the publication with distinction, and have established its standards of excellence.

This chapter is dedicated to all of their inputs.

a Personal Communication: Lucy Wileman, Communication Officer; Health Systems Trust, 11 April 2017.

References

1 Harrison D, Nielsen M, editors. South African Health Review 1997. Durban: Health Systems Trust; 1997.

2 Hussey N. The language barrier: the overlooked challenge to equitable health care. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

3 Adeleke O. Barriers to the implementation of tuberculosis infection control among South African healthcare workers. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

4 Price J. Lean management in the South African public health sector: a case study. In: Padarath A, English R, editors. South African Health Review 2013/14. Durban: Health Systems Trust; 2014.

5 Chetty V. A model of care for the rehabilitation of people living with HIV in a semi-rural South African setting. In: Padarath A, King J, English R, editors. South African Health Review 2014/15. Durban: Health Systems Trust; 2014.

6 Naledi T, Barron P, Schneider H. Primary Health Care in South Africa since 1994 and implications of the new vision for PHC re-engineering. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health System Trust; 2011.

7 South African National Department of Health. White Paper on National Health Insurance. Government Notice No. 1230, Government Gazette No. 39506. 11 December 2015. [Internet]. [cited 4 May 2017]. URL: http://www.gov.za/sites/www.gov.za/files/39506_gon1230.pdf

8 United Nations. The Millennium Development Goals Report 2010. New York: United Nations; 2010.

9 United Nations General Assembly. Transforming our world: the 2030 Agenda for Sustainable Development. Vol. A/70/L.1. 4th plenary meeting, 25 September 2015. [Internet]. [cited 4 May 2017]. URL: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

10 South African National Department of Health. Negotiated Service Delivery Agreement for Outcome 2: A long and healthy life for all South Africans. Pretoria: National Department of Health; 2010.

11 Harrison S, Bhana R, Ntuli A, editors. South African Health Review 2007. Durban: Health Systems Trust; 2007.

12 Scheibe A, Richter M, Vearey J. Sex work and South Africa's health system: addressing the needs of the underserved. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

13 Corrigal J, Matzopoulus R. Violence, alcohol misuse and mental health: gaps in the health system response. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

14 Diet-related non communicable diseases in South Africa: determinants and policy responses. In Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

15 Bamford L. Maternal, newborn and child health. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

16 Du Plessis L, Peer N, Honkiman S, English R. Breastfeeding in South Africa: are we making progress? In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

17 Rispel L, Niewoudt S. Mainstreaming the social determinants of health in South Africa: rhetoric or reality? In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

18 Lince-Deroche N, Pleaner M, Harries J, Morroni C, Mullick S, Firnhaber C, et al. Achieving universal access to sexual and reproductive health services: pitfalls for contraceptive services in South Africa. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

19 Schneider M, Barron E, Breuer E, Docrat S, Honikman S, Kagee A, et al. Integrating mental health into South Africa's health system: current status and way forward. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

20 Sherry, K. Disability and rehabilitation: essential consideration for equitable, accessible and poverty-reducing health care in South Africa. In: Padarath A, English R, editors. South African Health Review 2013/14. Durban: Health Systems Trust; 2014.

21 Myers JE, Rother AH. Public health impact of and responses to climate change in South Africa. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

22 Rao M, Knight S, Samarth A. Environmental sustainability, climate change and health. In: Fonn S, Padarath A, editors. South African Health Review 2010. Durban: Health Systems Trust; 2010.

23 Adams S, Ehrlich R, Ismail N, Quail Z, Jeebhay M. Occupational health challenges facing the Department of Health: protecting employees against tuberculosis and caring for former mineworkers with occupational health disease. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

24 World Health Organization. Everybody's business: Strengthening Health Systems to improve Health Outcomes: WHO'S Framework for Action. 2007. [Internet]. [cited 4 May 2017]. URL: http://www.who.int/healthsystems/strategy/everybodys_business.pdf

25 Tollman S, Rispel L. Organisation, planning and governance. In: Harrison D, Neilson M, editors. South African Health Review 1995. Durban: Health Systems Trust; 1997.

26 Rispel L. Analysing the progress and fault lines of health sector transformation in South Africa. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

27 Engelbrecht B, Crisp N. Improving the performance of the health system. In: Fonn S, Padarath A, editors. South African Health Review 2010. Durban: Health Systems Trust; 2010.

28 Elloker S, Olckers P, Gilson L, Lehmann U. Crises, routines and innovations: the complexities and possibilities of sub-district management. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

29 Hendricks SJH, Buch E, Seekoe E, Bossert T, Roberts M. Decentralisation in South Africa: options for district health authorities in South Africa. In: Padarath A, King J, English R. South African Health Review 2014/15. Durban: Health Systems Trust. 2015.

30 Wolvaardt G, Johnson S, Cameron D, Botha B, Kornik S. Challenges and constraints at district management level. In: Padarath A, English R, editors. South African Health Review 2013/14. Durban: Health Systems Trust; 2014.

31 Cleary S, Schaay N, Botes E, Figlan N, Lehmann U, Gilson L. Re-imagining community participation at the district level: lessons from the DIALHS collaboration. In: Padarath A, King J, English R, editors. South African Health Review 2014/15. Durban: Health Systems Trust; 2015.

32 Makgoba M. The report into the circumstances surrounding the deaths of mentally ill patients: Gauteng Province; No guns: 94+ silent deaths and still counting. Pretoria: Office of the Health Ombudsman; 2017. [Internet]. [cited 17 March 2017].
URL: http://www.ohsc.org.za/images/documents/FINALREPORT.pdf

33 De Waal M. Eastern Cape's so-called health system: In dire need of resuscitation. Daily Maverick, 27 June 2012. [Internet]. [cited 17 March 2017].
URL: https://www.dailymaverick.co.za/article/2012-06-27-eastern-capes-so-called-health-system-in-dire-need-of-resuscitation/#.WMu_Im9973g

34 Gonzalez L. Free State health "collapses" amid alleged financial crisis. Health- e-News, 23 June 2014. [Internet]. [cited 17 March 2017].
URL: https://www.health-e.org.za/2014/06/23/free-state-health-collapses-amid-alleged-financial-crisis/

35 Laganparsad M (2016). Limpopo's hospitals of despair and death. Sunday Times, 29 May 2016. [Internet]. [cited 17 March 2017].
URL: http://www.timeslive.co.za/sundaytimes/stnews/2016/05/29/Limpopos-hospitals-of-despair-and-death

36 SAnews.gov.za. Mpumalanga Health Department placed under curatorship. South African Government News Agency, June 2014. [Internet]. [cited 17 March 2017].
URL: http://www.sanews.gov.za/south-africa/mpumalanga-health-department-placed-under-curatorship

37 Pick W. Human Resources Development. In: Harrison D, Neilson M., editors. South African Health Review 1995. Durban: Health Systems Trust; 1995.

38 Reid S. Community service for health professionals. In: Ijumba P, editor. South African Health Review 2002. Durban: Health Systems Trust; 2002.

39 Matsoso M, Strachan B. Human Resources for Health in South Africa: HRH Strategy for the Health Sector 2012/13 – 2016/17. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health Systems Trust; 2011.

40 Friedman I. CHWs and community caregivers: towards a unified model of practice. In: Ijumba P, Barron P, editors. South African Health Review 2005. Durban: Health Systems Trust; 2005.

41 Pillay Y, Barron P. The implementation of PHC re-engineering in South Africa. Public Health Association of South Africa; 2011. [Internet]. [cited 18 March 2017].
URL: https://www.phasa.org.za/the-implementation-of-phc-re-engineering-in-south-africa/

42 National Development Plan 2030. Our future – making it work (2011). Pretoria: Government Printer; 2011. [Internet]. [cited 18 March 2017].
URL: http://www.poa.gov.za/news/Documents/NPC%20National%20Development%20Plan%20Vision%202030%20-lo-res.pdf

43 Day C, Gray A. Health and related indicators. In: Padarath A, English R, editors. South African Health Review 2013/14. Durban: Health Systems Trust; 2014.

44 Padayachee T, Chetty N, Matse M, Mampe T, Schneider H. Progress in the establishment of Ward-based Outreach Teams: experiences in the North West Province. In Padarath A, English R, editors. South African Health Review 2013/14. Durban: Health Systems Trust; 2014.

45 Zweigenthal V, London L, Pick W. The contribution of specialist training programmes to the development of a public health workforce in South Africa. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

46 Day C, Gray A. Health and related indicators. In: Fonn S, Padarath A, editors. South African Health Review 2010. Durban: Health Systems Trust; 2010.

47 Spedding M, Stein D, Sorsdahl K. Task-shifting psychosocial interventions in public mental health: a review of the evidence in the South African context. In: Padarath A, King J, English R, editors. South African Health Review 2014/15. Durban: Health Systems Trust; 2015.

48 Rispel L, Bruce J. A profession in peril? Revitalising nursing in South Africa. In: Padarath A, King J, English R, editors. South African Health Review 2014/15. Durban: Health Systems Trust; 2015.

49 Tandwa L. Denosa to march to nursing council over registration woes. News 24, 1 February 2017. [Internet]. [cited 18 March 2017].
URL: http://www.news24.com/SouthAfrica/News/denosa-to-march-to-nursing-council-over-registration-woes-20170201

50 World Health Organization. Frameworks and Standards for Country Health Information Systems. 2nd ed. Geneva: World Health Organisation; 2008.

51 Bradshaw D, Mbobo L. Informatics Support. In: Harrison D, Neilson M, editors. South African Health Review 1995. Durban: Health Systems Trust; 1995.

52 English R, Masilela T, Barron P, Schönfelt A. Health Information Systems in South Africa. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health Systems Trust; 2011.

53 Masilela T, Foster R, Chetty M. The eHealth strategy for South Africa 2012–2016: how far are we? In: Padarath A, English R, editors. South African Health Review 2013/14. Durban: Health Systems Trust; 2014.

54 Wolmarans M, Solomon W, Tanna G, Chetty M, Dombo M, Venter J, Parsons A. eHealth programme reference implementation in primary health care facilities. In: Padarath A, King J, English R, editors. South African Health Review 2014/15. Durban: Health Systems Trust; 2015.

55 Scott V, Dingito N, Xapile Z. Operational health service management: understanding the role of information in decision-making. In: Padarath A, King J, English R, editors. South African Health Review 2014/15. Durban: Health Systems Trust; 2015.

56 Day C, Gray A. Health and related indicators. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

57 Massyn N, Peer N, English R, Padarath A, Barron P, Day C, editors. District Health Barometer 2015/16. Durban: Health Systems Trust; 2016.

58 Abdool-Karim Q. The HIV/AIDS Epidemic. In: Harrison D, Neilson M, editors. South African Health Review 1995. Durban: Health Systems Trust; 1995.

59 South African National Department of Health. The National Antenatal Sentinel HIV Prevalence Survey, South Africa, 2014. National Department of Health, Pretoria. 2017.

60 Venter F. HIV treatment in South Africa: The challenges of an increasingly successful antiretroviral programme. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

61 Folb P, Valentine N, Eagles P. Drug Policy. In: Harrison D, Neilson M, editors. South African Health Review 1995. Durban: Health Systems Trust; 1995.

62 Pharasi B, Miot J. Medicines selection and procurement in South Africa. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2013.

63 Bangalee V, Suleman F. Towards a transparent pricing system in South Africa: trends in pharmaceutical logistic fees. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

64 Seunanden T, Day C. The extent and impact of TB drug stock-outs. In: Padarath A, English R, editors. South African Health Review 2013/14. Durban: Health Systems Trust; 2014.

65 McIntyre D. Financing and expenditure. In: Harrison D, Neilson M, editors. South African Health Review 1995. Durban: Health Systems Trust; 1995.

66 Matsoso M, Fryatt R. National Health Insurance: the first 18 months. In: Padarath A, English R, editors. South African Health Review 2013/14. Durban: Health Systems Trust; 2014.

67 Blecher M, Meyer-Rath G, Chiu C, et al. HIV and AIDS financing in South Africa: sustainability and fiscal space. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

68 Ellis KS. Knowledge translation and the governance of health research in Canada: A critical discourse analysis. University of Western Ontario Electronic Thesis and Dissertation Repository, Paper 2198; Health and Rehabilitation Sciences. Ontario: University of Western Ontario; 2014.

69 Oborn E, Barrett M, Racko G. Knowledge translation in healthcare: a review of the literature Working Paper Series 5/2010. Cambridge: University of Cambridge; 2010.

70 Senkubuge F, Mayosi B. The state of the National Health Research System in South Africa. In: Padarath A, English R, editors. South African Health Review 2012/13. Durban: Health Systems Trust; 2016.

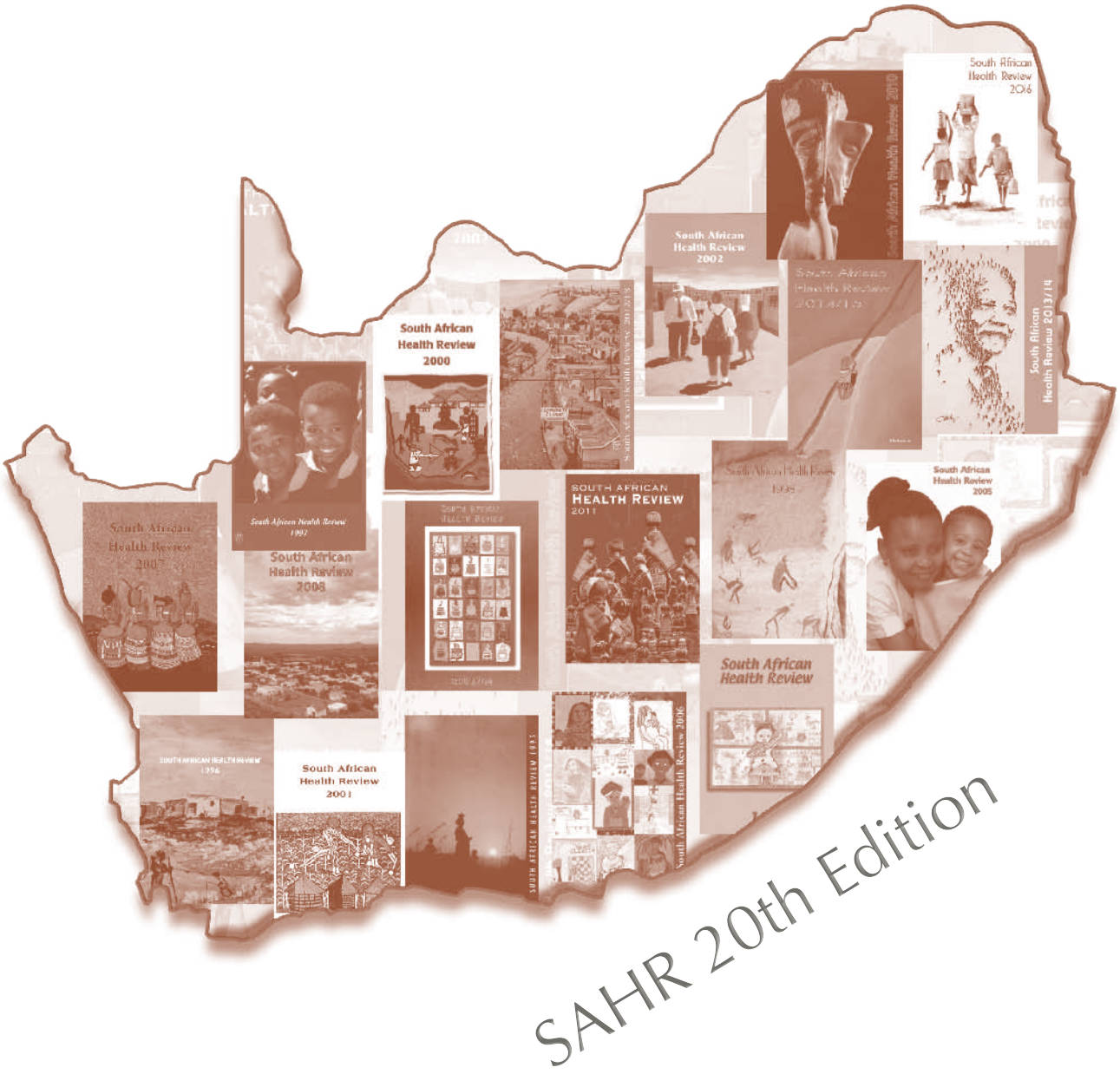
71 Mekwa NJ, Van Niekerk A, Madela-Mntala EN, Jeenah M, Loots G, Mayosi BM. The development of a National Health Research Observatory in South Africa: considerations and challenges. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

72 Shaxson L. Improving the impact of development research through better research communications and uptake. Report of the AusAid, DFID and UKCDS funded workshop: London, November 29th and 30th 2010. London: AusAid; 2010.

73 Ross S, Goering P, Jacobson N, Butterill D. A guide for assessing health research knowledge translation plans. Toronto: SickKids Foundation; 2007.

Health systems issues: macro

Health systems issues: macro



Health Policy and Legislation

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Authors:

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Although the introduction of National Health Insurance still dominates the health policy space in South Africa, there is little evidence of legislative action in this regard since the comment period on the White Paper ended in 2016.

No proposed amendments to the Medical Schemes Act have yet been revealed. Neither the National Health Laboratory Service Amendment Bill nor the National Public Health Institute of South Africa Bill have yet been tabled in Parliament.

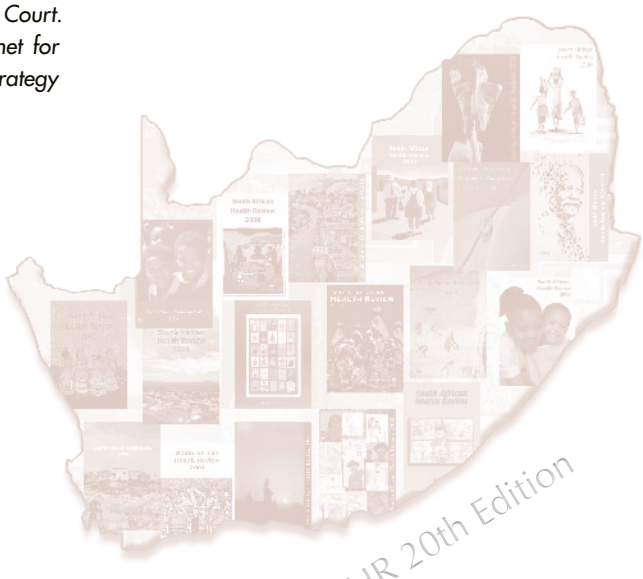
A draft Dental Technology Professions Bill has been published for comment. However, important regulations have been published in terms of the National Health Act, which should enable the operationalisation of the Office of Health Standards Compliance.

The South African Health Products Regulatory Authority is expected to replace the Medicines Control Council in 2017, and will also have to tackle the long-neglected issue of medical device regulation.

No radical redesign of the Health Professions Council of South Africa seems likely.

Two important court judgments were delivered in 2017 – in the Dermalex case, and in respect of the appeal against the Stransham-Ford decision by the High Court. The National Ministerial Advisory Committee on Antimicrobial Resistance met for the first time, but implementation of the Antimicrobial Resistance National Strategy Framework 2014-2024 still demands urgent attention.

Although the introduction of National Health Insurance still dominates the health policy space in South Africa, there is little evidence of legislative action in this regard since the comment period on the White Paper ended in 2016.



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Introduction

The inaugural *South African Health Review*, published in 1995, noted the appointment of a National Health Legislation Review Committee, tasked with developing a "comprehensive, development-oriented Public Health Act" for South Africa.[1] The Department of Health was described as "reluctant to amend legislation on a piecemeal basis". The chapter also noted the risks attendant on a process of wholesale reform of health legislation: "unless this process is carefully managed and properly co-ordinated, administrative chaos and increased fragmentation of the health system may ensue". In the spirit of the times, the chapter also emphasised the need for "active community participation in the formulation of legislation", noting that "not only are undemocratic legislative processes ideologically unacceptable, but they also give rise to legislation that is poorly implemented".

This chapter, taking advantage of the 20th edition of the *Review*, provides a concise summary of health-related legislative instruments at the national level that have been the subject of change since the last edition was published in 2016. These include primary legislation (in the forms of Bills or Acts of Parliament), secondary legislation (Regulations published by the Minister of Health) and tertiary legislation (Board Notices issued by statutory health councils). However, changes to provincial health legislation or health-related municipal by-laws are beyond the scope of this chapter. Important health-related jurisprudence is also described, as are selected national policies and the processes for their development and implementation.

In addition, the chapter attempts to identify key unfinished business, where provisions have not been implemented, or legislative processes appear to have stalled. A recent World Health Organization report has underlined the "flexible and enabling role" of public health law in the realisation of the right to health.[2] The report suggests a number of principles that can be used to evaluate the adequacy of existing law, as well as the need for reform. In essence, these principles are encapsulated in the duty of governments to "ensure that health care facilities, goods and services, as well as public health services, facilities and programmes, are available, accessible, culturally acceptable, scientifically and medically appropriate and of good quality". Health legislation and policy are a means to an end.

National legislation related to health

Unlike in 2015, when just one health-related Act was passed (the Medicines and Related Substances Amendment Act 14 of 2015[3]), Parliament did not pass a single health-related law in 2016. Two draft Bills which had previously been published for comment have yet to be tabled (National Health Laboratory Service Amendment Bill[4] and National Public Health Institute of South Africa Bill[5]). A draft Dental Technology Professions Bill has been gazetted for comment by the Dental Technicians Council, but has also not yet been tabled in Parliament.[6] This is a comprehensive Bill which seeks to repeal the existing South African Dental Technicians Act (19 of 1979). The Medical Innovation Bill (Private Member's Bill 1 of 2014[7]) remains before Parliament, but appears to be in abeyance while the Medicines Control Council considers how to apply existing provisions to enable access to cannabis for medical purposes.[8]

National Health Act

National Health Insurance

The key policy and legislative issue facing South Africa remains the effort to ensure universal health coverage through National Health Insurance (NHI). The White Paper published in December 2015 envisaged a three-phase process of implementation over a 14-year period.[9] The first of these was intended to last five years, from 2012/2013 to 2016/2017, and to focus on strengthening the public health sector, but also implementing key enablers such as the Office of Health Standards Compliance (OHSC).

Phase 2, starting in 2017, is intended to enable the registration of the population and the creation of a transitional NHI Fund. The Department of Health Annual Performance Plan 2016/17–2018/19 notes that a key policy initiative will be to facilitate the implementation of NHI, noting the need to develop systems and processes for the NHI Fund, such as provider payment systems, patient registration systems, health provider registration systems, and fraud and risk mitigation systems.[10] It is expected that some amendments to the Medical Schemes Act will be necessary. However, to date, no details of such amendments have been released. The expected input from the Treasury on the financing options for NHI has also not been issued. However, in the 2017 Budget Speech, the Minister of Finance indicated that clarity would be provided later in the year.[11] The Minister of Finance also provided an insight into the potential scope of the NHI Fund, noting that the initial focus would be to: "improve access to a common set of maternal health and antenatal services and family planning services"; "expand the integrated school health programmes, including provision of spectacles and hearing aids"; and "improve services for people with disabilities, the elderly and mentally ill patients, including provision of wheelchairs and other assistive devices".

Office of Health Standards Compliance

The year 2016 marked critical steps being taken in the implementation of the Office of Health Standards Compliance (OHSC). Final regulations outlining procedures for the functioning of the OHSC and the Health Ombud were issued in November 2016.[12]

The first report from the Ombud, relating to the transfer of psychiatric patients from the Life Esidimeni facility in Gauteng (the so-called 'Gauteng Marathon Project'), was issued on 1 February 2017.[13,14] The Ombud found "*prima facie* evidence, that certain officials and certain NGOs and some activities within the Gauteng Marathon Project violated the Constitution and contravened the National Health Act and the Mental Health Care Act (2002)". He further found that "some executions and implementation of the project have shown a total disregard of the rights of the patients and their families". The responses to the report are ongoing, but have included the resignation of the provincial MEC responsible for Health, the suspension of the Head of Department and other senior officials, and remedial action to ensure the safety of patients who were transferred to inappropriate facilities. An *ad hoc* tribunal chaired by a retired Judge President has been appointed by the Minister of Health to process appeals lodged against the Health Ombud's report.[15]

Although the Health Ombud's report can be regarded as evidence of the potential power and reach of the OHSC and its structures, some elements remain subject to development. For instance, Regulation 21 calls on the OHSC to develop an enforcement policy, and to

publish this in the Gazette. Most importantly, the OHSC will rely on the existence of clear and implementable standards. Draft norms and standards Regulations were issued for comment by the Minister in January 2017.[16] Importantly, Regulation 2 states that these norms and standards would apply to all health establishments. Among the proposed norms is the provision of an antimicrobial stewardship programme and a pharmaceutical and therapeutics programme at all health establishments. A call for nominations for the OHSC Board was issued in June 2016.[17]

Secondary legislation

The issuing of secondary legislation in terms of the National Health Act (61 of 2003) continues, with a short amended Regulation on the removal of tissue, blood and gametes from living persons that was issued for comment in May 2016.[18] In July 2016, extensive draft Regulations on emergency medical services were published for comment. These included lists of medicines to be available in different types of emergency response vehicles, a provision also impacted upon by the Schedules to the Medicines Act.[19] In September 2016, final Regulations on artificial fertilisation, which require fertility clinics to be authorised by the Director-General, were issued.[20] The Director-General is also required to establish an electronic database to capture details of all donated gametes and the outcomes achieved. Gametes from a single donor may not be used for more than 12 live births.

Lastly, Notices were issued in terms of the National Health Act to elicit nominations for the National Health Research Ethics Council[21] and National Health Research Committee.[22]

The National Health Act enables the issuing of a wide range of Regulations. Apart from those dealing with the controversial chapter 6 (such as the certificate of need), a glaring omission is the envisaged Regulations on the "development of an essential drugs list and medical and other assistive devices list" (section 90(1)(d)).

Medical Schemes Act

The planned but as yet unannounced amendments to the Medical Schemes Act will be crucial to the next step of implementing NHI. Nonetheless, some progress has been made, with the issuing of final Regulations that serve to clearly demarcate the boundaries between the business of a medical scheme and that of insurance companies.[23,24] The Regulations allow insurers to continue to offer medical expense shortfall policies (so-called 'gap cover') and non-medical expense as a result of hospitalisation policies (so-called 'hospital cash plans'), within prescribed limits. However, after a two-year exemption period, insurers would no longer be allowed to offer primary health care insurance policies, which offered limited benefits. It is expected that these policies will be replaced by the Low-Cost Benefit Options (LCBOs) still being investigated by the Department of Health, and which will remain subject to the strictures of the Medical Schemes Act (131 of 1998). How LCBOs will operate under NHI remains the subject of debate. Critically, the application of the demarcation was again delayed, with the publication of an exemption framework by the Council for Medical Schemes in March 2017.[25] The exemptions are expected to remain in place for up to two years, by which time the LCBOs should be in operation.

In May 2016, The Registrar of Medical Schemes issued draft rules on conduct of elections for medical scheme trustees.[26] In August 2016, the Registrar invited comment on a proposed declaration to enable clear differentiation between the brand names and identity of medical schemes and administrators or other corporate entities.[27]

Though not operating in terms of the Medical Schemes Act, the Competition Commission's Health Market Inquiry will have a major impact on this sector. The terms of reference were amended in December 2016 to further extend the completion date to 15 December 2017.[28] The Panel held public hearings between February and May 2016, and has scheduled a further round in April–June 2017. The initial round dealt specifically with the relationships between stakeholders in the private health market. The Commission continues to publish stakeholder submissions and documents generated by the Inquiry on its website.[a] According to its terms of reference, the Inquiry may recommend new or amended legislation, Regulations and policies, and may make recommendations to regulatory authorities such as the Council for Medical Schemes, Health Professions Council of South Africa and both the national and provincial health departments. Such recommendations will presumably inform the design of amendments to the Medical Schemes Act, in order to advance NHI.

Statutory Health Councils

The range of subordinate legislation issued by various statutory health councils, related to the regulation of specific professions' scopes of practice, registration and qualifications, is extensive. Only those that are of particular interest, or where controversial aspects are regulated, are described below.

Health Professions Council of South Africa

As was noted in the 2016 edition of the *Review*, the 10-year period allowed for the registration of dental assistants expired in 2015.[29] Despite a court challenge, the need for registration was upheld. In July 2016, the Minister of Health, on the recommendation of the Health Professions Council of South Africa (HPCSA), issued a draft regulation for comment which would provide some flexibility.[30] Once issued in final form, dental assistants already in practice will be given four months to apply for registration, and a further two years in which to pass the Board examination. A similarly contested scope of practice for psychologists, initially published in 2011,[31] was declared invalid by the Cape High Court in November 2016.[32] Although the order of invalidity was postponed for 24 months, the professional board concerned and the Council were instructed to consider postponing any disciplinary action for acting outside the prescribed scope until new Regulations were promulgated.

Final Regulations defining the scope of practice of clinical associates were issued in November 2016.[33] As with the Regulations on emergency services issued in terms of the National Health Act, these Regulations underscore the complexity of ensuring consistency between different pieces of legislation. Although the Medicines and Related Substances Act (101 of 1965) allows for the recognition of persons other than medical practitioners and dentists who are registered with the HPCSA as authorised prescribers, the scheduled substances (medicines) to be prescribed by such persons have to be listed for this purpose in the Schedules. Regulation 2(h) states that the scope of practice of clinical associates includes "prescribing medicines for common and important conditions according to the primary health care level Essential Drug List (EDL) and up to

a A full list of all documents received and published by the Inquiry can be found on www.compcom.co.za/healthcare-inquiry

Schedule IV, except in emergencies when appropriate drugs of higher schedules may be prescribed". This is insufficient to meet the needs of section 22A of the Medicines Act. The scope of practice further allows for the counter-signature by a supervising medical practitioner of any prescription for a medicine not on the EDL. Every prescription issued by a clinical associate must reflect the name of a supervising medical practitioner. No enabling provision for such a category of 'dependent prescriber' exists in South African law.

No formal proposals for radical redesign of the HPCSA have been issued, either by the Council or by any other stakeholders. No movement on that score therefore seems likely in the short term.

South African Nursing Council

It is striking that the only gazetted Notices issued in terms of the Nursing Act in 2016 dealt with fees to be paid to the Council (SANC). As was noted in 2016, updated regulations to enable the effective operation of section 56 of the Nursing Act (dealing with the recognition of certain nurses as authorised prescribers) have yet to be issued. Nonetheless, there was some movement in this regard. In May 2016, the Director-General issued a document described as a "Policy for issuing of authorisations to professional nurses to perform functions provided for in terms of section 56(6) of the Nursing Act 33 of 2005".[34] It stated that:

> Nurses who hold such authorisation may only prescribe medicines for adults and children in accordance with the latest version of the Primary Health Care Essential Medicines List and Standard Treatment Guidelines (PHC STG and EML) and associated provincial formulary or code list as approved by the provincial pharmaceutical and therapeutics committee.

Pharmacists and pharmacy support personnel may dispense a prescription issued by a nurse authorised to prescribe medicine in terms of Section 56(6) of the Nursing Act, provided that the nurse has only prescribed medicine which he/she has been authorized to prescribe in terms of the authority issued to him/her. A nurse may, however, not dispense a repeat of a prescription for specialised or hospital level medicines prescribed by a medical practitioner.

One of the key barriers preventing the SANC from creating specialist registers is the absence of suitable qualifications. The policy document listed a number of options that should be taken into account when issuing a section 56(6) permit. These include the following:

- appropriate postgraduate qualification or other suitable course/s accredited by the South African Nursing Council; or
- Adult Primary Care Guide (PC101) (all modules) or Integrated Management of Childhood Illness (IMCI) – for 0 to 5 years or other in-service training approved by the NDoH in consultation with provinces or municipalities.

The policy introduced a new time limit for permits (three years, renewable), which does not appear in the Act or regulations. A database to capture the details of all nurses holding such permits was also envisaged. Updated regulations, to replace those issued in 1984 in terms of the previous Nursing Act (50 of 1978), are urgently needed, not least to enable nurses to have access to Schedule 5 and 6 medicines at primary health care level. The creation of specialist registers and the recognition of formal qualifications for this purpose is also a priority.

South African Pharmacy Council

The propensity of the South African Pharmacy Council (SAPC) to issue important notices, either for implementation or comment, at the very end of the year was upheld in 2016. On 23 December 2016, the SAPC issued updated Good Pharmacy Practice (GPP) rules dealing with community or institutional pharmacies providing pharmaceutical services from a mobile unit, community or institutional pharmacies operating websites, the transportation of thermolabile medicines, and the sale of HIV self-tests.[35] The last of these removed the prohibition on the sale of such tests by pharmacies. Draft GPP rules proving minimum standards for the sale of HIV screening tests were also published for comment.[36] The proposed minimum standard avoids the pitfalls of an overly bureaucratic approach, which might create unnecessary barriers to accessing both the tests and the necessary information about their conduct and interpretation.

The SAPC is in the midst of a complex process of reform of the categories of pharmacy support personnel. As was noted in the 2014/2015 edition of the *Review*, until the Medicines Act and the Regulations to the Pharmacy Act were amended, the Council proposed to register the new cadre of pharmacy technicians as pharmacist's assistants (post-basic).[37] One small step forward was taken in 2016, with the gazetting of a draft qualification for the pharmacy technician, for comment, in the formats required by the Higher Education and Training authorities and the Quality Council for Trades and Occupations.[38,39]

The 2013/2014 edition of the *Review* noted that, despite repeated signals from the SAPC, the Regulations relating to continuing professional development (CPD) for persons registered in terms of the Pharmacy Act had not been gazetted in final form.[40] No reasons for the delay have been advanced by either the Ministry or the Department of Health.

Allied Health Professions Council of South Africa

Apart from routine notices dealing with elections, fees and honoraria, the only significant subordinate legislation emanating from the Allied Health Professions Council of South Africa (AHPCSA) has been a decision on the composition of an inquiring body for disciplinary inquiries.[41]

South African Dental Technicians Council

As noted above, the draft Dental Technology Professions Bill has been gazetted for comment by the South African Dental Technicians Council, but has yet to be tabled in Parliament.[6] The Bill proposes to create a new South African Dental Technology Professions Council, recognise the category of clinical dental technologist and specialist training in the area, and to regulate both the practice/laboratories and the products (artificial teeth, dental and oral prostheses).

Under the existing legislation (Act 19 of 1979), the right to supervise a dental laboratory was restricted to holders of a BTech (Dent Tech) degree, unless the technician was already doing so.[42]

Traditional Health Practitioner Council

As was noted in 2016, draft regulations in terms of the Traditional Health Practitioners Act (22 of 2007) were published for comment in 2015.[43] The comment period was extended to April 2016, but no final regulations have yet been issued.[44] The Department of Health Annual Performance Plan 2016/17–2018/19 notes that a

Traditional Health Practitioners Bill has been drafted for submission to Parliament.[10] The intended effect will be to create a Council to replace the Interim Traditional Health Practitioners Council established in terms of Act 22 of 2007. However, no further details are available.

Medicines and Related Substances Act

The transition from the Medicines Control Council (MCC) to the South African Health Products Regulatory Authority (SAHPRA) will occur once the Medicines and Related Substances Amendment Acts of 2008 and 2015 take effect.[45,46] The transition process is a complex one, involving, among others, the constitution of a new authority in terms of the Public Finance Management Act,[47] the appointment of a Board, and the transfer of existing MCC secretariat staff to the new authority. In order to effect a seamless transition, the Council will continue to perform its current functions, and its decisions, procedures and activities will be deemed to be those of the new authority, until the latter comes into existence. The Board of SAHPRA will be appointed by the Minister, and the authority comes into existence once the Board has its first sitting. The Board, after consultation with the Minister, will appoint a suitably qualified person as the CEO of SAHPRA. The General Regulations for SAHPRA have been drafted, and were published for comment in late January 2017.[48] The expectation is that SAHPRA will be operational on 1 April 2017, although the first meeting of its board may occur some time later. However, as the comment period on the draft regulations is for three months (ending 26 April 2017), it appears that the promulgation of the 2008 and 2015 Amendment Acts is likely to be delayed.

SAHPRA will not only have responsibility for the regulation of medicines, but also for medical devices and *in vitro* diagnostics (IVDs). Medical devices were included within the ambit of the Medicines Act in 1991,[49] and this aspect of the MCC's work has been somewhat controversial, particularly in view of the lack of the relevant regulations being promulgated, which has given rise to litigation and significant court challenges. This deficiency has now been remedied with the issuing of final regulations relating to medical devices and IVDs in December 2016.[50] In particular, regulation 8(6) requires that "(a) medical device or IVD, in respect of which an application for registration is made, must comply with the Essential Principles for Safety and Performance of Medical Devices which include requirements for quality, safety and performance, as determined by the Council". Regulation 11 provides for the classification of medical devices and IVDs according to four categories of risk "where risk relates to the patient, user or to public health".

As intimated earlier, certain manufacturers have argued before the courts that in the absence of the promulgation of the relevant regulations, medical devices were not subject to registration by the MCC. This argument was upheld in two decisions of the Gauteng High Court in 2014 (*Galderma*) and 2015 (*Allergan*).[51,52] In the *Dermalex* judgment in the same division, delivered late in 2016, the Court departed from the decisions in *Galderma* and *Allergan*.[53] The Court was particularly critical of the decision in *Allergan*, stating that "the *Gelderma*[b] judgment is not authority for the proposition that it is for a Court and not the Medicines Control Council to decide whether a substance is a "medicine" or a "medical device"". It held, further, that these two decisions had erred in their interpretation of the decision in *Rath*[54] in the Cape High Court that "a body such as the MCC has no power to classify products either as "medicines" or "medical devices"". It concluded that, while the Court "is the final arbiter in these matters on the ordinary grounds of review of the MCC's decision", it "is not to second-guess the decision of the MCC as regards the correctness of its classification". These two developments – the *Dermalex* judgment and the issuing of final Regulations – will go a long way to ensuring that the MCC and its successor, SAHPRA, will be able to effectively regulate medical devices and IVDs.

Another major area of extension of the remit of the MCC has been in relation to complementary medicines. Draft Regulations were issued for comment in July 2016, which extended the definition of complementary medicines from those associated with particular disciplines regulated by the AHPCSA to include "health supplements".[55] Health supplements are defined as substances that supplement the diet, have a nutritional physiological effect, or include pre- and probiotics, but which are sold in pharmaceutical dosage forms not usually associated with foodstuffs.

In March 2017, the Medicines Control Council issued draft guidance on the "Cultivation of Cannabis and Manufacture of Cannabis-related Pharmaceutical Products for Medicinal and Research Purposes".[56] The licensing of active pharmaceutical ingredient manufacturers, on which the licensing of cannabis cultivators would rely, will require promulgation of the 2015 Amendment Act.

The Medicines Act enables the MCC to declare a substance to be a medicine in terms of category A as described in General Regulation 25(1), and thus subject to registration. In May 2016, the MCC declared any preparation containing ibogaine to be registrable.[57] Ibogaine is a naturally occurring psychoactive substance, originally extracted from plants indigenous to West Africa, which has been claimed to be of use in managing opiate addiction.

South Africa's medicine pricing provisions are enabled by the Medicines Act, even though they do not involve the MCC in any way. The usual procedure each year is for the Pricing Committee to request inputs, and then recommend the annual maximum single exit price (SEP) increase (adjustment), and the dispensing fees for pharmacists and for holders of section 22C(1)(a) dispensing licences, for promulgation by the Minister of Health in the form of regulations. However, in 2016, in recognition of the effect of major currency shifts, the Minister enabled an additional SEP adjustment of up to 2.9%.[58] A number of important medicine pricing interventions remain unimplemented, with draft Regulations not having been issued in final form. These include more careful designation of what constitutes unacceptable incentive schemes, a transparent and enforceable logistics fee, and the staggered application of international benchmarking (external reference pricing). It is unclear why these clearly signalled interventions remain unimplemented. In addition, as the submission of pharmaco-economic analyses remains voluntary, it is unclear how many (if any) have been submitted, or how these submissions have been viewed by the Department of Health. Further to a call for nominations issued in April 2016, a new Pricing Committee was appointed in early 2017.[59]

b The applicant's name (Galderma Laboratories) has been spelt as 'Gelderma' in Court papers.

Foodstuffs, Cosmetics and Disinfectants Act

Among a number of regulations issued in terms of the Foodstuffs, Cosmetics and Disinfectants Act (54 of 1972), dealing with fortification of foodstuffs,[60] fungus-produced toxins,[61] additives in food,[62] maximum levels for metals in foodstuff,[63] and the labelling, advertising and composition of cosmetics,[64] perhaps the draft Regulation that has garnered the most attention is that relating to the reduction of the sodium content of certain foodstuffs.[65] The proposed reductions in a wide range of processed foods would come into effect between June 2016 and June 2019. However, final Regulations have yet to be issued in this regard. An editorial in the *South African Medical Journal* noted that "South Africa is playing a leading role in salt reduction globally".[66] The editorial also noted that, since salt is fortified with iodine, it would be necessary to monitor iodine intakes and perhaps adjust iodine levels in future. However, most importantly, the editorial noted the range of interventions that would be needed to achieve the ultimate health goals of salt reduction, beyond legislation or even compliance with that legislation.

Mental Health Care Act

The Mental Health Care Amendment Act (12 of 2014) was brought into effect by a proclamation notice on 4 June 2016.[67] This is a brief piece of legislation, enabling the Director-General of Health to delegate some, but not all, powers conferred by the principal Act. More importantly, the Minister of Health issued a final set of amended Regulations in terms of the Mental Health Care Act (17 of 2002) in December 2016.[68] A number of the new Regulations would appear to have direct implications for the process of de-institutionalisation that followed the cancellation of the Gauteng Department of Health's contract with Life Esidimeni. Regulation 6, for instance, now reads as follows:

> Within available resources the State must provide subsidies to appropriate nongovernment organisations or volunteer organisations for the provision of community care, treatment and rehabilitation to meet the objectives of the Act.

However, Regulation 43(1) reads:

> Any service which is not a designated psychiatric hospital or care and rehabilitation centre, but which provides residential or day-care facilities for 5 people or more with mental disorders must in terms of the Act –
>
> (a) obtain a licence from the provincial department concerned to operate; and
>
> (b) be subjected to at least an annual audit by designated officials of the provincial department concerned.

Health-related jurisprudence

Apart from the court decisions already listed, the most important health-related judgment was that of the Supreme Court of Appeal (SCA) in *Stransham-Ford*.[69] On 30 April 2015, the Gauteng High Court had granted an order in favour of a terminally-ill patient, Robert Stransham-Ford, allowing him to have a consenting medical practitioner help him end his life either by the administration of a lethal agent or by providing him with same to administer it himself.[70] Further, the Court held that such medical practitioner would not be acting unlawfully and hence would not be liable to criminal prosecution or professional sanction, and that the common-law crimes of murder and culpable homicide, in such circumstances, unjustifiably limited his constitutional rights, were overbroad and in conflict with the provisions of the Bill of Rights relating to human dignity, and freedom to bodily and psychological integrity.

This decision was appealed against by, among others, the Ministers of Health, and of Justice and Correctional Services, and the Health Professions Council of South Africa. In summary, the appeal was based on the following issues, among others: the existence of factual evidence that contradicted facts put forward before the High Court: the Court, in considering whether death by terminal disease infringed one's rights had failed to appropriately balance the rights of dignity and bodily integrity against the unqualified right to life and equality; if the law were to be changed to permit physician-assisted euthanasia (PAE) and physician-assisted suicide (PAS), in the context of the disparities in healthcare (particularly palliative care) availability, poverty and economic pressures could cause families to put pressure on elderly or sick relatives to resort to such measures in order to relieve the financial burden on the family of their continued existence; and provisions relating to euthanasia in permissive foreign jurisdictions were difficult to enforce. On 6 December 2016, the appeal was upheld on the following three grounds: firstly, at the time the order was made, Stransham-Ford had died and, because of the personal nature of the relief sought, the cause of action ceased to exist upon his death. Accordingly, no order should have been made on a cause of action that no longer existed. Secondly, the High Court incorrectly applied the current law and failed to make a distinction between PAE and PAS. The haste with which the Court proceeded to rule on such a controversial area was found to be altogether inappropriate. Thirdly, the order was made on an inadequate factual record, without all the required and relevant information before the Court and without granting reasonable opportunity to interested parties to adduce evidence before the Court. This was underscored by the substantial new information presented to the SCA. The Court held that it was thus inappropriate for the High Court to attempt to reconsider the common law regarding murder and culpable homicide in such circumstances.

While this may not be the final word on this complex and emotionally-charged issue, it is clear that the courts are not willing to pronounce definitively on PAE and PAS, and it remains for the legislature to deal with the unfinished business.

Other legislation with implications for health

A number of other Bills, while not tabled by the Minister of Health, have some relevance for the health sector.

Protection, Promotion, Development and Management of Indigenous Knowledge Systems Bill (6 of 2016)

The purpose of this Bill[71] is to provide for the protection, promotion, development and management of indigenous knowledge systems (IKS). It defines IKS as knowledge which has been developed within, and has been assimilated into, the cultural make-up or essential character of an indigenous community. IKS includes knowledge of a scientific or technical nature, knowledge of natural resources, and indigenous cultural expressions. The Bill aims to recognise indigenous knowledge as 'property' within the meaning of section 25 of the Constitution, and thus as 'prior art' in respect of intellectual

property protection. The Bill establishes the National Indigenous Knowledge Systems Office (NIKSO), which will, *inter alia*, determine the criteria for licences to use indigenous knowledge, promote commercialisation, regulate the equitable distribution of the benefits accruing from such knowledge, register indigenous knowledge, and provide for the accreditation of indigenous knowledge practitioners. Section 11 of the Bill sets out the criteria for determining what falls within the ambit of indigenous knowledge. The intellectual property is deemed to be owned by the indigenous community collectively, which is held in trust by a trustee who may be a natural or juristic person duly delegated to represent that indigenous community; and where the owner of the indigenous property cannot be identified, NIKSO is to act as custodian. While the intent of the Bill to empower the indigenous communities to take ownership of, and benefit from, their indigenous knowledge is laudable, significant problems loom with regard to implementation. Most notable is the breadth and ambiguity of the meanings of key terms like 'indigenous communities', issues of eligibility of trustees, and the problem of identifying discrete indigenous communities. Further, the notion of a trustee appears paternalistic and offensive to the otherwise democratic impulses of the Bill.

Children's Amendment Bills (Bills 13 and 14 of 2015)

Two Children's Amendment Bills have been prepared. The purpose of the first Amendment Bill[72] is to amend the Children's Act (38 of 2005), so as to give effect to recent Court judgments.[73] The Bill seeks to provide better protection to child offenders, which is warranted considering the constitutional imperative that the best interests of the child be paramount. The Children's Second Amendment Bill[74] was necessitated by the declaration of unconstitutionality of certain of the provisions of the principal Act.[75] The Bill extends the definition of adoption social worker, provides for the provincial head of social development to transfer a child or a person from one form of alternative care to another form of alternative care, and provides that an application for a child to remain in alternative care beyond the age of 18 years must be submitted before the end of the year in which the relevant child reaches the age of 18 years.

Red Tape Impact Assessment Bill (13 of 2016)

The Red Tape Impact Assessment Bill is a private member's Bill which seeks to provide for the assessment of regulatory measures developed by the executive, the legislatures and self-regulatory bodies, in order to determine and reduce red tape and the cost of red tape for businesses.[76] The Bill provides for the mapping of proposed regulatory measures and the preparation of a red tape impact statement, as well as for the evaluation of existing regulatory measures. It establishes a Red Tape Impact Assessment Unit whose duties and powers will include the development and provision of general guidelines on conducting red tape impact assessments and on preparing red tape impact statements. If passed, this Bill could impact a wide range of health regulatory bodies, such as the MCC/SAHPRA and the statutory health councils. Significantly, it is focused on red tape which affects business, with no mention of its impact on the general public. Ironically, it may well represent a new form of 'red tape', and thus serve to delay legislation by introducing a new bureaucratic hurdle.

Health-related policy

The National Department of Health's website should be a careful and complete repository of all current national health-related policies, but also the means to engage with stakeholders about the content of proposed policies. It is therefore disturbing that the 'Policies and Guidelines' page shows no documents for 2016. The 'Strategic document' page contains some policy-related documents. Some pointers can also be gleaned from the Annual Performance Plan 2016/17–2018/19[10] and the most recent Annual Report.[77] Apart from the focus on NHI and SAHPRA, the APP 2016/17–2018/19 highlights the role of Operation Phakisa and the Ideal Clinic initiative. One of the strategic policy interventions is described as integrated clinical services management (ICSM), defined as

> a health system strengthening model that builds on the strengths of the HIV programme to deliver integrated care to patients with chronic and/or acute diseases or who came for preventative services by taking a patient-centric view that encompasses the full value chain of continuum of care and support.

Framework and Strategy for Disability and Rehabilitation Services in South Africa (2015–2020)

The foreword notes that this policy document was developed by a Task Team appointed in 2013, and representing a wide range of stakeholders, including disabled people's organisations, academics, professional organisations, provincial representatives, the private sector and other government departments. The primary goal of the strategy is to "integrate comprehensive disability and rehabilitation services within priority health programmes (including Maternal and Child Health, District Health Services, HIV/AIDS, TB, Health Promotion, Nutrition, Tertiary Services, Mental Health and Substance Abuse and Human Resources) from primary to tertiary and specialised health care levels".

Antimicrobial Resistance National Strategy Framework 2014–2024

Although the first meeting of the National Ministerial Advisory Committee (MAC) on Antimicrobial Resistance occurred in December 2016, little concrete evidence exists yet on the implementation of the strategy. In particular, the comprehensive review of the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (36 of 1947) has yet to commence. The proposed imposition of requirements for annual reporting of antimicrobial use by means of both Act 36 of 1947 and the Medicines and Related Substances Act (101 of 1965) has also not been put into effect. There is discussion, nonetheless, about how to improve control of the use of specific high-profile, last-resort antimicrobials used in both animal and human health, such as colistin.

Other clinical policies

Although not shown on the Department of Health's website, at least two extensive clinical guidelines were issued in final form in 2016; the Adherence Guidelines for HIV, TB and NCDs (February 2016) and the HIV Testing Services Policy (2016). Both guidelines emphasised the wide stakeholder engagement and consultation that had taken place.

National Policy Framework and Strategy on Palliative Care (2017–2022)

Although not mentioned in the APP or the Annual Report, nor reflected on the NDoH web site, the work of the Steering Committee on Palliative Care is worth mentioning. Unusually, the chair of the Steering Committee is a provincial MEC for Health (Dr Sibongiseni Dhlomo, from KwaZulu-Natal). The proposed policy has three broad goals, at least in draft form:

- Goal 1. To strengthen systems across all levels of the health service, from the tertiary level to the patient in the home, in order to deliver equitable, integrated palliative care services
- Goal 2. Ensure adequate numbers of appropriately qualified healthcare providers to deliver palliative care at all levels of the health service
- Goal 3. To strengthen governance and leadership to support implementation of the policy.

One of the objectives is to provide equitable and sustained access to appropriate medications and related consumables, so as to deliver palliative care. To this end, a Drug Availability Task Team has been established, with representation from the National Essential Medicines List Committee. This is an attempt to ensure co-ordination between the policy drafting process and the structure responsible for medicines selection, thus avoiding conflict between the palliative care guideline and the standard treatment guidelines.

Other policies with an impact on the health sector

The Department of Trade and Industry (DTI) published the Intellectual Property Consultative Framework for comment in July 2016.[78] The Framework identifies the intersection between intellectual property and public health as a priority area that requires immediate domestic review. As with previous iterations of the policy, the framework has both positive and negative features. Among the former is the acceptance of: a substantive search and examination model for the consideration of pharmaceutical patent applications, to counter the excessive degree of patenting permitted under the current depository system, which has resulted in the approval of a large number of undeserving 'evergreening' patents which delay the entry of generic competitors and hence, access to affordable medicines. There is also provision for stricter patenting standards, a streamlined administrative process for considering applications for compulsory licences (as opposed to the expensive, cumbersome judicial process relied upon at present) and more effective use of competition regulation to counteract the incidence of pricing monopolies. On the negative side, the framework fails to adequately reference the human rights paradigm in its approach to policy-making, include the full panoply of flexibilities (exemptions, exceptions and country-specific options) to enhance access to quality-assured, affordable medicines as permitted under international law, and clearly commit to strict guidelines and time-frames for the finalisation of the policy and its progression to the relevant implementing legislation.[79] The DTI has received many submissions from a variety of stakeholders (civil society, academics, industry), which are in the process of being reviewed.

Conclusion

Health legislation is an important enabler of the implementation of health policy, as a necessary if not always sufficient component. Since 1995, when the first edition of the *Review* appeared, South Africa has been engaged in a constant process of public health law reform. Despite significant gains, some legislative processes remain stalled. Examples include the certificate of need provided for in the National Health Act, the introduction of compulsory continuing professional development for pharmacists, the recognition of specialist nurses as prescribers, and the introduction of international benchmarking for medicine prices. Ensuring coherence between multiple legal instruments is always challenging. The process of introducing NHI remains contested, with the legislative component still poorly developed. The ability of the OHSC to issue and enforce compliance notices has yet to be tested. On a more positive note, progress towards the creation of SAHPRA, to replace the MCC, is evident. A recent Court judgment has also clarified the role of the medicines regulatory authority. Effective regulation of medical devices can now start, with a risk-based approach used to identify priority targets. The ability of the Department of Health to engage in meaningful stakeholder engagement has been demonstrated in the process of development of individual policy documents, but would be strengthened by a more complete and well-maintained website. In short, 2016 was very much like the curate's egg – good in parts.

References

1 Harrison S. Legislative reform. In: Harrison D, Nielsen M. editors. South African Health Review 1997. Durban: Health Systems Trust; 1997.
URL: http://www.hst.org.za/sites/default/files/sahr95.pdf

2 World Health Organization. Advancing the right to health: the vital role of law. Geneva: World Health Organization; 2017.
URL: http://apps.who.int/iris/bitstream/10665/252815/1/9789241511384-eng.pdf?ua=1

3 Republic of South Africa. Medicines and Related Substances Amendment Act (14 of 2015).
URL: http://www.gov.za/sites/www.gov.za/files/39585_Act14of2015MedicinesRelatedSub.pdf

4 Minister of Health. National Health Laboratory Service Amendment Bill. Government Notice No. 1093, Government Gazette No. 39392, 11 November 2015.
URL: http://www.gov.za/sites/www.gov.za/files/39392_gon1093.pdf

5 Minister of Health. National Public Health Institute of South Africa Bill. Government Notice No. 1092, Government Gazette No. 39392, 11 November 2015.
URL: http://www.gov.za/sites/www.gov.za/files/39392_gon1092.pdf

6 South African Dental Technicians Council. Draft Dental Technology Professions Bill. Board Notice 864 of 2016, Government Gazette No. 40480, 9 December 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40480_gen864.pdf

7 Mr M G R Oriani-Ambrosini (IFP). Medical Innovation Bill (PMB1–2014).
URL: http://pmg-assets.s3-website-eu-west-1.amazonaws.com/pmb1-2014.pdf

8 Medicines Control Council. Medicines Control Council clarifies access to cannabis for the treatment of medical conditions. 25 November 2016.
URL: http://www.mccza.com/documents/5933cac110.14_Media_Release_Cannabis_Nov16_v1.pdf

9 Minister of Health. White Paper on National Health Insurance. Government Notice No. 1230, Government Gazette No. 39506, 11 December 2015.
URL: http://www.gov.za/sites/www.gov.za/files/39506_gon1230.pdf

10 Department of Health. Annual Performance Plan 2016/17 –2018/19.
URL: http://www.health.gov.za/index.php/2014-03-17-09-09-38/strategic-documents/category/266-2016-str?download=1234:app-inside-2016-8-march-2016-lowres

11 Minister of Finance. Budget Speech 2017, 22 February 2017.
URL: http://www.gov.za/SPEECHES/MINISTER-PRAVIN-GORDHAN-2017-BUDGET-SPEECH-22-FEB-2017-0000

12 Minister of Health. Procedural regulations pertaining to the functioning of the Office of Health Standards Compliance and handling of complaints by the Ombud. Government Notice No. 1365, Government Gazette No. 40396, 2 November 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40396_gon1365.pdf

13 Health Ombud. No guns: 94+ silent deaths and still counting. The report into the 'circumstances surrounding the deaths of mentally ill patients: Gauteng Province'. Final Report. 1 February 2017.
URL: http://www.ohsc.org.za/images/documents/FINALREPORT.pdf

14 Health Ombud. No guns: 94+ silent deaths and still counting. The report into the 'circumstances surrounding the deaths of mentally ill patients: Gauteng Province'. Annexures. 1 February 2017
URL: http://www.ohsc.org.za/images/documents/FINALANNEXURES.pdf

15 Kahn T. Tribunal to hear appeals against report on patients removed from Life Esidimeni hospital. Business Day, 14 March 2017.
URL: http://www.businesslive.co.za/bd/national/health/2017-03-14-tribunal-to-hear-appeals-against-life-esidimeni-deaths-report/

16 Minister of Health. Norms and standards regulations applicable to different categories of health establishments. Government Notice No. 10, Government Gazette No. 40539, 4 January 2017.
URL: http://www.gov.za/sites/www.gov.za/files/40539_gon10.pdf

17 Minister of Health. Call for nominations of suitable candidates to serve as members on the Board of the Office of Health Standards Compliance. Government Notice No. 774, Government Gazette No. 40106, 30 June 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40106_gon774.pdf

18 Minister of Health. Regulations regarding the general control of human bodies, tissue, blood, blood products and gametes: amendment. Government Notice No. 515, Government Gazette No. 39982, 11 May 2016.
URL: http://www.gov.za/sites/www.gov.za/files/39982_gon515.pdf

19 Minister of Health. Emergency medical services regulations. Government Notice No. 830, Government Gazette No. 40140, 15 July 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40140_gon830.pdf

20 Minister of Health. Regulations relating to artificial fertilisation of persons. Government Notice No. 1165, Government Gazette No. 40312. 30 September 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40312_gon1165.pdf

21 National Health Act: National Health Research Ethics Council members: Applications invited. 05 August 2016.
URL: http://www.gov.za/sites/www.gov.za/files/NHREC%20Members.pdf

22 National Health Act: National Health Research Committee members: Applications invited. 18 Nov 2016
URL: http://www.gov.za/sites/www.gov.za/files/NHRC%20MEMBERS.pdf

23 Minister of Finance. Long-term Insurance Act: Amendment of regulations made under section 72. Government Gazette No. 40515, 23 December 2016.
URL: http://www.treasury.gov.za/legislation/regulations/FinalDemarc2016/GG_LT%20Demarcation%20Regs.pdf

24 Minister of Finance. Short-term Insurance Act: Amendment of regulations made under section 70. Government Gazette No. 40515, 23 December 2016.
URL: http://www.treasury.gov.za/legislation/regulations/FinalDemarc2016/GG_ST%20Demarcation%20Regs.pdf

25 Kahn T. Health insurers get temporary reprieve from demarcation regulations. Business Day, 17 March 2017.
URL: https://www.businesslive.co.za/bd/national/health/2017-03-17-health-insurers-get-temporary-reprieve-from-demarcation-regulations/

26 Registrar of Medical Schemes. Declaration of certain electoral and voting practices for appointment of trustees of medical schemes irregular or undesirable practices. General Notice No. 305 of 2016, Government Gazette No. 40022, 27 May 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40022_gen305.pdf

27 Registrar of Medical Schemes. Declaration of certain brand-sharing practices between medical schemes and their administrators as irregular or undesirable practices in terms of Financial Institutions (Protection of Funds) Act. Government Notice No. 917, Government Gazette No. 40209, 15 August 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40209_gon917.pdf

28 Competition Commission South Africa. Amended terms of reference for market inquiry: private healthcare sector. Government Notice No. 1514, Government Gazette No. 40480, 9 December 2016.
URL: http://www.compcom.co.za/wp-content/uploads/2014/09/Government-Gazette-Amended-Terms-of-Reference-HMI-91216.pdf

29 Gray A, Vawda Y. Health policy and legislation. In: Padarath A, King J, Mackie E, Casciola J (eds). South African Health Review 2016. Durban: Health Systems Trust; 2016.
URL: http://www.hst.org.za/sites/default/files/Health_Policy_Legislation_0.pdf

30 Minister of Health. Regulations relating to the qualifications for registration of dental assistants: amendment. Government Notice No. 850, Government Gazette No. 40154, 22 July 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40154_gon850.pdf

31 Minister of Health. Scope of the profession of psychology. Government Notice No. R. 704, Government Gazette No. 34581, 2 September 2011.
URL: http://www.gov.za/sites/www.gov.za/files/34581_rg9582_gon704.pdf

32 The Recognition of Life Long Learning in Psychology Action Group and another v Prof T Sodi N.O. and others. Case No. 12420/13. High Court of South Africa Western Cape Division, 14 November 2016.

33 Minister of Health. Regulations defining the scope of practice of clinical associates. Government Notice No. 1390, Government Gazette No. 40414, 11 November 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40414_gon1390.pdf

34 Director-General of Health. Policy for issuing of authorisations to professional nurses to perform functions provided for in terms of section 56(6) of the Nursing Act 33 of 2005. 4 May 2016.

35 South African Pharmacy Council. Rules relating to Good Pharmacy Practice. Board Notice 193 of 2016, Government Gazette No. 40522, 23 December 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40522_bn193.pdf

36 South African Pharmacy Council. Rules relating to Good Pharmacy Practice. Board Notice 194 of 2016, Government Gazette No. 40522, 23 December 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40522_bn194.pdf

37 Gray A, Vawda Y. Health policy and legislation. In: Padarath A, King J, English R (eds). South African Health Review 2014/2015. Durban: Health Systems Trust; 2015.
URL: http://www.hst.org.za/sites/default/files/1_Health_Policy_Legislation.pdf

38 South African Pharmacy Council. Qualification for pharmacy support personnel: diploma: pharmacy technician. Board Notice 196 of 2016, Government Gazette No. 40522, 23 December 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40522_bn196.pdf

39 South African Pharmacy Council. Qualification for pharmacy support personnel: occupational certificate: pharmacy technician. Board Notice 198 of 2016, Government Gazette No. 40522, 23 December 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40522_bn198.pdf

40 Gray A, Vawda Y. Health policy and legislation. In: Padarath A, English R (eds). South African Health Review 2013/2014. Durban: Health Systems Trust; 2014.
URL: http://www.hst.org.za/sites/default/files/Health_Policy_Legislation.pdf

41 Allied Health Professions Council of South Africa. Composition of inquiring body for a disciplinary inquiry into unprofessional conduct. Board Notice 42 of 2016, Government Gazette No. 39912, 8 April 2016.
URL: http://www.gov.za/sites/www.gov.za/files/39912_bn42.pdf

42 Minister of Health. Notice relating to the supervision of registered dental laboratories. Government Notice No. 71, Government Gazette No. 39632, 29 January 2016.
URL: http://www.gov.za/sites/www.gov.za/files/39632_gon71.pdf

43 Minister of Health. Traditional Health Practitioners Act: Regulations. Government Notice No. 1052, Government Gazette No. 39358, 3 November 2015.
URL: http://www.gov.za/sites/www.gov.za/files/39358_gon1052.pdf

44 Minister of Health. Extension of comment period for the Traditional Health Practitioner Regulations 2015. Government Notice No. 171, Government Gazette No. 39685, 12 February 2016.
URL: http://www.gov.za/sites/www.gov.za/files/39685_gon171.pd

45 Republic of South Africa. Medicines and Related Substances Amendment Act (72 of 2008).
URL: http://www.gov.za/sites/www.gov.za/files/32148_434.pdf

46 Republic of South Africa. Medicines and Related Substances Amendment Act (14 of 2015).
URL: http://www.gov.za/sites/www.gov.za/files/39585_Act14of2015MedicinesRelatedSub.pdf

47 Republic of South Africa. Public Finance Management Act (Act 1 of 1999).
URL: http://www.treasury.gov.za/legislation/pfma/act.pdf

48 Minister of Health. Draft General Medicines Regulations. Government Notice No. 50, Government Gazette No. 40577, 27 January 2017.
URL: http://www.gov.za/sites/www.gov.za/files/40577_gon50.pdf

49 Republic of South Africa. Medicines and Related Substances Control Amendment Act (94 of 1991).
URL: http://www.gov.za/sites/www.gov.za/files/Act%2094%20of%201991.pdf

50 Minister of Health. Regulations relating to medical devices and in vitro diagnostic medical device (IVDs). Government Notice No. 1515, Government Gazette No. 40480, 9 December 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40480_gon1515.pdf

51 Gelderma Laboratories SA (Pty) Ltd v Medicines Control Council and Others (54281/2013) [2014] ZAGPPHC 360.

52 Allergan Pharmaceuticals (Pty) Ltd v Medicines Control Council and Others [2015] 3 All SA 173 (GP).

53 Omega Labs (Pty) Ltd (Dermalex) v MCC and others (32570/2015) – unreported.

54 Treatment Action Campaign and Another v Rath and Others [2008] 4 All SA 380 (C).

55 Minister of Health. General regulations made in terms of the Medicines and Related Substances Act, 1965 (101 of 1965): amendment. Government Notice No. 858, Government Gazette No. 40158, 25 July 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40158_gon858.pdf

56 Medicines Control Council. Cultivation of Cannabis and Manufacture of Cannabis-related Pharmaceutical Products for Medicinal and Research Purposes. Draft guideline, 7 March 2017.
URL: http://www.mccza.com/Publications/DownloadDoc/5500

57 Registrar of Medicines. Medicines and Related Substances Act: Registration: Preparations containing ibogaine, either as such or in combination with any other pharmacologically active ingredient(s). Government Notice No. 502, Government Gazette No. 39970, 5 May 2016.
URL: http://www.gov.za/sites/www.gov.za/files/39970_gon502.pdf

58 Minister of Health. Interim adjustment of single exit price of medicines and scheduled substances (SEPA) for 2016. Government Notice No. 893, Government Gazette No. 40188, 5 August 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40188_gon893.pdf

59 Director-General of Health. Recruitment of potential candidates to serve as members of the Ministerial Recommendatory Committee (The Pricing Committee). Closing date 29 April 2016.
URL: http://www.health.gov.za/index.php/single-exit-price-documents?download=1165:pc-member-recruitment-advert

60 Minister of Health, Regulations relating to the fortification of certain foodstuffs. Government Notice No. 217, Government Gazette No. 39776, 3 March 2016.
URL: http://www.gov.za/sites/www.gov.za/files/39776_gon217.pdf

61 Minister of Health. Regulations governing tolerances for fungus-produced toxins in foodstuffs. Government Notice No. 987, Government Gazette No. 40250, 5 September 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40250_gon987.pdf

62 Minister of Health. Regulations: Regulations relating to miscellaneous additives in foodstuffs. Government Notice No. 1425, Government Gazette No. 40432, 17 November 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40432_gon1425.pdf

63 Minister of Health. Regulations relating to the maximum levels of metals in foodstuffs. Government Notice No. 990, Government Gazette No. 40252, 6 September 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40252_gon990s.pdf

64 Minister of Health. Regulations relating to the labelling, advertising and composition of cosmetics. Government Notice No. 921, Government Gazette No. 40216, 19 August 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40216_gon921.pdf

65 Minister of Health. Regulations relating to the reduction of sodium in certain foodstuffs and related matters: amendment. Government Notice No. 989, Government Gazette No 4025, 6 September 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40252_gon989s.pdf

66 Webster J, Crickmore C, Charlton K, Steyn K, Wentzel-Viljoen E, Naidoo P. South Africa's salt reduction strategy: are we on track and what lies ahead? S Afr Med J 2017: 107(1): 20–21.

67 President of the Republic of South Africa. Commencement of the Mental Health Care Amendment Act, 2014 (12 of 2014). Proclamation No. 37 of 2016, Government Gazette No. 40107, 30 June 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40107_pro37s.pdf

68 Minister of Health. Mental Health Care Act: General Regulations: Amendment. Government Notice No. 1590, Government Gazette No. 40515, 23 December 2016.
URL: http://www.gov.za/sites/www.gov.za/files/40515_gon1590.pdf

69 Minister of Justice and Correctional Services & others v Estate Late Stransham-Ford, Robert James (531/2015).
URL: http://www.justice.gov.za/sca/judgments/sca_2016/sca2016-197.pdf

70 Stransham-Ford v Minister of Justice And Correctional Services and Others [2015] 3 All SA 109 (GP).
URL: http://www.saflii.org/za/cases/ZAGPPHC/2015/230.html

71 Minister of Science and Technology. Protection, Promotion, Development and Management of Indigenous Knowledge Systems Bill (6 of 2016).
URL: http://www.parliament.gov.za/live/commonrepository/Processed/20160415/615036_1.pdf

72 Minister of Social Development. Children's Amendment Bill (13B of 2015).
URL: http://www.gov.za/sites/www.gov.za/files/b13B-2015_160420.pdf

73 J v National Director of Public Prosecutions and Another [2014] ZACC 13; C and Others v Department of Health and Social Development, Gauteng and Others 2012 (2) SA 208 (CC); Nono Cynthia Manana and Others v The Presiding Officer of the Children's Court: District of Krugersdorp and Others (A3075/2011) [2013] ZA GPJHC 64.

74 Minister of Social Development. Children's Second Amendment Bill (B14B of 2015).
URL: http://www.gov.za/sites/www.gov.za/files/b14B-2015_160420.pdf

75 C and Others v Department of Health and Social Development, Gauteng and Others 2012 (2) SA 208 (CC).

76 Mr HCC Krüger MP. Red Tape Impact Assessment Bill (13 of 2016).
URL: http://www.gov.za/sites/www.gov.za/files/b_13_2016_red_tape_impact_assessment_18Oct2016.pdf

77 Department of Health. Annual Report 2015–2016.
URL: http://www.health.gov.za/index.php/2014-08-15-12-56-31?download=1770:annual-report-2016-reduced-size

78 Department of Trade and Industry. Intellectual Property Consultative Framework.
URL: http://www.thedti.gov.za/news2016/IPConsultativeFramework.pdf

79 Vawda Y, Baker B et al. Submission by academics, experts, scholars and pro-access advocates, 30 September 2016. URL: http://www.fixthepatentlaws.org/wp-content/uploads/2016/10/Academics-etc-Submission-on-IP-Consultative-Framework-Final-30-Sept-2016-yv.pdf

Health spending at a time of low economic growth and fiscal constraint

3

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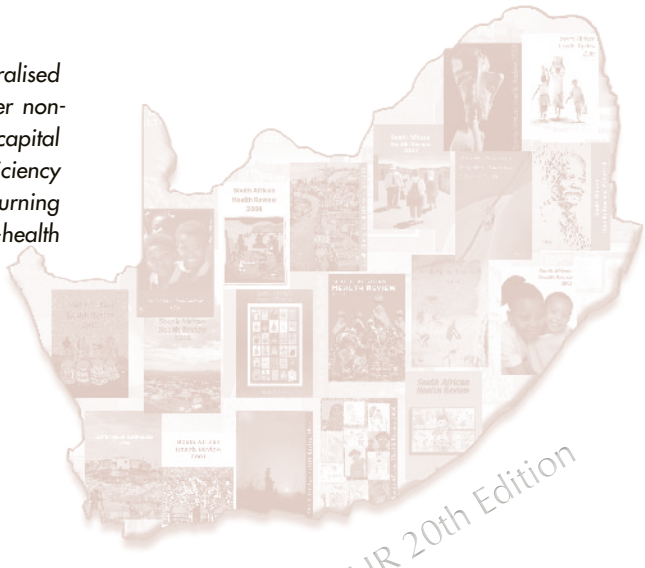
This chapter reviews public-health spending in South Africa over a 20-year period starting shortly after the dawn of democracy in 1994. Particular emphasis is placed on spending changes following the global economic recession in 2008, which has slowed the upward spending trajectory re-established since 2000. In South Africa, the slowdown in health spending following the global recession was delayed as government followed a counter-cyclical fiscal stance, protecting social-sector spending levels. However, by 2012/13, economic growth and tax revenue collected again slowed and the national deficit had risen to a troubling extent (5% of GDP on the main budget) contributing to growth in health budgets slowing considerably from 2012/13 to 2019/20.

This chapter describes health-expenditure trends in the context of a decade of low national economic growth and rising input costs. Government-expenditure data are used. The chapter reviews some of the ways the health sector has responded to a funding slowdown, both planned and unplanned, and it argues that a better-planned approach to efficiencies and budget constraints might lead to better outcomes. Managing limited budgets under cost pressures while achieving efficiencies and service restructuring is a significant challenge for health service managers. This is contextualised within wider debates on the effects of austerity on health systems and outcomes from experience in other countries.

Strategies adopted by the health sector include limiting personnel numbers, centralised tendering for medicines, prioritising 'non-negotiable' core budget items over non-essential items, prioritising primary health care, and temporarily reducing capital infrastructure spending. The chapter emphasises both the need to seek efficiency solutions and the role that National Health Insurance can potentially play in turning around a seven-year period (from 2012/13 to 2019/20) of reduced public-health spending.

Managing limited budgets under cost pressures while achieving efficiencies and service restructuring is a significant challenge for health service managers. This is contextualised within wider debates on the effects of austerity on health systems and outcomes from experience in other countries.



SAHR 20th Edition

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Introduction

Global economic recession of 2008

The 2008 global recession started as a mortgage loan and banking crisis but soon escalated into a large-scale economic recession. A range of cost-containment mechanisms was followed by countries where deficit and debt levels had risen substantially; this was done in order to stabilise public finances, with average fiscal consolidation of 5.5% of gross domestic product (GDP) in Organisation for Economic Co-operation and Development (OECD) countries by 2012.[1] The recession rapidly evolved as slow growth, revenue shortfalls and serious fiscal challenges emerged in many countries. While many countries initially followed counter-cyclical fiscal policies in trying to sustain social-sector expenditure, at some point many OECD countries were forced to implement strategies to control or reduce spending.

The global economic downturn has had a huge impact on health budgets across the world. Negative or slow economic growth has resulted in revenue shortfalls, and governments had to rely partially on loans to cover sustained expenditure. Countries such as Greece and Ireland are widely cited as having cut their health budgets significantly.[2] Other OECD countries, including the UK, Iceland, Portugal and Spain, also saw negative growth in their health budgets between 2009 and 2011.[3]

South Africa has also experienced a period of economic slowdown, causing considerable fiscal constraint. After 2008, the South African government sustained high levels of expenditure despite revenue shortfalls in order to cushion the economy. However, as economic growth did not recover as fast as previously anticipated, government introduced cost-containment and reprioritisation measures from 2011/12 and reduced the public-expenditure growth rate. At the same time, in 2011/12, the Green Paper on National Health Insurance (NHI)[4] was released with the goal of creating a more integrated health system for universal health care. It is envisaged that this will ensure greater access and quality of care for all South Africans, and a significant upward trajectory for health expenditure.

While total public-health spending grew by 8.2% per year in real terms between 2007/8 and 2011/12, this growth has slowed down significantly and is estimated at 1.8% between 2012/13 and 2019/20.[a] This chapter looks at the growth of public sector health expenditure since 2008/9 and budgets up to 2019/20 in the context of a constrained fiscal climate.

This chapter aims to:

- study how health allocations and expenditure have been constrained in the post-2008 period;
- document through relevant provincial spending data how provinces have restructured, saved and reprioritised their budgets and highlight areas where this has been done successfully and areas that have impacted service delivery; and
- explore strategies that are being implemented to achieve technical efficiencies in the health sector.

a Authors' calculations based on expenditure data from the National and Provincial Departments of Health, Department of Defence, Department of Correctional Services, Road Accident Fund and Workmen's Compensation Fund.

Methodology

Public sector health expenditure and budget-allocation trends are reviewed in the context of national fiscal and macro-economic indicators. These data are collected routinely by the National Treasury as part of its oversight of provincial budgeting, and include the latest budgets gazetted by provincial governments (2017/18–2019/20), audited annual reports for historical expenditure, and in-year adjusted budgets for all nine provinces. Provincial health budgets are analysed to determine how the sector has responded to the low growth environment in terms of budgeting and prioritisation of core programmes, sub-programmes and economic classification items, vis-à-vis administration and non-core items. Attention is given to personnel numbers and expenditure and the 'non-negotiable'[b] budget areas announced by the Minister of Health. A few selected lower-priority non-essential items, such as entertainment, travel and subsistence, and consultants are also reviewed to determine the extent to which cost-containment and reprioritisation measures have generated savings. The chapter also discusses other reforms aiming to achieve greater technical efficiency and value for money, such as centralised medicines procurement and a new chronic medicines dispensation model. The time period studied is from 1995/96 to 2019/20, but with a particular emphasis on spending from 2008/09 onward. In cases where prices have been adjusted for inflation, these are presented in terms of 2015/16 prices and indicated as real.

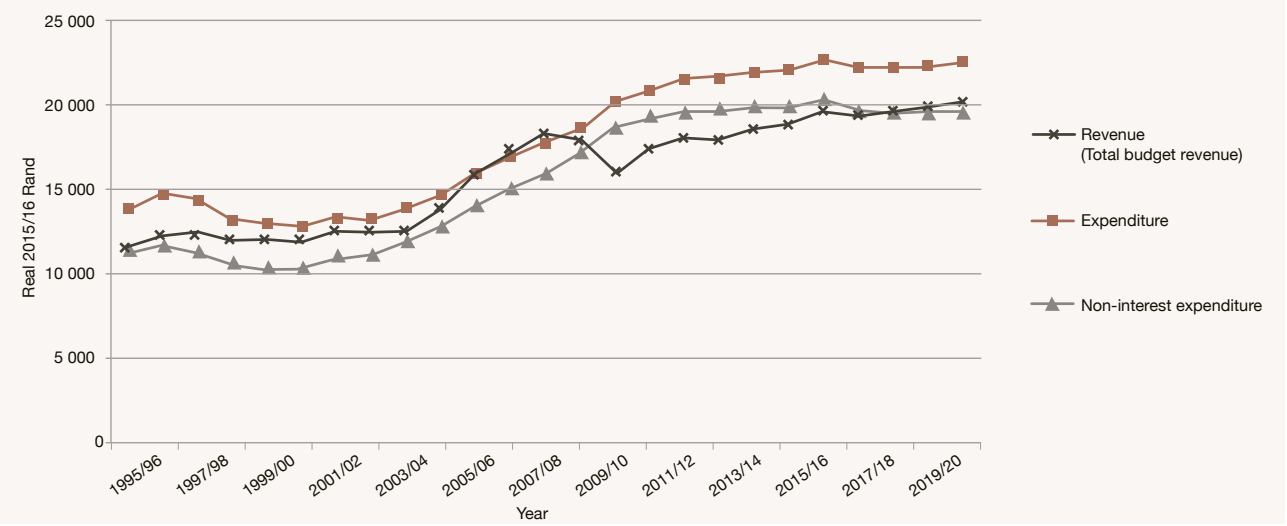
Key findings

Macro-economy and fiscal policy: how public spending was protected from full effects of the 2008 global recession until 2012/13

The effects of the 2008 global recession on the South African health sector were delayed until around 2012/13, largely because of the counter-cyclical fiscal policy adopted by government to protect social spending and stimulate economic growth. Figure 1 shows that soon after the start of the 2008 global recession, total government revenue per capita dropped markedly in 2008/09 and 2009/10. However, government spending as a whole continued to rise at the same pace as before, until approximately 2012/13, when total non-interest expenditure per capita began to be constrained as government believed it had reached the limits of sensible deficit and borrowing. Government used this counter-cyclical policy both to protect social services through the period of global recession, but also because maintaining spending stability in the face of economic swings was considered to be a sensible policy objective to re-ignite economic growth. However, the economy did not respond as strongly as hoped and did not recover substantially. Instead, economic growth recovered to positive levels but has remained low for close to a decade. As projected in the recent Medium-term Budget Policy Statement (MTBPS),[5] total national revenue for

b Non-negotiables include: (a) Infection Control and Cleaning, (b) Medical Supplies including Dry Dispensary, (c) Medicines, (d) Medical Waste, (e) Laboratory Services: National Health Laboratory Services (NHLS), (f) Blood Supply and Services: South African National Blood Services (SANBS) or Western Province Blood Transfusion Services (WPBTS), (g) Food Services and Relevant Supplies, (h) Security Services, (i) Laundry Services, (j) Essential Equipment and Maintenance of Equipment, (k) Infrastructure Maintenance, (l) Children's Vaccines, (m) HIV and AIDS, (n) TB, (o) Children's Health Services (including Neonatal and Perinatal Care), (p) Maternal and Reproductive Health Services, (q) Pilot Districts Full Complement (of teams), (r) District Specialist Teams (s) Registrars, and (t) Public Hospital Norms and Standards.

Figure 1: Total government revenue and spending per capita, South Africa, 1995/96–2019/20



Source: Compiled by authors based on Budget Review series for 2006/07–2017/18[6] and the MTBPS 2016.[5]

Table 1: Public-sector health expenditure (Rand million) trend, South Africa, 1995/96–2019/20

Year	Nominal	Real (2015/16 prices)	Change real	Change % real
95/96	18 724	68 086		
96/97	23 709	79 738	11 651	17.1
97/98	25 672	80 065	327	0.4
98/99	26 497	73 609	-6 456	-8.1
99/00	27 652	71 860	-1 749	-2.4
00/01	30 170	72 731	871	1.2
01/02	33 775	76 380	3 649	5.0
02/03	38 165	78 580	2 200	2.9
03/04	42 961	83 843	5 263	6.7
04/05	46 025	86 286	2 443	2.9
05/06	52 674	95 419	9 133	10.6
06/07	60 100	103 476	8 057	8.4
07/08	69 550	110 747	7 271	7.0
08/09	82 657	119 762	9 015	8.1
09/10	97 294	132 366	12 605	10.5
10/11	107 803	141 294	8 928	6.7
11/12	123 566	153 366	12 071	8.5
12/13	134 043	157 547	4 181	2.7
13/14	143 383	159 286	1 740	1.1
14/15	155 643	163 736	4 450	2.8
15/16	171 313	171 313	7 576	4.6
16/17	184 217	173 136	1 824	1.1
17/18	196 812	174 504	1 367	0.8
18/19	208 255	174 362	-142	-0.1
19/20	222 762	176 450	2 089	1.2

Source: Authors' calculations using National Treasury budget and expenditure data.[c]

2019/20 has only grown by 0.7% per year in real[d] per capita terms since 2007/08. The health sector was protected for the first three years (2008/09–2011/12) but has been going through a 'lean period' for four years (2012/13–2016/17), with the tabled provincial budgets for 2017/18 suggesting that this will continue until 2019/20.

Total public-health expenditure

In nominal terms, public-health spending has increased from R18.7 billion in 1995/6 to over R220 billion in 2019/20 (Table 1), which in real 2015/16 terms is an increase from R68.0 million to R176.5 million. Despite the sharp revenue drop in 2009/10 shown in Figure 1, health-spending growth was sustained at between 8.5% and 10.5% per year in real terms for three years until 2012/13, when expenditure growth dropped to annual average real growth of R2.9 billion or 1.8% between 2012/13 and 2019/20.

The uninsured population (ie. population without medical aid) has also grown substantially over time. Between 2008 and 2016, the uninsured population grew at an average rate of 1.52% per year,[e] eroding the per capita real trend. Adjusting for population growth, real per capita (uninsured) public-health expenditure has levelled off since 2012/13, and according to some measures it is decreasing (Figure 2).

In the decade from 2002/03 to 2012/13, health expenditure doubled in real terms. Some of the key areas that drove spending increases included:

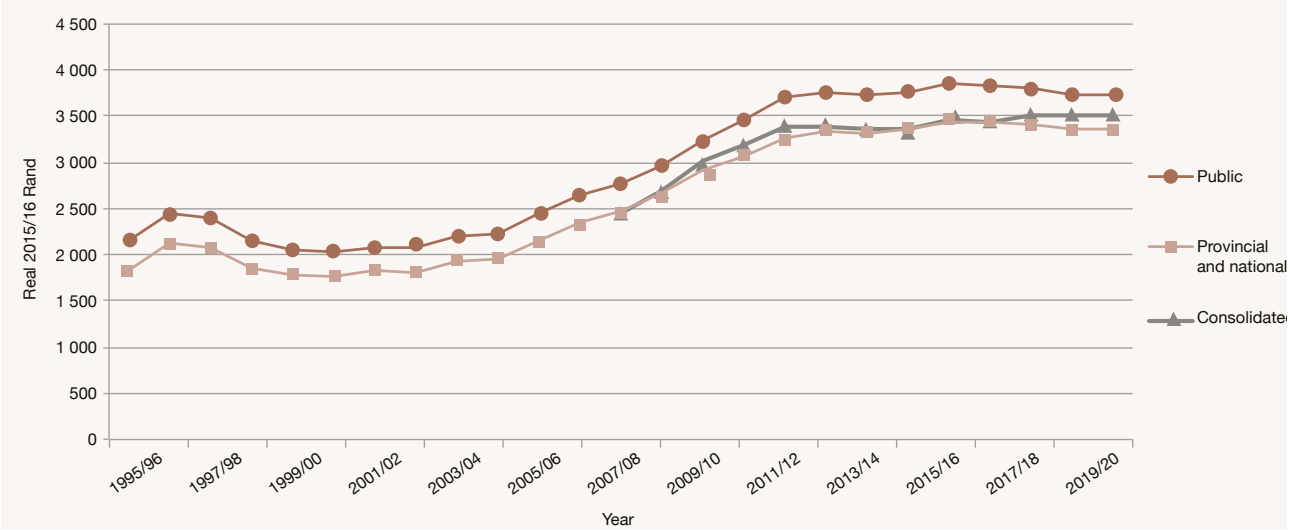
- Rollout of government's HIV and AIDS programme. The HIV conditional grant budget more than doubled in nominal terms from R9.2 billion in 2012/13 to R22 billion in 2019/20.[7]

c Authors' calculations. This table is based on the wider definition of public-health spending, which includes several departments and public entities (refer to footnote a). Using the consolidated definition, growth over the Medium-term Expenditure Framework (MTEF) is somewhat higher, averaging 1.6% per annum as unallocated provincial surpluses are allocated out (refer to footnote f).

d That is adjusting for inflation and converting all prices to 2015/16 values.

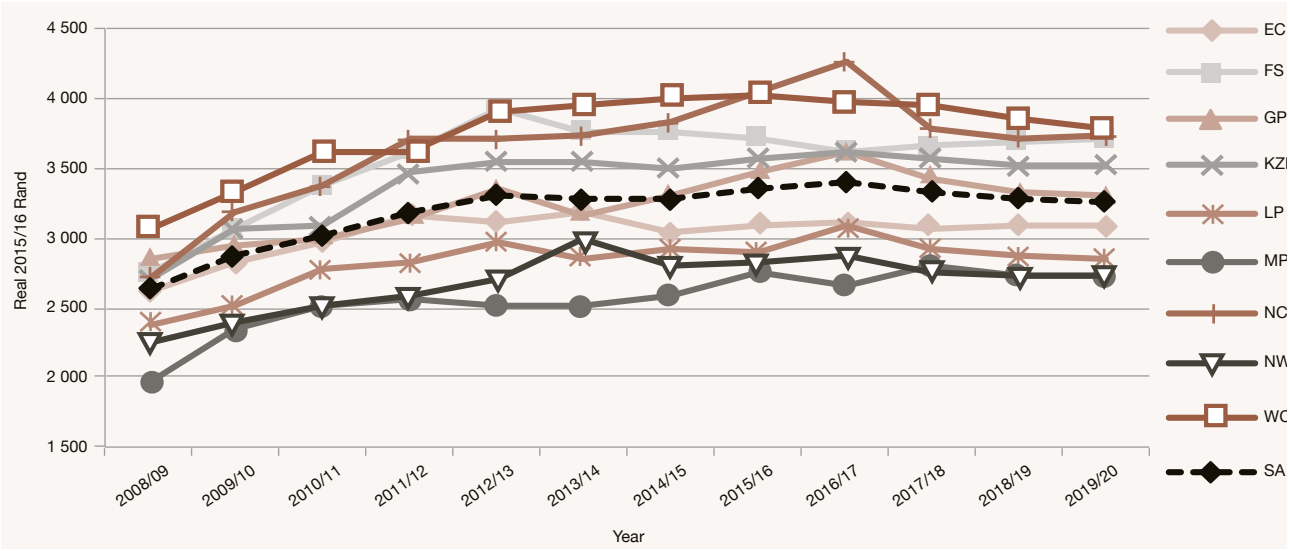
e Statistics South Africa (Stats SA) mid-year population estimates less estimates of medical scheme beneficiaries from Stats SA General Household Surveys and Council for Medical Schemes.

Figure 2: Real per capita (uninsured) public-health expenditure, South Africa (2015/16 prices)



Source: Authors' calculations using National Treasury data.[f]

Figure 3: Total provincial health expenditure per capita, 2008/09–2019/20 (real 2015/16 Rand)



Source: Authors' calculations based on Estimates of Provincial Revenue and Expenditure.[11,g]

f *Public:* A wider definition that includes other Departments (Defence, Correctional Services etc.) and funds (Road Accident Fund and Workmen's Compensation).
National and provincial Departments of Health: The narrowest definition, which only includes published budget information from national and provincial departments of health.
Consolidated: Intermediate definition published in Budget Reviews. The consolidated health budget envisages slightly higher forward growth than the other two estimates (1.6% per annum vs 0.6%) because it assumes that a proportion of unallocated provincial surplus funds will still be allocated out to Departments of Health. All three estimates are divided by uninsured population estimates explained in footnote e.

g Authors' calculations using data from reference 11 divided by uninsured population estimates explained in footnote e.

Table 2: Trends in filled posts, real personnel expenditure and real unit costs of personnel in the health sector, South Africa, 2005/06–2015/16 (2015/16 prices)

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Filled posts (n)	228 789	237 887	255 091	265 856	271 971	284 191	308 813	314 636	303 631	306 784	309 367
Real average unit cost (Rand per filled post)	201 285	208 011	218 615	234 080	250 837	271 638	272 601	277 161	299 501	304 359	312 598
Real expenditure on compensation (Rand million)	46 052	49 483	55 767	62 232	68 220	77 197	84 183	87 205	90 938	93 373	96 707
Annual change											
Filled posts (%)	2.7	4.0	7.2	4.2	2.3	4.5	8.7	1.9	-3.5	1.0	0.8
Real average unit cost (Rand per filled post) (%)	2.2	3.3	5.1	7.1	7.2	8.3	0.4	1.7	8.1	1.6	2.7
Real expenditure on compensation (Rand million) (%)	5.0	7.5	12.7	11.6	9.6	13.2	9.0	3.6	4.3	2.7	3.6

Source: Authors' calculations based on Estimates of Provincial Expenditure 2008/09–2016/17[h] and personnel headcount data from Vulindlela, National Treasury.[8]

- Personnel numbers, which increased by more than 80 000 from 228 000 in 2005/06 to 313 000 in 2012/13, including a net additional 27 842 nurses, 5 088 doctors and 6 597 pharmacists and pharmacy assistants.[8]
- A series of expensive occupation-specific dispensations (OSDs) or remuneration improvements for health professionals implemented from 2006 to 2009. It took several years for provinces to phase in the OSDs fully and they continued to drive spending for several years beyond the 2008 recession, raising personnel costs at the same time as growth was slowing and fiscal pressure was intensifying. The overall average unit cost per employee in provincial Departments of Health increased by 38.2% above inflation between 2005/06 and 2012/13.
- Non-personnel unit costs rising above consumer price index (CPI) inflation, especially for imported products (e.g. medicines) during a period of currency depreciation.
- New interventions such as the introduction of rotavirus, pneumococcal and human papillomavirus vaccines.
- Primary care visits, which increased from 101.7 million in 2005/06 to 128.9 million in 2012/13.[9]

The period from 2012/13 onwards has been entirely different. While health budgets will continue to grow in real terms over the medium term, there is at best a levelling off of per capita health expenditure in provinces (Figure 3), particularly from 2016/17. Once conditional grant allocations such as the HIV and AIDS grant are excluded and annual cost increases above inflation are factored in, the situation is even starker. These cost pressures include continuing personnel cost increases above inflation, e.g. negotiated wage increases of CPI +1 pay progression, improved medical and housing benefits,[10] and medical inflation on goods and services. Taking these into account, Mr AJ van Niekerk,[i] Chief Financial Officer (CFO) of the Western Cape Department of Health, suggests an adjusted real decline in health budgets of 1.3–2.2% per annum or R7 billion in total over the period from 2015/16 to 2018/19.

How the health sector responded to declining budget growth and rising costs

The health sector has responded to the slowing budget growth and rising costs in the following ways:

- Control of personnel costs
- Control of medicine costs
- Protection of 'non-negotiable' budget items and saving on non-essential items
- Reduction in capital spending on buildings
- Prioritisation of primary health care (PHC)
- Chronic medicine dispensing and distribution at additional and alternate sites to reduce queues and improve access
- Focus on health outcomes.

Control of personnel costs

Average real unit costs of personnel continue to exceed CPI inflation (Table 2). During the period that OSDs were phased in (2006/07–2011/12), personnel spending grew by R28.4 billion in real terms and by a further R13.3 billion from 2010/11 to 2015/16. Real unit costs of personnel have increased on average by 4.5% per annum above inflation over a decade. Given the apparent inability of government to control personnel unit costs, limits on personnel numbers have been put in place to control personnel expenditure, which is increasingly being capped and specifically and exclusively appropriated. Most provinces have imposed some form of restrictions in terms of filling vacant posts. In some cases they require appointments to be approved by both the provincial Treasury and the Office of the Premier, although the intention is for provinces to exclude health professionals from this requirement as far as possible.[12]

The total number of filled posts in provincial Departments of Health peaked at around 314 636 in 2012/13 and has since declined by an average of 0.5% per year.[8]

h http://www.treasury.gov.za/documents/provincial%20budget/default.aspx

i van Niekerk A. Analysis of the MTEF budget allocations. Presentation at Health Sector 10 by 10 Budget Meeting. Pretoria: National Department of Health; 2016.

Table 3: Filled posts in provincial Departments of Health as at March each year, South Africa, 2006–2016

Occupational Classification	March 2006	March 2008	March 2012	March 2016	Change 2006 – 2012	Change 2012 – 2016
Medical Practitioners	9 603	10 781	13 204	14 454	3 601	1 250
Medical Specialists	3 711	4 050	5 198	4 990	1 487	-208
Nursing Assistants	31 923	34 082	35 377	32 843	3 454	-2 534
Professional Nurses	44 245	47 975	58 274	66 024	14 029	7 750
Staff Nurses and Pupil Nurses	20 866	22 781	29 353	30 774	8 487	1 421
Student Nurses	8 944	9 789	10 816	6 911	1 872	-3 905
Dental Practitioners	719	655	997	1 143	278	146
Dental Specialists	41	32	143	173	102	30
Dental Technicians	38	39	42	45	4	3
Dental Therapy	147	146	259	318	112	59
Ambulance and Related Workers	7 672	10 304	11 308	12 361	3 636	1 053
Emergency Services Related	168	611	2 240	2 360	2 072	120
Pharmaceutical Assistants	409	648	1 439	1 723	1 030	284
Pharmacists	1 755	2 157	3 710	4 874	1 955	1 164
Radiography	2 109	2 155	4 714	4 973	2 605	259
Supplementary Diagnostic Radiographers	186	180	904	982	718	78
Community Development Workers	202	164	96	95	-106	-1
Dieticians and Nutritionists	515	612	940	1 253	425	313
Environmental Health	883	820	902	442	19	-460
Health Sciences Related	2 388	4 423	4 247	3 751	1 859	-496
Medical Research and Related Professionals	80	69	2 076	1 731	1 996	-345
Medical Technicians/Technologists	819	413	464	515	3 55)	51
Occupational Therapy	672	789	1 020	1 251	348	231
Optometrists and Opticians	52	33	2 310	2 445	2 258	135
Oral Hygiene	143	159	308	336	165	28
Physiotherapy	790	908	1 069	1 306	279	237
Psychologists and Vocational Counsellors	406	441	669	774	263	105
Speech Therapy and Audiology	283	337	491	702	208	211
Subtotal Clinical Posts	*139 769*	*155 553*	*192 570*	*199 549*	*52 801*	*6 979*
Total	234 180	261 851	314 859	309 386	80 679	-5 473

Source: Vulindlela, National Treasury.[8]

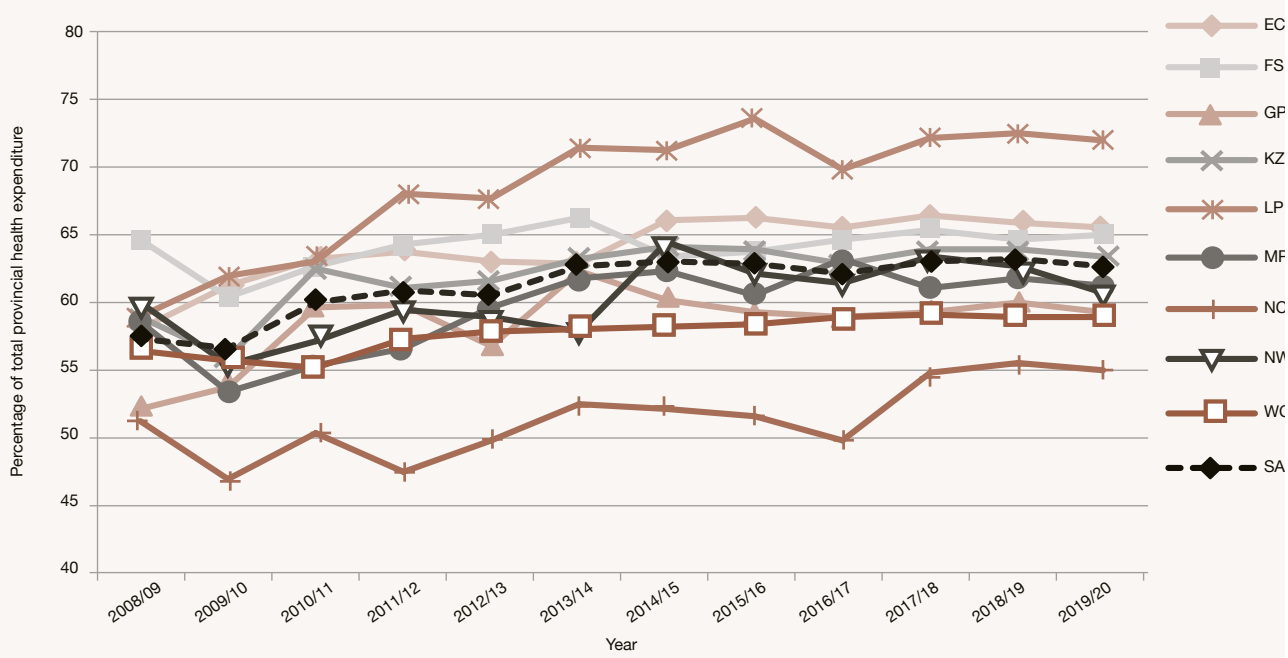
However, from a somewhat more encouraging perspective, there has on average been some protection of clinical posts during the period. From 2006 to 2012, the number of employees in provincial Departments of Health increased by 80 679, whereas in the period from 2012 to 2016, the number of net filled posts declined by 5 473 (Table 3). Clinical filled posts increased by 53 100 in the first period, and continued to increase by 7 038 in the latter period. While the number of core administrative posts was supposed to have been contained in favour of direct service delivery posts, these also increased by close to 3 000 over the past three years (from 34 517 to 37 391). The biggest decreases have been in the 'Other' category, which includes general support and non-clinical staff.[8]

Figure 4 shows that compensation of employees constitutes an increasingly large proportion of provincial health budgets, but also that there is significant interprovincial variation in this regard. In South Africa as a whole, health personnel costs have increased from 57.2% of total expenditure in 2008/09 to 63.4% in 2016/17, after which personnel costs will remain relatively stable. While there has been a slight convergence across provinces over this time-period, Limpopo Province has the highest proportion of spending on compensation relative to other items, which could potentially crowd out funding for essential goods and services, such as medical supplies and laboratory services.

Control of medicine costs

Control of medicine price increases has generally been one of the Department of Health's greatest successes. Overall, medicine spending has been prioritised, rising by 6.7% per annum above inflation from 2005/06 to 2012/13 and 4.8% per annum in real terms from 2011/12 to 2019/20 (Table 4). Most spending increases are attributed to the progressive expansion of antiretroviral (ARV) treatment, with approximately 400 000 net additional patients per annum and 3.6 million patients remaining in care (unpublished data)[13] and the introduction of new-generation child vaccines. Significant progress has been made through centralised procurement of medicines, essential medicine lists and treatment protocols, improved international price benchmarking, and price-negotiation strategies. Medicines comprise only 8% of provincial health spending in South Africa, compared with 20% in the OECD countries and 15.3% in South African medical schemes,[14] which reflects some success in controlling medicine costs in the public sector.

Figure 4: Percentage of total health budget spent on compensation of employees, South Africa, 2008/09–2019/20



Source: Authors' calculations based on Estimates of Provincial Expenditure 2011/12–2016/17.[11]

Table 4: Medicine expenditure by provincial Departments of Health, 2011/12–2019/20 (nominal Rand million)

Year	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Real annual growth 2011/12 to 2019/20 (%)
Eastern Cape	861	1 031	1 087	1 219	1 074	1 417	1 516	1 857	2 031	5.2
Free State	437	472	587	668	706	646	698	753	873	3.1
Gauteng	1 869	1 993	2 214	2 387	2 804	3 384	3 885	4 275	4 793	6.4
KwaZulu-Natal	1 865	2 317	2 521	2 393	2 895	3 204	3 527	3 876	4 404	5.3
Limpopo	629	829	910	897	819	1 148	1 166	1 257	1 489	5.3
Mpumalanga	656	781	851	1 020	1 118	1 233	1 299	1 307	1 458	4.5
Northern Cape	196	192	222	187	255	306	280	298	346	1.5
North West	410	536	633	559	580	767	808	889	1 116	7.1
Western Cape	766	840	890	1 028	1 136	1 260	1 448	1 559	1 672	4.2
Total	7 689	8 991	9 914	10 357	11 388	13 366	14 627	16 069	18 182	5.3

Source: Estimates of Provincial Revenue and Expenditure 2015/16 and 2016/17.[11]

Two specific medicine-related problems have been currency depreciation and medicine stock-outs. A high proportion of active pharmaceutical ingredients are imported, and currency depreciation has arisen as a significant problem since the value of the Rand dropped by 38% against the US Dollar, from R8.51 in 2012/13 to R13.78 in 2015/16. The sector has largely coped with increases in volume of patients on ARVs and currency depreciation due to the effectiveness of central procurement and international benchmarking. Prices of ARVs are generally considered the lowest in the world, and overall public-sector medicine prices have been said to be 87% lower than average OECD prices.[i] Although medicine cost-saving strategies appear to have been very successful overall, it is possible that some aspects of aggressive tendering strategies may at times have contributed to medicine stock-outs. However, the latter are usually considered to arise mainly from logistical and managerial problems rather than from procurement.

Protection of 'non-negotiable' budget items and saving on non-essential items

In 2012, the Minister of Health and the National Health Council adopted a set of non-negotiable budget items to protect in provincial budgets. Provincial CFOs monitor and report back to the national Department on these items on a regular basis.[15,16] The items include medicines, medical supplies, laboratory services, food services, HIV and AIDS treatment, medical equipment, and infrastructure (including maintenance). Budget growth between 2012/13 and 2019/20 (Table 5) shows that all of these items (except for buildings) have been above overall growth in the provincial Health Departments, indicating that they have indeed been relatively protected. The strong growth in spending on HIV and AIDS (and to some extent medicines and laboratory services) can largely be attributed to the additional allocations through the HIV and AIDS and TB conditional grant to sustain the expanding

i Steel G. Medicine supply, stock control, and Central Chronic Medicines Dispensing and Distribution (CCMDD). Presentation at Health Sector 10 by 10 Budget meeting. Pretoria: National Department of Health; 2016.

Table 5: Real growth for selected non-negotiable health budget items between 2012/13 and 2019/20

Year	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Average growth 2012/13 – 2019/20 (%)
Medicines (%)	10.7	4.2	-1.1	4.5	10.3	3.2	3.7	7.0	4.6
Medical supplies (%)	4.1	-0.3	6.6	-0.1	2.4	1.8	2.5	2.9	2.3
Laboratory services (%)	-0.2	-12.1	18.5	6.0	7.5	-2.2	4.6	1.4	3.4
Food services (%)	-24.0	-10.2	8.8	-1.3	9.9	2.8	2.0	-0.7	1.6
HIV/AIDS (%)	16.0	13.2	6.3	6.7	7.1	7.0	6.2	4.4	7.3
Buildings (%)	8.1	-23.0	-18.0	10.7	-11.2	6.8	-12.0	2.1	-6.4
Equipment (%)	-30.0	7.3	-20.1	-4.6	46.0	15.0	-10.5	1.3	4.9
Weighted average (%)	5.4	-0.8	0.8	4.8	6.6	4.6	2.0	4.1	3.2
Overall PDoH budgets (%)	4.1	0.8	2.1	4.0	3.3	-1.0	-0.2	1.2	1.5

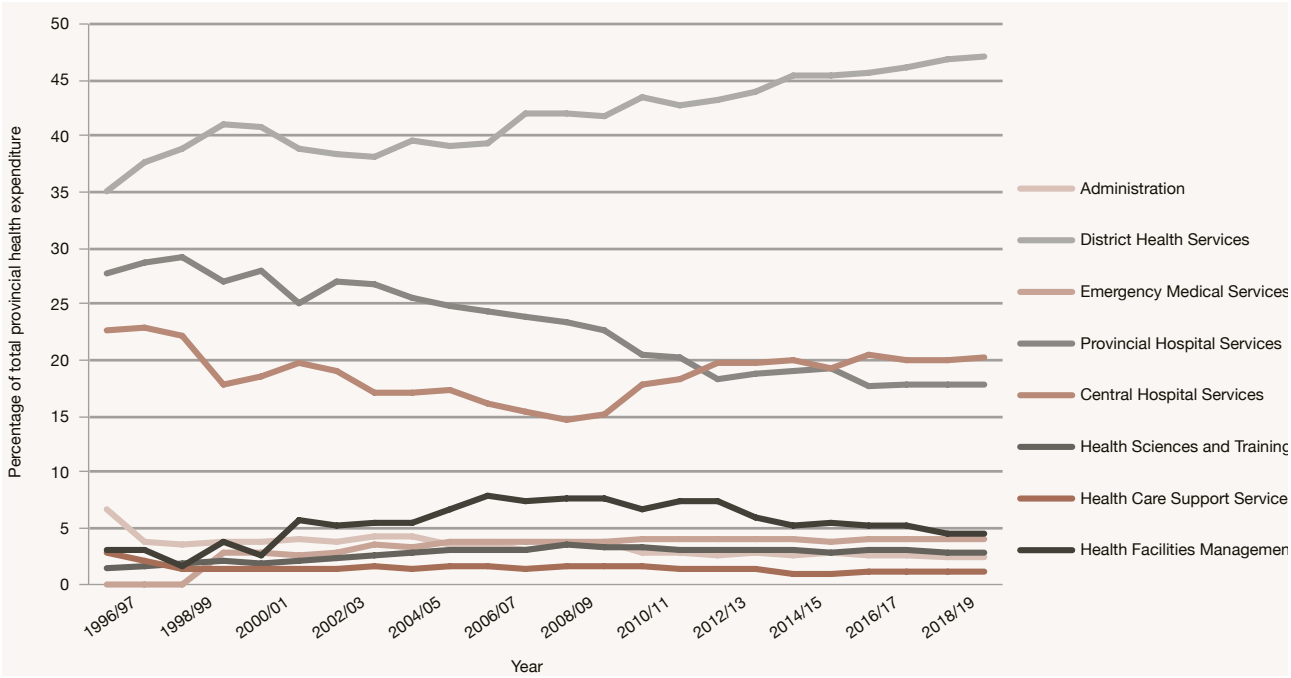
Source: Authors' calculations based on Estimates of Provincial Revenue and Expenditure 2016.[11]

Table 6: Real growth in administration and selected non-core health budget items, 2012/13–2019/20

Year	2013/14	2014/15	2015/15	2016/17	2017/18	2018/19	2019/20	Average real growth 2012/13 – 2019/20 (%)
Administration (%)	5.7	-4.8	13.9	-0.2	-7.1	-3.9	1.5	0.7
District Management (%)	-1.9	-0.9	2.4	7.2	-14.4	1.1	0.6	-0.8
Travel and Subsistence (%)	-39.6	-4.5	-11.4	-5.5	-10.1	-11.2	0.2	-11.7
Venues. Catering and Entertainment (%)	-16.0	-13.6	-23.5	-14.8	-11.0	-1.4	-1.2	-11.7
Consultants (%)	-14.3	9.9	-15.3	11.5	9.7	-10.9	7.5	-0.3
Weighted Average (%)	-4.8	-1.8	4.6	2.1	-8.7	-2.7	1.2	-1.5
Overall PDoH budgets (%)	0.8	2.1	4.0	3.3	-1.0	-0.2	1.2	1.5

Source: Authors' calculations based on Estimates of Provincial Revenue and Expenditure 2016.[11,k]

Figure 5: Health spending by budget programme, South Africa, 1996/97–2019/20



Source: Authors' calculations based on Estimates of Provincial Revenue and Expenditure.[11]

k These two grants are (1) the Health Facility Revitalisation Grant, which is a direct conditional grant transferred to the provincial Departments via the National Department of Health (NDoH) and (2) the Health Facility Revitalisation component of the Indirect National Health Insurance Grant, which is managed and implemented by the NDoH on behalf of provinces.

antiretroviral therapy (ART) programme. However, other items, such as medical supplies and food services, have also grown in real terms (by 2.3% and 1.6% per year respectively) compared with the overall provincial health budget growth of 1.5%. Expenditure on the buildings item has declined in real terms, as discussed later in this chapter.[l]

At the same time, both the Health and Finance Ministries have tried to reduce administration costs and make savings in non-core items. Table 6 shows the administration programme growing by only 0.7% in real terms between 2013/14 and 2019/20 and making up only 2.4% of the total provincial budgets in 2019/20 (Figure 5). Similarly, in the district management sub-programme, which is responsible for primary health care administration, the real average growth rate over the seven-year period is -0.8%. While frontline service-delivery programmes are generally prioritised over administration, caution must also be taken so that this does not have a negative impact on management capacity in provincial Departments, thereby undermining important functions such as financial management, human resources and health-services planning.

In December 2013, the Office of the Accountant-General at the National Treasury issued an instruction note[17] and guidelines[18] on cost-containment measures, mainly pertaining to spending on non-core items such as entertainment, travel and subsistence, and consultants. A subsequent instruction note was issued in 2016, imposing further restrictions on these and other areas.[19] However, it should be noted that provincial Departments of Health had already started implementing cost-containment measures as early as 2009/10 due to the pressure exerted by the nursing OSD on the budget and directives from some provincial Treasuries.

It is evident from Table 6 that these interventions have had the intended effect and generated significant savings. Over the six-year period, expenditure on venues, catering and entertainment will on average have declined by 11.7% per year, travel and subsistence also by 11.7% per year, and consultants by 0.3%.

Reduction in capital spending on buildings

While health infrastructure (including maintenance) is included in the non-negotiable items, it appears to be the area where the largest savings have been effected in the health sector. Based in part on significant historical underspending,[20,21] budget reductions have been made to the two conditional grants[l] that fund the majority of capital projects in the health sector.[7,22] As shown in Table 5, provincial spending on buildings will have declined substantially in real terms between 2012/13 and 2019/20. Health Departments have in some cases postponed certain projects in the planning phase and refurbished hospitals instead of replacing them.[m]

Prioritisation of primary health care

A shift towards primary health care has long been a policy intention and is reflected in the spending numbers. Figure 5 shows the composition of provincial spending by budget programme. Expenditure on district services will have increased from 35.1% of total provincial health budgets in 1995/96 to 43.3% in 2012/13 and to 47.1% by 2019/20. Thus this is not only a new emphasis, but a long-term policy shift from 1994. Table 7 shows that District Health Services received a real R28.9 billion spending increase between 2005/06 and 2012/13 (49.2% of all new health funds) and a further increase of R12.7 billion between 2012/13 and 2019/20 (88% of new health funds).

Table 7: Provincial health spending by budget programme, 2012/13–2019/2020

R million	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Change real 2005/06–2012/13	Change real 2012/13–2019/20	Change real pa 2002/13–2015/16 (%)	Change real pa 2015/16–2019/20 (%)	Change real pa 2012/13–2019/20 (%)
Administration	3 202	3 580	3 598	4 308	4 538	4 455	4 638	4 925	789	138	4.6	-2.5	0.5
District Health Services	53 034	57 517	63 805	69 788	74 883	81 108	87 593	94 735	28 960	12 706	4.0	1.7	2.7
Emergency Medical Services	5 050	5 347	5 556	6 025	6 686	7 281	7 694	8 108	2 752	487	0.5	1.6	1.1
Provincial Hospital Services	22 531	24 443	26 687	29 628	29 568	31 541	33 370	35 783	5 295	1 862	3.8	-1.1	1.0
Central Hospital Services	24 268	25 890	28 166	29 513	32 653	34 585	36 586	40 540	13 789	3 588	1.2	2.1	1.7
Health Sciences and Training	3 726	4 041	4 244	4 521	4 890	5 216	5 408	5 812	1 671	224	1.0	0.5	0.7
Health Care Support Services	1 764	1 927	1 322	1 465	1 919	1 904	2 000	2 184	634	-343	-10.4	3.8	-2.6
Health Facilities Management	8 965	7 926	7 491	8 513	8 797	9 093	9 551	9 124	4 916	-3 310	-6.9	-4.0	-5.2
Total	**122 540**	**130 672**	**140 868**	**153 762**	**163 934**	**175 182**	**186 840**	**201 211**	**58 805**	**15 353**	**2.3**	**0.9**	**1.5**

Source: Authors' calculations based on Estimates of Provincial Revenue and Expenditure 2016/17 and 2017/18.[11]

l It should, however, be noted that the sharp decrease in buildings spending in 2013/14 seen in Table 5 was largely due to the creation of the Health Facility Revitalisation component of the Indirect National Health Insurance Grant, when approximately R1 billion per year was shifted from provincial Departments to the national Department.

m Examples of such projects are the Bambisana and Zithulele Hospitals in the Eastern Cape. It was initially planned that they would be replaced, but instead they will undergo major refurbishment, funded by the indirect grant.

The District Health Services programme includes district hospitals, which are not traditionally seen as part of primary health care. Primary health care, including HIV services,[n] has also increased significantly as a proportion of total provincial health budgets, from 21.0% in 2008/09 to 28.5% in 2019/20.[o]

The shift of ART from hospitals, mostly to the primary care setting, has been an important efficiency gain. Around half of the real growth in District Health Services expenditure has been in the HIV and AIDS sub-programme, with total real growth of R14 billion from 2006/07 to 2012/13 and R6.9 billion from 2012/13 to 2019/20. This is likely to have contributed to total national primary care visits rising from 101.7 million in 2005/06 to 128.9 million in 2012/13 (and from 2.5 to 3 visits per capita uninsured). Early initiation of ART has helped to reduce the need for hospital admissions, and hospital admission rates have remained relatively stable, having only increased by an average of 0.4% (which is a per capita decrease) per year from 3.7 million in 2008 to 3.8 million in 2015.[23]

Chronic medicines dispensing and distribution at additional and alternative sites to reduce queues and improve access

Over recent years, a Central Chronic Medicines Dispensing and Distribution (CCMDD) programme has been initiated in most provinces to dispense chronic medicines at external pick-up points such as community halls and private pharmacies. This has the potential to improve efficiencies by reducing the need for stable patients to visit public PHC facilities to collect chronic medicines. This is important for HIV and AIDS, hypertension, diabetes and other chronic-disease patients. While a systematic review on the effectiveness of the CCMDD programme should be done, it appears to have helped to reduce unnecessary consultations, decongest clinics, and reduce waiting times. Primary care visits declined from 129 million in 2012/13 to 126 million in 2015/16 (from 3 to 2.8 per capita uninsured), likely due to CCMDD and the Ward-based Outreach Teams. These programmes have been operated by both the national and several provincial Departments. As of September 2016, 700 facilities in the NHI pilot districts were implementing CCMDD, reaching 521 798 patients, and 329 external pick-up points had been contracted, according to the conditional grants report (when including other districts, these numbers are even higher).[24] Unfortunately, there are inadequate consolidated national data to track the emerging scale of the programme as a whole (including non-NHI districts), and this should be addressed.

Focus on health outcomes

South Africa has an unusual arrangement in which Ministers sign outcomes-based performance agreements and report on these regularly to Cabinet and the new Department of Planning, Monitoring and Evaluation. Given the difficulty of shifting outcomes, this was a brave move, but the sector has been surprisingly effective in prioritising to make real progress on what were extremely poor health outcomes:

- National life expectancy rose to 62 years in 2014,[25] up from 52 years in 2006.
- Infant mortality rates dropped from 57.8 deaths per 1 000 live births in 2002 to 34.4 per 1 000 in 2014.[25]
- The under-5 mortality rate dropped from 85.2 deaths per 1 000 live births in 2002 to 44.1 per 1 000 in 2014.[25]
- The maternal mortality rate dropped to 141 per 100 000 live births in 2013, after an increasing trend which peaked at 312 per 100 000 in 2009.[25]
- Mother-to-child transmission of HIV decreased from 10.9% in 2009/10[26] to 1.5% in 2015/16.[27]

These outcome improvements are likely to have been achieved by focusing, inter alia, on improving ART coverage, introduction of new child vaccines, as well as other developmental interventions such as widening coverage of child-support grants, and improved water, sanitation, electricity and housing access.

Discussion

Lessons from OECD countries

Lessons, both positive and negative, can be derived from the experience of other countries. Many OECD countries experienced economic turbulence in the period following the global recession in 2008. Greece faced one of the most profound fiscal crises of all the European countries. Unemployment rose from 7% to 24% and public debt increased from 105% to 142% of GDP between 2007 and 2014.[28] The main strategies to reduce health expenditure were hospital rationalisation and consolidation, savings in personnel expenditure (both numbers and wage rates) and pharmaceutical expenditure, and better expenditure management and oversight. Greece's attempts to deal with fiscal constraint in the health sector have been criticised in the literature,[29] partly because of the magnitude of health-expenditure reduction and the lack of risk protection for vulnerable groups.

Ireland experienced a severe banking crisis, negative GDP growth, a rise in unemployment, revenue reductions and a substantial fiscal imbalance leading to a public debt of over 120% of GDP, requiring a €85 billion bail-out package. Governmental expenditure, which had peaked in 2009 at around 39% of GDP, has been reduced very substantially by 8% to 31% of GDP in 2014. In this context, health expenditure declined by 8.6% from €15.5 billion to €14.2 billion in two years. There were few interventions that could achieve this magnitude of savings. Given that personnel tends to be the largest area of health spending, in an unprecedented step, social partners agreed to reduce public-sector wages instead of focusing exclusively on downsizing personnel numbers (12 000 were downsized[3]). Gross pay in the Irish health sector declined from €7.5 billion to €6.3 billion. Capital projects were delayed and capital budgets reduced by 26%.[1] Ireland also decided to increase co-payments for medicines and hospital accident and emergency visits. Hospital beds were consolidated, leading to a reduction of 941 beds countrywide.[1]

In the UK, when the effects of the banking and fiscal crisis finally affected the health budget, spending declined by £3 billion in real terms between 2009 and 2011 and budgets were effectively capped until 2015.[2] This led to spending cuts in many areas. At the same time, it is estimated that long-term sectoral pressures, including pay rises, rising chronic diseases and population growth, have cost

n Primary health care spending here is made up of the following sub-programmes: community health clinics, community health centres, HIV and AIDS (prevention and treatment), community-based services and other community services.

o Authors' calculations based on Estimates of Provincial Revenue and Expenditure.

implications of £13 billion in 2015 and will cost £30 billion by 2021. The combined effect of cuts and spending pressures in the UK has sometimes been referred to as the 'Nicholson challenge' after the former chief executive of the UK's National Health Service (NHS).[30] Strong institutions, better planning and huge public protests in support of the NHS have helped to limit the effects of the recession on the health sector.

Table 8 shows a selection of some of the potential options followed by different OECD countries.

Table 8: Selected policy options used by OECD countries after the 2008 recession

Area	Intervention	Country	Interventions implemented in South Africa
Fiscal cushion	Counter-cyclical fiscal policy		Yes, particularly until 2012/13.
	Use accumulated surpluses in insurance fund/hospitals	Estonia	Departments/hospitals are not allowed to keep surpluses, but some provincial Treasuries are holding surpluses which they sometimes use to augment budgets.
Improve budget management and expenditure oversight	Improve expenditure monitoring, controls and oversight, management, improved budgeting, e.g. better links to outputs and tightening up on unspent funds		Focus on non-negotiable items, cost-containment measures and budget cuts in underspending areas.
	Performance-based budgeting, performance monitoring, value for money monitoring		Increased focus on performance and health outcomes, but linking of these focus areas to budgeting can be improved.
Revenue	New or increased taxes, in some cases earmarked		As NHI unfolds, additional revenue streams may be introduced.
	Increase insurance contributions, or broaden base, change limits, etc.		N/A
	Introduction or increase of user fees (not recommended)	Ireland, Greece	No plans to introduce user fees as this may discourage necessary use of health services. There may be a role for by-pass fees under NHI.
Hospitals	Rationalisation by consolidating hospitals with low occupancy		Limited use to date, but addressing low occupancies through consolidation has potential to improve economies of scale and efficiencies. This may become necessary as resource allocation becomes more demand-driven under NHI.
	More day surgery, shorter length of stay	Many OECD countries	No specific interventions to date, but the introduction of DRG reimbursement is likely to improve efficiencies.
	Increasing productivity e.g. doctor: patient ratio		More work on staffing norms, including the evolution of the Workload Indicators for Staffing Needs (WISN) tool for hospitals would be useful.
	Standardisation of procedures, beds and admissions		Standard treatment guidelines are available in South Africa.
Level of care	Primary Health Care (PHC) gatekeeping		Plans to introduce more explicit referral pathways under NHI (potentially including by-passing fees).
	Shifting balance of work to treat patients at appropriate level, e.g. more at PHC, lower-level hospitals through improved demand-management tools and referral chains		Shift from largely hospital-based to nurse-initiated and managed ART (NIMART) at PHC level in 2010.
	Self care, demand-management tools, call-lines		Removal of hospital user fees has the potential to lead to by-passing and attention to this area could be useful in helping individuals to access the appropriate levels of care.
Reimbursement reform	Capitation for PHC as a supply-side reform which helps to contain price and quantity	Thailand, UK	Planned under NHI
	DRG, capped DRG	Thailand, most OECD countries	Planned under NHI
	Budget holding, e.g. to control referrals	UK	
Medicines	Central procurement		Medicines intervention have been among the most widely used and successful during the post-2008 recession and has resulted in South Africa having the lowest ARV prices in the world.
	Tougher negotiation, benchmarking international and local prices	Australia	Yes, with largely positive results, i.e. lower pharmaceutical prices.
	Generics policy		Yes, public sector uses largely generic medicines.
	Essential drug lists (EDLs), treatment guidelines, appropriate use of medicines		Yes, EDLs and standard treatment guidelines are in use.

Area	Intervention	Country	Interventions implemented in South Africa
Benefit package	Use of HTA to exclude less cost-effective new interventions	Thailand, UK	Limited use of HTA to date, although it has been used in specific areas such as HIV and TB. HTA agency is being considered.
Capital projects	Delay projects; don't over-capitalise; use of standardised designs; competitive purchasing and dealing with cartels	Ireland	Yes, capital budgets have been reduced and projects delayed. Standardised designs for PHC facilities form part of the Ideal Clinic initiative.
Medical equipment	Delay purchase, essential equipment lists, servicing and appropriate technologies		Yes, essential equipment lists are used. Some purchases delayed to save capital budgets.
Personnel	Retrenchment, staff mix and lower-level cadre substitution		Personnel costs are the largest cost driver in the South African health system. Retrenchment is not possible in the public sector, but limitations on filling vacant posts are widely implemented, although often with exemptions for clinical staff.
	Technically efficient allocation of personnel to match workloads		WISN have been developed but implementation is limited. There appears to be significant potential to better match personnel with workload.
	Freeze or reduce wage levels, benefits, salary freeze	Ireland	On the contrary, recent wage negotiations have resulted in increased costs of employment.
Laboratory	Protocols, cheaper inputs		Better gate-keeping measures are introduced at National Health Laboratory Services. A move away from fee-for-service to a capitated model is also planned.
Administration	Consolidate and review multi-level administrations	UK	
Funding pool consolidation	Consolidation of multiple fragmented funding pools into one or a few larger pool/pools to achieve economy of scale and increase purchasing power	Turkey	Plans to consolidate pools under NHI, starting with public sector funds.
Information systems	Improving health IT systems to streamline processes in health facilities, improve medicines stock management and help avoid duplicate laboratory tests		New patient registration system being rolled out at PHC level. New electronic stock management system being implemented nationally.
Coverage	Exclusion of certain groups, e.g. wealthier		No plans to implement this reform in South Africa.
Prevention and public health	Focus on disease prevention strategies and health promotion	UK	New vaccines, e.g. pneumococcal, rotavirus and HPV have been introduced and significant improvement in prevention of mother-to-child transmission of HIV have been achieved. Plans to introduce a tax on sugary beverages are far advanced.

The South African experience

International experience suggests that if downsizing is unplanned and done in a haphazard way, it is more likely to be harmful. The results presented in this chapter suggest that South Africa has been fairly successful in some of the ways in which budget constraints have been addressed, including centralised medicines procurement, focus on health outcomes, control of personnel numbers, prioritisation of 'non-negotiable' spending areas, prioritisation of PHC in budgets, the chronic medicines dispensing programme, and reduction of new-build programmes.

However, there are areas of potential weakness. For example, concerns have been raised about insufficient mechanisms to identify and prioritise the refilling of critical vacant posts. Inefficiencies and suboptimal service configurations should be looked for so that resource utilisation can be restructured optimally. There are still significant inequities in the distribution of skilled health personnel.

Improved matching of posts and budget with workload could contribute to improved efficiencies. Some clinics have very heavy workloads and a severe shortage of staff, whereas others are relatively empty. While the sector has developed workload indicators for staffing needs, implementation of the tool varies, partly because the WISN indicators are perceived by some to be unaffordable.

There is also a need to review the nature of hospital platforms. The Eastern Cape has over 40 district hospitals, many located close to each other, but each with low bed occupancies and inadequate professional staff to achieve quality care. Internationally, the trend has been to move towards shorter lengths of stay and more day cases and outpatient care. A better-quality and more efficient dispensation in South Africa might see some consolidation of district hospitals, with fewer inpatient facilities of higher quality. However, appropriate buy-in and management capacity would be essential for such reforms. An additional challenge is newly built facilities that are not, or only partially, operationalised after completion due to lack of operational budgets (e.g. Trompsberg Hospital in Free State), indicating a disjuncture between infrastructure planning and service and financial planning. Partly as a result of this, the NDoH has stressed the need for the sector to shift its focus from building new facilities to maintaining its existing estate.

While finding efficiencies is essential in times of economic slowdown, if cuts are too deep or poorly managed, there can be adverse consequences in health-service delivery, as occurred in Greece. Adequate planning is required to achieve efficiencies and attention should be given to management capacity and change management. Managing a combination of low-growth and high-cost pressures presents a formidable challenge for health managers in South Africa. Most managers aspire to grow services and dealing with restructuring to achieve greater efficiency requires stability in leadership positions, change-management strategies and strong management capacity. This can be all the more difficult in a context of public pressure around perceived austerity. Management should work with communities and staff to plan and prioritise, thus building collective ownership. This enables decisions that achieve greater efficiencies and buy-in for appropriate restructuring of services.

Towards National Health Insurance

A potential disjuncture may be emerging between the path of increasing patient choices, a mixed-provision model, greater pooling and improved resourcing envisaged by the NHI, and a seven-year 'lean' period in public budgets for health services as published for the period 2012/13–2019/20. There is a need to bridge this disjuncture more clearly and begin to put in place one of the financing sources for NHI indicated in the White Paper.[31] In his Budget speech, the Minister of Finance recently announced an intention to establish the NHI Fund, and to support key benefits in the areas of maternal health, school health, and services for the disabled and elderly. The possibility of slightly reducing the tax credit for medical-scheme contributions and the consolidation of public-sector schemes was raised.[32]

Although NHI will in due course be a game-changer and there has been some health-service strengthening in NHI pilot districts to date, in general, implementation has been slower than anticipated in the NHI Green Paper released in August 2011.[33] The NHI White Paper[31] indicated that public healthcare spending was likely to increase substantially, potentially over 15 years, from 4% to 6% of GDP. Several mechanisms for revenue-raising have been proposed, including some combination of an increase in VAT or payroll tax, or a surcharge on personal income tax.

National Health Insurance[31] also has the potential to improve efficiencies in the overall health system through the following: improved pooling; strategic purchasing; medicine price reductions through central procurement; redistribution; improved quality in the public sector; and providing greater access to general practitioners. South Africa is also considering how to build Health Technology Assessment capacity to inform priority-setting and decision-making in an objective and scientifically robust manner (e.g. 'best buys' for specific health outcomes).

Conclusions and recommendations

The global recession of 2008 has negatively affected economic growth in South Africa and has continued to do so for almost a decade, from 2008/09 to 2016/17 and beyond. Government protected social-sector spending by means of a counter-cyclical fiscal stance, but after 2012/13 there has been considerable constraint, as evidenced by the lower real health expenditure growth of 1.8% per annum between 2012/13 and 2019/20. Although the sector has not been subject to the drastic budget cuts experienced in several OECD countries, this slow growth, along with increased personnel expenditure, currency depreciation and increased expenditure on ART, has put pressure on health budgets. The sector has responded with strategies that include limiting personnel numbers, centralised tendering for medicines, delay of major capital projects, and reprioritisation within available budgets, although the effect of these interventions should be fully evaluated. This slow-down in growth may last for a long time, impacting health budgets negatively, while the NHI has the potential to reverse this trend through additional revenue streams to fund health services.

The key recommendations emanating from this chapter are:

- During economic downturns, Government should continue to protect key social services, including health. While the rapid expenditure growth seen pre-2012/13 may not be fiscally sustainable, maintaining real growth in health spending (albeit at a lower rate) is vital to continue to realise improved health outcomes. Too-low levels of public health expenditure growth may create problems and hamper a smooth transition to NHI, which envisages, and is likely to require, a more positive growth trajectory.
- The more recent low expenditure growth trend places a greater onus on health managers to prioritise within their available budget. Both positive and negative lessons from OECD and other countries can be applied to contain health expenditure. Measures that focus on improved efficiencies and rationalisation (e.g. prioritisation of non-negotiables) should take precedence over blunt cutting of health services, which may harm the health system and lead to a reversal of South Africa's health-outcome gains made in recent years.
- In order to contain personnel expenditure without negative impacts on health services, it is essential that provinces have systems in place to prioritise critical service-delivery posts and ensure that these are filled without undue delays. The NDoH should support provinces in this regard and close collaboration between provincial Departments of Health and provincial Treasuries will be required.
- Significant progress has been made in medicines procurement, which has resulted in significant savings. Further development in this area is recommended, but it is also important to ensure that prices do not become so low that they impact negatively on supplier performance. It is also recommended that similar procurement strategies be extended to other areas such as medical supplies, equipment, and non-medical consumables.
- National Health Insurance has the potential to generate additional funding for health, and to improve equity and efficiency through implementing financing, pooling, purchasing, and provision reforms. While several decisions pertaining to the design of NHI are yet to be made and considered carefully, it is recommended that Government increasingly start planning for implementation, as this could potentially play an important role in turning around the trend of low public-health expenditure growth.
- While many of the efficiency reforms already undertaken, such as alternative chronic medicines distribution appear promising, these should be evaluated systematically to see if they warrant expansion. Additional health-system innovations that improve efficiencies should also be explored.
- In times of financial constraint, it is important to prioritise among health interventions and implement only those that achieve the greatest value for money. South Africa should therefore consider how to build Health Technology Assessment capacity and establish more formal processes to evaluate the cost-effectiveness and value-for-money of new interventions and enable more evidence-based decision-making.

References

1 Organisation for Economic Co-operation and Development (OECD). Restoring public finances. Paris: OECD; 2012. [Internet]. [cited 1 December 2016]. URL: http://www.oecd.org/gov/budgeting/restoringpublicfinances-reportoutliningthefiscalconsolidationplansof30oecdcountries.htm

2 Organisation for Economic Co-operation and Development (OECD). Fiscal Sustainability of Health Systems: Bridging Health and Finance Perspectives. Paris: OECD Publishing; 2015. URL: http://dx.doi.org/10.1787/9789264233386-en.

3 Morgan D, Astolfi R. Health Spending Continues to Stagnate in Many OECD Countries. OECD Health Working Paper Number 68. Paris: OECD Publishing; 2014. [Internet]. [cited 16 December 2016]. URL: http://dx.doi.org/10.1787/5jz5sq5qnwf5-en

4 South African National Department of Health. National Treasury Instruction 02 of 2016/17: Cost containment measures. Pretoria: National Treasury; 2016. [Internet]. [cited 20 December 2016]. URL: http://www.hst.org.za/sites/default/files/2bcce61d2d1b8d972af41ab0e2c8a4ab.pdf

5 National Treasury. Medium Term Budget Policy Statement 2016. Pretoria: National Treasury; 2016.

6 National Treasury. Budget Review series for 2006/07–2017/18. Pretoria: National Treasury; 2016. [Internet]. [cited 7 January 2017]. URL: http://www.treasury.gov.za/documents/national%20budget/default.aspx

7 National Treasury. Estimates of National Expenditure 2016. Pretoria: National Treasury; 2016.

8 National Treasury. Vulindlela. Pretoria: National Treasury; 2016. [Internet]. [cited 1 December 2016]. URL: http://www.vulindlela.gov.za/index.asp

9 South African National Department of Health. District Health Information System. Pretoria: NDoH; 2016.

10 Public Service Co-ordinating Bargaining Council. Resolution 2 of 2015: Agreement on Salary Adjustments and Improvements on Conditions of Service in the Public Service for the Period 2015/16 – 2017/18. Pretoria: PSCBC. [Internet]. [cited 24 January 2017]. URL: http://www.dpsa.gov.za/dpsa2g/documents/pscbc/2015/Res2%20of%202015%20PSCBC.pdf

11 National Treasury. Estimates of Provincial Revenue and Expenditure (2011/12–2016/17). Pretoria: National Treasury; 2017. [Internet]. [cited 20 February 2017]. URL: http://www.treasury.gov.za/documents/provincial%20budget/default.aspx).

12 Rural Health Advocacy Project. Causes, implications and possible responses to the implementation of staffing moratoria in the public health system in South Africa during times of budget austerity. Johannesburg: Rural Health Advocacy Project; 2016. [Internet]. [cited 5 January 2016]. URL: http://www.rhap.org.za/wp-content/uploads/2016/08/RHAP_Working_Paper_Frozen_posts_July_2016-1.pdf

13 South African National Department of Health. Quarter 3 of 2016/17 Consolidated Conditional Grants Performance Report. Pretoria: NDoH; 2016 (unpublished).

14 Council for Medical Schemes. Annual Report 2015/16. Pretoria: Council for Medical Schemes; 2016.

15 Day C, Daviaud E. Development and application of benchmarks for budgeting of non-negotiable goods and services for the provincial departments of health. Durban: Health Systems Trust; 2014. (unpublished)

16 Shezi S, Chiwire P, Ndlovu N. Factsheet on the Non-Negotiable Budget Items in the Provision of Public Health and HIV/AIDS Services in South Africa; 2014. [Internet]. [cited 3 January 2017]. URL: http://www.heroza.org/wp-content/uploads/2014/10/Final_CEGAA_HERO_Factsheet_Health_Non-negotiables_SouthAfrica_12Sept141.pdf

17 National Treasury. National Treasury Instruction 01 of 2013/14: Cost containment measures. Pretoria: National Treasury; 2013. [Internet]. [cited give date]. URL: http://www.treasury.gov.za/legislation/pfma/TreasuryInstruction/Treasury%20Instruction%2001%20of%202013%202014%20Cost%20Containment%20Measures.pdf

18 National Treasury. Guideline on Cost Containment Measures. National Treasury Instruction 01 of 2013/2014. Pretoria: National Treasury; 2014. [Internet]. [cited 5 January 2017]. URL: http://www.treasury.gov.za/legislation/pfma/guidelines/Guideline%20on%20Cost%20Containment%20Measures.pdf

19 National Treasury. National Treasury Instruction 02 of 2016/17: Cost containment measures. Pretoria: National Treasury; 2016. [Internet]. [cited 15 January 2017]. URL: http://www.treasury.gov.za/legislation/pfma/TreasuryInstruction/Treasury%20Instruction%20No%202%20of%20201617%20Cost%20Containment%20Measures.pdf

20 National Department of Health. Quarter 4 of 2013/14 Consolidated Conditional Grants Performance Report. Pretoria: NDoH; 2014 (unpublished).

21 National Department of Health. Quarter 4 of 2014/15 Consolidated Conditional Grants Performance Report. Pretoria: NDoH; 2015 (unpublished).

22 National Treasury. Estimates of National Expenditure 2015. Pretoria: National Treasury; 2015.

23 National Department of Health. National Health Information Repository and Datawarehouse. Pretoria: NDoH; 2016. [Internet]. [cited 30 December 2016]. URL: https://nhird.health.gov.za

24 National Department of Health. Quarter 2 of 2016/17 Consolidated Conditional Grants Performance Report. Pretoria: NDoH; 2016 (unpublished).

25 Department of Planning, Monitoring and Evaluation. Development Indicators 2014. Pretoria: Department of Planning, Monitoring and Evaluation; 2015.

26 South African National Department of Health. Annual Performance Plan 2012/13. Pretoria: NDoH; 2012.

27 South African National Department of Health. Annual Report 2015/16. Pretoria: NDoH; 2016.

28 Kentikelenis A, Karanikolos M, Papanicolas I, Basu S, McKee M, Stuckler D. Health effects of financial crisis, omens of a Greek tragedy. Lancet. 2011;378(9801):1457–8.

29 Infanti AA, Argyriou AA, Kalofonou FH, Kalofonos HP. Financial crisis and austerity measures in Greece: their impact on health promotion policies and public health care. Health Policy and Planning. 2013;113(1–2):8–12.

30 Applebea J, Galea AR, Murray R. The NHS productivity challenge: experience from the front-line. London: Kings Fund; 2014. [Internet]. [cited 6 December 2017]. URL: https://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/the-nhs-productivity-challenge-kingsfund-may14.pdf.

31 Government Gazette. White Paper on National Health Insurance. Pretoria: National Department of Health; 2015.

32 Gordhan P. 2017 Budget Speech. Pretoria: The National Treasury of South Africa; 2017. [Internet]. [cited: 23 February 2017].
URL: http://www.treasury.gov.za/documents/national%20budget/2017/speech/speech.pd

33 South African National Department of Health. National Health Insurance in South Africa: Policy Paper. Pretoria: NDoH; 2011.

4 Where from and where to for health technology assessment in South Africa? A legal and policy landscape analysis

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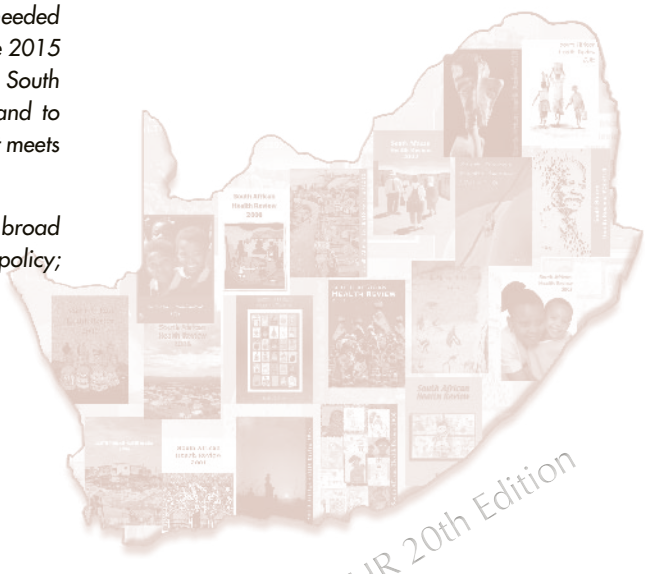
The aim of National Health Insurance (NHI) is to achieve universal health coverage by delivering a Health Service Package (HSP) of quality healthcare services to all South Africans. Health technology assessment (HTA) is an explicit, transparent and evidence-informed approach to healthcare prioritisation and HSP formulation. In this chapter, definitions of HTA are discussed, a legal and policy analysis of HTA development since 1994 is presented, and adoption of an HTA framework is recommended to guide future healthcare prioritisation, including HSP formulation.

The 2015 NHI White Paper includes a strong policy intent for the comprehensive adoption of HTA systems. However, limited attention has been given to financing these prioritisation mechanisms and structures. A comprehensive secondary data-gap analysis of relevant international and national resolutions and legislation revealed no specific provision in the National Health Act for HTA, which is narrowly and incompletely defined, and no legislative provision for evaluation of the broad range of interventions for which HTA could be used.

Much prior work has been done and much consideration has been given to HTA in South Africa, but implementation efforts have been fragmented. Further development and amendment of the relevant HTA policy and legislative frameworks are needed in order to inform appropriate universal health coverage, and to align with the 2015 NHI White Paper. With no national HTA mechanism or entity yet in place, South Africa is well positioned to learn from the experiences of other countries and to establish an HTA framework that delivers the components of HTA in a way that meets the needs of NHI and the National Development Plan.

A five-step implementation process is recommended to: define HTA through broad stakeholder engagement; align policies with NHI; harmonise legislation and policy; legislate amendments in Parliament; and implement a unified vision for HTA.

Further development and amendment of the relevant HTA policy and legislative frameworks are needed in order to inform appropriate universal health coverage, and to align with the 2015 NHI White Paper.



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Introduction

We live in a world of finite resources. Budgets are constrained within the health system, yet the demand for quality health care is seemingly infinite. In South Africa, healthcare policymakers face difficult choices on a daily basis as they balance optimal patient care against the best value for healthcare spending. Explicit, transparent and evidence-informed approaches to healthcare prioritisation can greatly enhance the quality and integrity of our policymakers' decisions.[1]

South Africa has adopted a universal health coverage (UHC) approach to health care in its Constitution and recognises the health inequalities present in the country. This approach was implicit in the 1994 provision of free primary health care nationally and in the 1996 extended healthcare plan for pregnant women and children, but was made explicit in the National Health Insurance (NHI) White Paper in 2015.[2] The NHI mechanism aims to achieve UHC by 2025 with the delivery of a platform of comprehensive quality healthcare services to all South Africans (sometimes referred to as the benefits package). However, as noted in the 2016 *South African Health Review*, the 2015 NHI White Paper does not yet provide details of the package or the methods required to determine the contents of such a package,[3] but proposes the establishment of an NHI Benefits Advisory Committee to do so.

Clearly, a fair, evidence-based and trusted approach to determining the criteria for inclusion of services and new technologies within the NHI healthcare platform will be required prior to implementation. International experience has shown that a health technology assessment (HTA) system can aid identification and inform decision-making about funding of health services and technologies. This might take into account clinical excellence and cost-effectiveness, practical issues such as affordability and human-resource constraints, and social values such as equity, fairness, and access to health services.[1] As a country moves towards UHC, one of the issues for consideration is governmental recognition of the need to drive, sustain and actively support the HTA process.[4] This chapter documents the development of HTA legislation, regulation and policy in South Africa over the past 20 years. Existing gaps are identified and resultant opportunities are explored; thereafter, recommendations are made on the steps required prior to adoption of an HTA framework to guide future healthcare prioritisation, including health service package (HSP) formulation.

What is health technology assessment?

Health technology assessment is variably defined. The classification of health technology is understood differently both between and within countries and institutions, often leading to confusion among healthcare decision-makers.

The World Health Organization (WHO) defines health technology broadly as: "the application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives".[5]

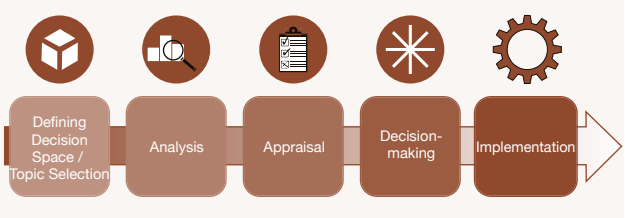
Health technology assessment is defined by the WHO as: "the systematic evaluation of properties, effects and/or impacts of health technologies and interventions. It covers both the direct, intended consequences of technologies and interventions and their indirect, unintended consequences".[6]

It is important to note that in accordance with these WHO definitions, HTA is not confined to pharmaceuticals and medical devices, but includes the broader organisation of the healthcare system.

For the purposes of this chapter, we use the working definition of health technology formulated at the first meeting of the International Decision Support Initiative in Africa held in March 2015 and hosted by PRICELESS SA:[a] "A health technology is any intervention that may be used to promote health, to prevent, diagnose or treat acute or chronic disease, or for rehabilitation and palliative care."[1] This broad definition encompasses non-pharmacological interventions including behavioural and psychosocial interventions and public health programmes. It extends the range of health technologies to include a focus on prevention as well as diagnostic, treatment, rehabilitation, and palliative modalities.

Thus the mechanism and processes for assessment of the health technologies defined above constitutes HTA. Importantly, HTA goes beyond an analytical exercise and incorporates upstream processes such as policy decisions and selecting elements for assessment and downstream implementation in a multi-component process (Figure 1).[7]

Figure 1: The components of a health technology assessment process



Source: Adapted from Walker et al., 2007.[7]

How is HTA delivered?

There is no 'one-size-fits-all' for delivery of HTA. In a 2015 survey of 111 WHO Member States, most countries reported having a formal process for compiling, analysing and synthesising relevant information and scientific evidence systematically to support healthcare policy decision-making.[8] In one-third of countries, this process was not termed 'HTA', and fewer than half of the countries legislated HTA. Health technology assessment was used for different purposes across countries, with planning and budgeting being the key driver of HTA.

Most countries reported having a national entity with more than six staff members doing HTA analysis for the ministry of health. As expected, organisations in high-income countries were better resourced than those in middle- or low-income countries.

a PRICELESS SA (Priority Cost Effective Lessons for System Strengthening South Africa) was launched in 2009 to support the development of evidence-based information and tools to optimise the use of scarce resources so that better decisions can be made in prioritising public health (see http://www.pricelesssa.ac.za/Home.aspx).

How is healthcare policy and legislation made in South Africa?

The National Department of Health (NDoH) is responsible for formulation of national health policy. Legislation and regulations that determine policy should be approved by Parliament following a period of public participation and comment.[9] At provincial level, legislation can be passed that is specific to the provision and functioning of district health councils, and to establish and describe the functions of clinic and community health centre committees.[10] Responsibility for development of legislation and policy related to HTA lies with the NDoH.

Methodology

Our aim was to identify and analyse relevant national and international documentation including resolutions, regulations, legislation, and policy reports to aid the identification of current gaps in, and opportunities for, HTA in South Africa. We recognise the existence of, but did not review, the decision-making structures in South Africa that use components of HTA methodology in decision-making. Some of these include the National Health Laboratory Services, the National Essential Medicines List, and provincial and hospital-based structures.

Our chosen method was secondary data analysis, which is the analysis of data or information gathered elsewhere, or for a purpose other than the current initiative, but that sheds light on the aim of the current initiative.[11] The following secondary data sources with a focus on HTA were included in our analysis: resolutions, legislation, regulations, government policy and technical reports.

The iterative search for documentation was conducted from March 2015 until June 2016 and included:

- websites of relevant agencies, e.g. the WHO, the NDoH, academic and research institutions, and international and national HTA associations;
- references on included documents; and
- contacts with experts in the field.

Key references to HTA in the documentation were extracted and summarised. Focus was placed on the legislative and policy changes that would be required to establish an HTA entity in South Africa and the optimal structure and support platforms for such an entity. Data were interpreted by the authors to aid determination of the overall key gaps and opportunities within current law and policy.

Two analyses were conducted: a comprehensive review of relevant international and national legislation and regulation, and a historical review of HTA policy development in South Africa from 1994 to date. A separate synthesis of the gaps and resultant opportunities was done for each analysis.

Review of relevant international and national legislation and regulation

Regulations were scrutinised to identify the legislative changes that would be required to incorporate and apply an HTA framework in South Africa.[b]

International

World Health Assembly Resolution 67.23

In May 2014, the World Health Assembly (WHA) passed Resolution WHA 67.23 "Health intervention and technology assessment in support of universal health coverage."[12] The Resolution acknowledges the importance of evidence-based policy development and decision-making in health systems and recognises the need for regional and international networking, and collaboration on health intervention and technology assessment to promote evidence-based health policy. The Resolution urges Member States to consider establishing national health systems that include health intervention and technology assessment. As a WHO member, South Africa is obliged to incorporate the principles contained in WHA 67.23 in a national HTA policy and legislative framework.

National

The Constitution, Act 108 of 1996

The right of all South Africans to have access to healthcare services is enshrined in the Bill of Rights of the Constitution (Section 27(1)(a)).[13] Provision is made for the State to take reasonable legislative and other measures, within its available resources, to achieve the "progressive realization" (Section 27(2)) of this right. Therefore, the Constitution requires that when making difficult and unavoidable decisions that necessarily impact on access to healthcare services, the State must demonstrate a degree of 'reasonableness'. International experience in this area has shown that the establishment of an HTA framework may provide this reasonableness,[14] as it facilitates consideration of a range of social values in the context of the health-system objectives and available resources.

National Health Act of 2003

The 2003 National Health Act (NHA) makes no specific provision for the establishment of an HTA framework.[15] The Act includes a definition of HTA, but it is a narrow definition with a focus on machinery and equipment and excludes medicines, medical devices and intravenous devices. This definition will have to be amended as a first step towards establishing an HTA legislative framework.

The NHA (as amended in 2015) makes provision for the creation of the Office of Health Standards Compliance (OHSC), which interprets the National Core Standards relating to the assessment of healthcare provider quality.[16] The creation of an independent HTA body would require similar legislation to that of the OHSC through amendment of the NHA, along with details surrounding the appointment of a Board, independent committees and the powers and functions associated with an HTA body.

Currently, the Minister may utilise Section 90(1) of the NHA, which provides authority to make regulations (standards and guidelines) for use of a health technology. As an interim step to legislative development, an HTA process could inform the Minister's use of Section 90(1).

The Medical Schemes Act of 1998

Under the Medical Schemes Act,[17] provision of prescribed minimum benefit (PMB)[c] conditions is mandatory for all medical schemes providing health services in the private sector. Prescribed minimum

b A summary of the main legal imperatives and the implications for HTA in South Africa can be found at www.pricelesssa.org.za

c Prescribed minimum benefits are a legislative requirement for those conducting the business of a medical scheme as defined in the Medical Schemes Act of 1998.

benefits consist of 25 defined chronic conditions, 270 defined diagnosis and treatment pairs, and any emergency medical condition. Medical schemes may develop reimbursement formularies and treatment protocols to manage the benefit of PMB treatment. The principles of evidence-based medicine and cost-effectiveness are applied when developing these formularies and protocols, implying that medical schemes in fact conduct a form of private or 'in-house' HTA. However, the Act does not specify a particular technical or procedural HTA standard to be applied by medical schemes when determining formularies or treatment protocols.

The Act applies only to medicines and not to devices. The Act would have to be amended in order for the governance of medical devices in use in the private sector to be included under the same conditions as medicines.

The Medicines and Related Substances Act of 1965

The Medicines and Related Substances Act provides for the registration, control and marketing of medicines under the Medicines Control Council (MCC).[18] The Act was amended in 2015 to enable the establishment of the South African Health Products Regulatory Agency (SAHPRA), proposed for 2017.[18] The Agency will have a broader mandate than the MCC, including the registration and control of medical devices, in vitro diagnostics, and complementary medicines.

A well-functioning SAHPRA will be critical to the success of HTA in South Africa. Regulation is primarily concerned with public safety and demonstration of efficacy, whereas HTA is applied to reimbursement decisions, which involves consideration of value for money, effectiveness and wider health-system objectives.[7] An HTA system that is co-ordinated but independent of a regulatory function enables decisions about public-resource allocation to be separated from decisions about safety, thus facilitating accountable and clear decision-making systems.

Regulations relating to a transparent pricing system under the Act (last amended in February 2016)[19] include provision for the Director-General to request detail from stakeholders as to the comparative efficacy, safety and cost-effectiveness of a medicine relative to other medicines in a therapeutic class when setting the price at which medicines are available in the private market (the single exit price (SEP)). Guidance on the methods required to evaluate the information received (the Guidelines for Pharamaco-economic Submissions) were gazetted pursuant to the Regulations in February 2013. Although decisions regarding the SEP are different in nature from decisions about public subsidy of different types of technologies, these Regulations provide a potential mechanism to request evidence inputs in HTA processes.

The following gaps were identified in South African legislation and Regulations with regard to HTA:

- There is currently no specific provision in the NHA for the establishment of a dedicated HTA body and associated structures.
- Health technology is narrowly and incompletely defined within current legislation.
- While assessment of the efficacy and safety of medicines is covered under the Medicines and Related Substances Act, and under the Medical Schemes Act in the private sector, no provision is made for the assessment of medical devices in either sector (although a Bill is currently before Parliament to include devices within the Medicines Act).

The following opportunities were identified arising from the gap analysis:

- A precedent exists for amendment of the NHA to include an HTA body, namely the example of the legislation governing the Office of Health Standards Compliance.
- Stakeholders will be required to formulate a coherent and encompassing definition of health technology and health technology assessment, acceptable to all, prior to drafting HTA legislation.
- The limited legislative framework for HTA currently provides the opportunity for the required legislation (such as the establishment of an HTA Agency and legislated interactions with other regulatory bodies) to be tailored towards the specific requirements of NHI.

Historical review of HTA policy development in South Africa, 1994–2017

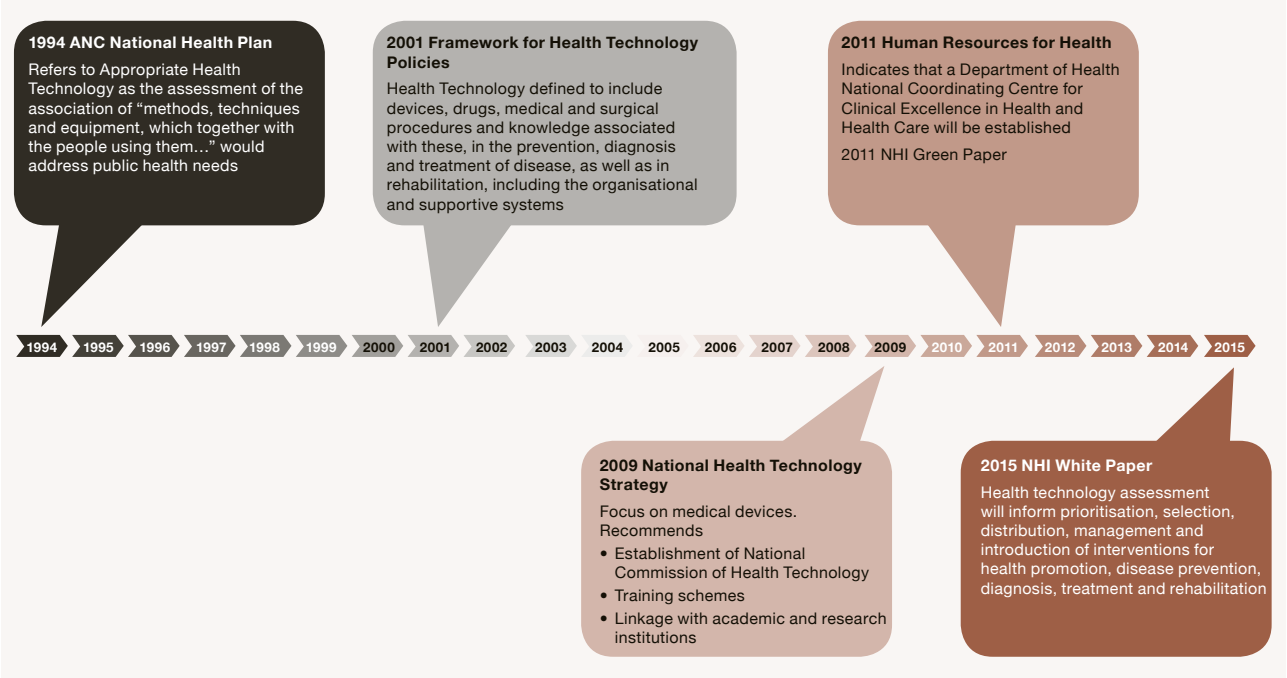
Five key HTA or HTA-related policy documents[d] have been published since 1994:

- 1994 African National Congress National Health Plan[20]
- 2001 Framework for Health Technology Policies[e]
- 2009 National Health Technology Strategy[e]
- 2011 Human Resources for Health South Africa: HRH Strategy for the Health Sector 2012/13–2016/17[21]
- 2015 National Health Insurance White Paper (which superseded the 2011 NHI Green Paper).[2]

d A tabulated summary of the HTA-relevant sections of each document can be accessed at www.pricelesssa.org.za

e This document is not available on the governmental sites. A scanned copy can be accessed at www.pricelesssa.org.za

Figure 2: Timeline of key events in the development of health technology in South Africa from 1994 to present



The synthesised findings and the implications for HTA in South Africa are outlined below.

2001 Framework for Health Technology Policies and 2009 National Technology Strategy

Two NDoH policy documents focus specifically on the establishment and administration requirements for a National Health Assessment mechanism. However, similar to the findings in the legislation review, different definitions and understandings of what constitutes health technology and HTA exist across these documents. The 2001 Framework provides overarching guidance on the components of policy, and proposes the establishment of several committees, including a National Health Technology Forum to be chaired by the Director-General of Health. The 2009 National Health Technology Strategy acknowledges the broad definition of HTA but focuses exclusively on medical devices. Despite detailed guidance in the annexes on the mechanisms and activities required to establish a functional national HTA system, there has been relatively little progress in the application of such a national HTA system since then. A universally understood definition of HTA and its application within the healthcare system is required to harmonise current South African policy.

2011 Human Resources for Health South Africa HRH Strategy for the Health Sector 2012/13–2016/17

The HRH Strategy published in 2011 recommends that a National Coordinating Centre for Clinical Excellence in Health and Health Care be established with functions reflective of HTA. However, the recommendation is not explicit.

2015 NHI White Paper

South Africa is progressing towards adopting UHC through provision of a comprehensive platform of health care as outlined in the 2015 NHI White Paper.[2] The White Paper definitively states the intended direction regarding the use of HTA to support decision-making under NHI. The principles of evidence-based health care clearly underpin NHI, providing an ideal platform to support the establishment of a national HTA structure. Although not explicitly stated, the implication is that creation of an HTA entity is critical to ensure the efficient use of resources in an NHI environment. However, limited attention is given to the detail of how affordable health technologies will be selected for a comprehensive set of services. The HTA components of the NHI will require alignment with previous or revised HTA policy and frameworks and with future HTA legislation, and this must be made explicit.

The following gaps were identified in South African policy and the development process with regard to HTA:

- The NDoH 2001 Framework for Health Technology Policies and the National Health Technology Strategy (2009) are not aligned with the NHI White Paper in terms of definitions and application of HTA.
- The National Coordinating Centre for Clinical Excellence in Health and Health Care outlined in the HRH Strategy is tasked with HTA activities but is not aligned with, nor referenced in the NHI White Paper. It currently does not exist.
- Limited detail is provided in the NHI White Paper regarding the mechanisms and structures required to apply HTA to determine the components of the essential healthcare services or other healthcare interventions more broadly.

The following opportunities arise from the identified gaps:

- The current policy documents provide a broad understanding of utilisation and practice of HTA, and as such, an opportunity to develop a comprehensive HTA strategy based on an existing foundation.
- NHI is built on the same principles as those underpinning the objectives of HTA. The establishment of a functioning NHI system will create a policy demand for HTA outputs, providing

an opportune moment for stakeholders to develop a South African-appropriate HTA framework and associated policy mechanisms to support the selection of the HSP specifically, and all healthcare interventions more generally.

Conclusions

Over the past 20 years, much work has been done and much consideration has been given to HTA in South Africa. Unfortunately, several proposals to establish mechanisms and structures to develop and implement a functional and robust national HTA system have not come to fruition. By linking HTA outputs with the explicit decision-making needs of UHC policies, the 2015 White Paper on NHI provides the best opportunity to realise a functioning and sustainable HTA system in South Africa. However, a central finding of our gap analysis is that the relevant policy and legislative frameworks require updating; further development and amendment is needed in order to meet the imperative to deliver UHC to all South Africans.

A strong lead by the NDoH is necessary to build on this prior body of work and to engage again with critical thinkers around the best fit for HTA in South Africa. All internal and external stakeholders should come to an agreement and work together to develop and implement a unified vision for HTA in the country. A robust and functional HTA system will best inform the provision of the NHI-recommended platform of healthcare services. Health technology assessment can be viewed as one of several tools needed to implement the NHI more broadly in order to achieve the aim of evidence-based and affordable health care for all South Africans, ultimately contributing to the improvement of the health of the nation.

Recommendations

Consideration was given to the findings of the gap analysis, the opportunities identified, and the implications thereof for South Africa, and steps are proposed to develop legislation and policy to support a functional HTA system in South Africa (Figure 3). Specific recommendations are categorised as short-, medium- and long-term in duration.

Short-term recommendations (6–12 months)

In the short-term, the NDoH might consider hosting an HTA summit that would include relevant government, non-government, academic, private-sector, and civil-society stakeholders. The aims of the summit would be to gain consensus on an acceptable and useful definition of HTA appropriate to the South African context, and to discuss the policy and legislative requirements for a national HTA agency or alternative mechanism in South Africa.

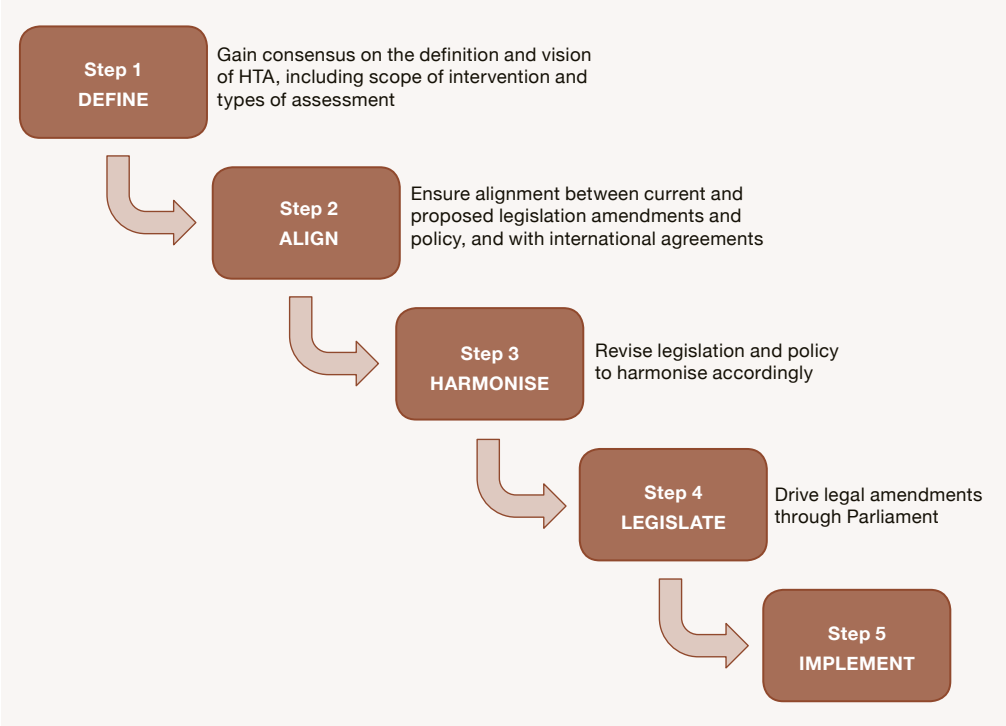
Medium-term recommendations (12–24 months)

In the medium term, consideration should be given to revision of relevant national legislation and policy in order to align with the NHI agenda and the international WHA resolution.

Long-term recommendations (24–48 months)

We propose that development and promulgation of legislation is key for HTA to become an effective component of NHI. Legislation and revised policy is necessary to support the selection of optimal methods to inform some of the components of the NHI health services. Ongoing public engagement at all stages is critical to this deliberative process. Development of the necessary human-resource capacity to perform HTA, and identification of related training needs, will be required to support these processes.

Figure 3: Step-by-step approach to the development of legislation and policy for a functional HTA system in South Africa



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References

1 Hofman KJ, McGee S, Chalkidou K, Tantivess S, Culyer AJ. National Health Insurance in South Africa: Relevance of a national priority-setting agency. S Afr Med J. 2015;105(9):739–40.

2 South African National Department of Health. White Paper on National Health Insurance. Government Notice No. 1230, Government Gazette No. 39506. 11 December 2015. [Internet]. [cited 13 April 2017]. URL: http://www.gov.za/sites/www.gov.za/files/39506_gon1230.pdf

3 Gray A, Vawda Y. Health policy and legislation. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review, 2016. Durban: Health Systems Trust; 2016.

4 Chalkidou K, Marten R, Cutler D, et al. Health technology assessment in universal health coverage. Lancet. 2013;382(9910):e48–9.

5 World Health Organization. Health Technology. Geneva: WHO; 2016. [Internet]. [cited 13 April 2017]. URL: http://www.who.int/health-technology-assessment/about/healthtechnology/en/

6 World Health Organization. Health Technology Assessment. Geneva: WHO; 2016. [Internet]. [cited 13 April 2017]. URL: http://www.who.int/health-technology-assessment/en/

7 Walker S, Palmer S, Sculpher M. The role of NICE technology appraisal in NHS rationing. Br Med Bull. 2007;81–82: 51–64.

8 World Health Organization. 2015 Global Survey on Health Technology Assessment by National Authorities. Main findings. Geneva: WHO; 2015.

9 Parliament of the Republic of South Africa. How a law is made. [Internet]. [cited 15 January 2017]. URL: http://www.parliament.gov.za/live/content.php?Item_ID=1843

10 Hassim A, Heywood M, Berger J. Chapter 4 – The statutory and administrative framework of the public health system, in Health and Democracy. Section 27. 2007; 94–125. [Internet]. [cited 13 April 2017]. URL: http://section27.org.za/wp-content/uploads/2010/04/Chapter4.pdf

11 Patton MQ. Qualitative evaluation and research methods. 2nd ed. Newbury Park: Sage Publications, 1990.

12 Sixty-seventh World Health Assembly. Health intervention and technology assessment in support of universal health coverage. WHA 67.23. 24 May 2014. [Internet]. [cited 27 January 2017]. URL: http://apps.who.int/gb/ebwha/pdf_files/WHA67/A67_R23-en.pdf?ua=1

13 Parliament of the Republic of South Africa. Bill of Rights, Constitution of South Africa. 1996. [Internet]. [cited 13 April 2017]. URL: http://www.gov.za/documents/constitution/chapter-2-bill-rights

14 Daniels N, Sabin JE. Accountability for reasonableness: an update. BMJ. 2008;337:a1850.

15 Parliament of the Republic of South Africa. National Health Act, 2003. [Internet]. [cited 13 April 2017]. URL: http://www.gov.za/sites/www.gov.za/files/a61-03.pdf

16 South African National Department of Health. Procedural Regulations pertaining to the functioning of the Office of Health Standards Compliance and its Board. Government Notice No. R.110, Government Gazette No. 38486. 18 February 2015. [Internet]. [cited 13 April 2017]. URL: http://www.gov.za/sites/www.gov.za/files/38486_r10367_gon110.pdf

17 South African National Department of Health. Regulations made in terms of the Medical Schemes Act, 1998. Government Notice No. 603, Government Gazette No. 38990. 14 July 2015. [Internet]. [cited 13 April 2017]. URL: http://www.gov.za/sites/www.gov.za/files/38990_gon603.pdf

18 South African National Department of Health. Medicines and Related Substances, Amendment Act, 2015. Government Gazette No. 39585. 27 January 2017. [Internet]. [cited 13 April 2017]. URL: http://www.gov.za/sites/www.gov.za/files/39585_Act14of2015MedicinesRelatedSub.pdf

19 South African National Department of Health. Medicines and Related Substances Act: Regulations relating to transparent pricing system for medicines and scheduled substances: Government Notice No. 153. Government Gazette No. 39658. 8 January 2016. [Internet]. [cited 13 April 2017]. URL: http://www.gov.za/sites/www.gov.za/files/39658_gon153.pdf

20 African National Congress. A National Health Plan for South Africa | African National Congress. 1994 [Internet]. [cited 13 April 2017]. URL: http://www.anc.org.za/content/national-health-plan-south-africa

21 South African National Department of Health. The HRH Strategy for Health South Africa: HRH Strategy for the Health Sector 2012/13–2016/17. 2011 [Internet]. [cited 13 April 2017]. URL: http://www.gov.za/documents/human-resources-health-south-africa-hrh-strategy-health-sector-201213-201617

South Africa's National Drug Policy: 20 years and still going?

5

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It has now been 20 years since the National Drug Policy (NDP) was published in 1996. This was one of the earliest comprehensive policy documents issued by the first post-apartheid Department of Health, and was subsequently included as an appendix to the 1997 White Paper on the Transformation of the Health System in South Africa. The NDP was developed in response to seven policy questions/challenges posed by the Department, and set out three sets of objectives: health objectives, economic objectives, and national development objectives. Although elements of the implementation of the NDP have been addressed in previous editions of the South African Health Review and in various academic publications, no comprehensive evaluation has yet been attempted.

The process of implementing the NDP has varied from being straightforward to highly contested, with litigation by a variety of stakeholders and an important Constitutional Court judgment in relation to medicines pricing. A number of high-profile issues, in particular considerations of intellectual property law, have not been pursued as aggressively as expected. Other issues, such as the appropriate regulation of traditional medicines, remain unaddressed or inadequately addressed. This chapter critically examines the process of developing and implementing the NDP from 1994 to date, and for the first time, covers all the key elements of the policy and its stated objectives. Emphasis is on the impact of the policy, but also on looking ahead to identify which elements of the NDP need reconsideration in the light of plans for National Health Insurance. This analysis follows the Walt and Gilson model, focusing not only on content, but also the actors, context and process.

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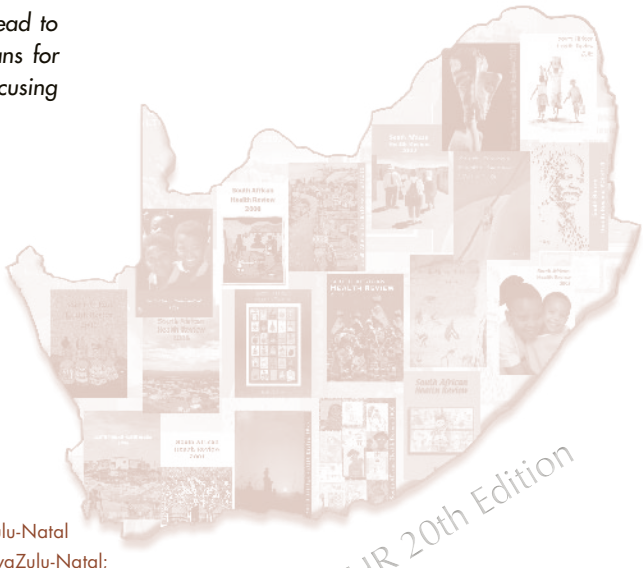

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Introduction

The advent of democracy in 1994 posed significant health policy challenges for the new democratic government. The new Minister of Health, Dr Nkosazana Dlamini-Zuma, duly appointed a range of policy committees to inform government action. Among these was the 12-member National Drug Policy Committee (NDPC), appointed in August 1994. The NDPC presented its final report to the Minister in November 1994, and the Cabinet-approved policy document was issued in February 1996. Initial implementation was closely linked with the externally funded South African Drug Action Programme (SADAP).[1] Although the policy called for periodic review of the document, this has never occurred. Policy implementation continues to this day, albeit with the addition of new policy elements and details in response to changing circumstances, and despite resistance from various quarters.

Methods

The present policy analysis used the Walt and Gilson approach[2] and was based primarily on publicly accessible documentation and peer-reviewed literature.

The policy-development process

The policy development process initiated in August 1994 did not occur in a vacuum. Previous governments had established commissions of inquiry to investigate various aspects of medicines policy.[3–5] Each of these commissions noted problems with medicines supply, such as the overuse of branded medicines rather than generic equivalents, but none resulted in a cogent national medicines[a] policy, or the implementation of legislative changes (such as the enablement of generic substitution by pharmacists). Medicines regulation in South Africa was governed by the Medicines and Related Substances Control Act (101 of 1965), which came into effect in 1967.[6] The most recent amendments to the Act had not all been brought into effect by the time of the change of government in 1994.[7] In a last-gasp attempt, the apartheid-era Department of National Health and Population Development prepared a draft National Pharmaceutical Policy for South Africa in 1993.[8]

Nonetheless, the process by which the NDPC engaged with the terms of reference set by the Department of Health (Box 1) reflected the time pressure under which they had to operate, as well as the understandable conviction that new approaches and solutions were needed to break from the past. The policy-development phase and initial implementation of the NDP has been comprehensively reviewed; the review characterised the process as displaying "limited use of available knowledge, particularly from sources associated with the previous regime; some engagement with the broader drug policy community; preference for inputs based on the personal experiences and perspectives of individuals trusted by the Minister; ignoring advice that was not in alignment with central actors' own views, with perhaps a failure to distinguish between opposition and constructive criticism; and less direct influence by international agencies than is the case in other developing countries".[9] To some extent it was typical of processes that take advantage of periods of transition.[10] However, such processes also have to deal with the constraints imposed by transition, such as "changes in leadership, loss of institutional memory and a rupture of old mechanisms of policy implementation".[9]

Box 1: The South African National Drug Policy Committee terms of reference, 1994

Seven key tasks:

1. Develop a pricing plan for drugs used in South Africa in the public and private sectors.
2. Develop a plan to ensure that drugs are tested and evaluated for effectiveness in the South African context, using epidemiological approaches.
3. Develop an Essential Drugs List to be used in the public sector and prepare treatment guidelines for health personnel.
4. Develop specific strategies to increase the use of generic drugs in South Africa.
5. Prepare a plan for effective procurement and distribution of drugs in South Africa, particularly in the rural areas.
6. Investigate traditional medicines.
7. Rationalise the structure for Pharmaceutical Services.

Content of the National Drug Policy, 1996

The Cabinet-approved version of the NDP was finally issued in February 1996,[1] and was subsequently included as an appendix to the 1997 White Paper on the Transformation of the Health System in South Africa.[11] That White Paper opened with the statement: "We have set ourselves the task of developing a unified health system capable of delivering quality health care to all our citizens efficiently and in a caring environment". Implementation of the NDP should be judged against that professed aim of a unified health system, and the impact on both the public and private sectors.

The policy document sets out three main objectives, in the domains of health, economics, and national development, as outlined in Table 1.

The content of the policy was summarised in the 1996 *South African Health Review* (SAHR), with mention of a three-phase implementation plan based on the need for legislative intervention.[12] Subsequent progress reviews appeared in the 1997, 1998, 1999, 2000 and 2016 editions of the SAHR, each focused on a particular element.[13–17] Related chapters in the SAHR have dealt with access to antiretroviral treatment[18] and the use of mid-level workers in pharmacy.[19] The present analysis represents the first attempt to assess implementation and impact across all objectives outlined in the policy document.

Legislation and regulations

The professed aim of this chapter of the policy was "to ensure that drugs reaching patients are safe, effective and meet approved standards and specifications".[1] The intended steps were therefore to strengthen the Medicines Control Council (MCC) by ensuring its financial autonomy and investment in systems improvements (such as an electronic management information system (MIS)). Legislative changes were needed to introduce a five-year re-licensing system for all medicines, what was described as "an evaluation report

a In more recent usage, the term 'drugs' has been reserved for drugs of abuse, with the term 'medicines' preferred when referring to the licit market. Thus, the term National Medicines Policy would be preferred. Historical references to the NDP are therefore preserved, while abiding by the more modern terminology where possible.

Table 1: South African National Drug Policy objectives, 1996

Domain	Specific objectives
Health objectives	• Ensure the availability and accessibility of essential drugs to all citizens. • Ensure the safety, efficacy and quality of drugs. • Ensure good dispensing and prescribing practices. • Promote the rational use of drugs by prescribers, dispensers and patients through provision of the necessary training, education and information. • Promote the concept of individual responsibility for health, preventive care and informed decision-making.
Economic objectives	• Lower the cost of drugs in both the private and public sectors. • Promote the cost-effective and rational use of drugs. • Establish a complementary partnership between government bodies and private providers in the pharmaceutical sector. • Optimise the use of scarce resources through co-operation with international and regional agencies.
National development objectives	• Improve the knowledge, efficiency and management skills of pharmaceutical personnel. • Re-orientate medical, paramedical and pharmaceutical education towards the principles underlying the NDP. • Support development of the local pharmaceutical industry and the local production of essential drugs. • Promote the acquisition, documentation and sharing of knowledge and experience through the establishment of advisory groups in rational drug use, pharmacoeconomics and other areas of the pharmaceutical sector.

Source: National Department of Health, 1996.[1]

exchange system with reputable regulatory bodies in other countries", as well as a 'fast-track' procedure for essential medicines. The legislative-reform process has been the most contested, with considerable delays in implementation caused by litigation, initially by the transnational pharmaceutical industry.

The first Medicines and Related Substances Control Amendment Bill (30 of 1997) was tabled in Parliament but withdrawn after initial public hearings. A subsequent Bill was resubmitted to Parliament in August 1997 (Bill 72 of 1997), and passed as Act 90 of 1997.[20] Although some provisions dealt with issues highlighted in the NDP (for example, establishing the MCC as a juristic person, providing for expedited registration and re-registration every five years), the most controversial section appeared to provide for the issuing of compulsory licences for medicines. The new section 15C of the Act read: "The Minister may prescribe conditions for the supply of more affordable medicines in certain circumstances so as to protect the health of the public, and in particular may – (a) notwithstanding anything to the contrary contained in the Patents Act, 1978 (Act No. 57 of 1978), determine that the rights with regard to any medicine under a patent granted in the Republic shall not extend to acts in respect of such medicine which has been put onto the market by the owner of the medicine, or with his or her consent". Although other provisions were also objected to, it was this provision that formed the basis for the legal challenge instituted by the Pharmaceutical Manufacturers' Association (PMA) and 39 of its member companies in February 1998.[21] While this court action was ongoing, and on the advice of a ministerial advisory panel,[22] Parliament passed a new Amendment Act, which intended to replace the MCC with a new South African Medicines and Medical Devices Regulatory Authority (SAMMDRA).[23] Following the premature promulgation of this Act, without the necessary Regulations, the promulgation notice was reversed by the Constitutional Court.[24] When the PMA withdrew its court challenge in 2001, a subsequent Amendment Act was passed in 2002 (which repealed the SAMMDRA Act),[25] and both the 1997 and 2002 Acts were brought into effect from May 2003. Following a report by yet another ministerial advisory committee,[26] two more Amendment Acts have been passed by Parliament, in 2008[27] and 2015,[28] and now await promulgation. Once brought into effect, these two Amendment Acts (2008 and 2015) will replace the MCC with a new South African Health Products Regulatory Authority (SAHPRA). The necessary Regulations were published for comment in January 2017.[29]

The final form of the proposed medicines regulatory authority (SAHPRA) bears little resemblance to what was proposed in the NDP. While section 15C has been retained, after 2003 it was interpreted to enable parallel importation, not compulsory licensing, and has never been used. The expedited registration provision inserted in 1997 will be removed, having been blamed for a burgeoning backlog in medicines registrations.[30,31] While South Africa has made considerable progress in advancing harmonisation (for example, joining the Pharmaceutical Inspection Co-operation Scheme, introducing the electronic Common Technical Document, achieving observer status at the International Conference on Harmonization, and joining the Zazibona initiative), there are still considerable challenges facing the new Authority. In January 2016, the African Union adopted a Model Law on Medical Product Regulation.[32] Domestication of the law entails consideration of how national law conflicts with the Model Law. One of the key provisions of the Medicines and Related Substances Act that has not been addressed is section 34, which hampers attempts to advance transparency in medicines regulatory practice. To date, the MCC has not been able to make a comprehensive medicines register publicly accessible, nor does it publish the grounds for registration decisions, in the form of public assessment reports.

The second target for this section of the policy was to ensure that "only practitioners who are registered with the relevant Council and premises that are registered and/or licensed … may be used for the manufacture, supply and dispensing of drugs". The key provision here was the introduction of a dispensing licence for authorised prescribers. Following a successful court challenge, this provision has been progressively weakened, but remains on the statute books as a regulatory hurdle, even though it has failed to reduce the number of dispensing practitioners.[33]

The inspectorate functions of the MCC were also constrained as a result of a court challenge.[34] No provincial inspectorate has been established. No MCC-operated laboratory has been established, and the contracted services at the Universities of the North West and Free State have been retained.

Although the medicines that may be prescribed by emergency personnel, optometrists and dental therapists have been listed for this purpose in the Schedules, little progress has been made in creating a specialist register for nurses, and an exceptional mechanism (section 56(6) of the Nursing Act, 2005) is still relied upon.[35] Other quality enhancement mechanisms have been mandated in other legislation, notably with the creation of the Office of Health Standards Compliance by the National Health Act, 2003.[36] Draft norms and standards Regulations for all health establishments were issued for comment by the Minister of Health in January 2017.[37] However, an enforceable code of marketing practice has not been developed, as enabled by the Act. The remit of the MCC (and in time SAHPRA) has been extended to cover medical devices and *in vitro* diagnostics.[38]

The 2002 Centre for Health Policy (CHP) assessment noted that "the NDP was confronted by a wide variety of sophisticated extra governmental players, including a well-established domestic pharmaceutical industry able to mobilise technical and legal resources to oppose policy".[9] It also noted that while the NDP process "showed a high awareness of the actor environment", there was only "partial recognition of the fact that policy implementation is inherently a process of constant negotiation and renegotiation". Most importantly, the CHP analysis noted that "over time, the opportunities for negotiation have tended to diminish rather than expand". The formal opportunities for engagement over legislation have been provided by public hearings before the National Assembly Portfolio Committee on Health (and, in 2015, provincial hearings), and by the opportunity to comment on draft Regulations and Guidelines. In addition, since the withdrawal of the PMA court challenge, an Industry Task Group (ITG) has provided for engagement between the MCC and industry stakeholders. However, the NDP legislative programme remains littered with delays or partial reversals caused by litigation. Amendments to South Africa's intellectual property policy have been signalled but not yet implemented.[39]

Following adoption of the NDP, the chief directorate responsible for development and implementation of the policy identified sections that could be implemented immediately without any legislative changes, and those that would require changes to either the Pharmacy Act or the Medicines and Related Substances Control Act. Those requiring legislative amendments were placed in two categories: those likely to be accepted, albeit grudgingly in some instances, by the pharmaceutical industry, and those that would almost certainly lead to litigation. Generic substitution was considered to fit in the first category, and parallel importation in the second. However, a planned phased approach, which would have avoided some sections being held hostage by opposition to others, was not implemented as the Minister of Health opted for an 'all-or-nothing' approach. A single Amendment Act was therefore passed initially, and predictably interdicted, resulting in unnecessary delay of the less controversial elements, such as generic substitution.

One of the changes brought about by the 1997 Amendment Act was the extension of application of the Medicines Act to the State (similar to the provision in the Pharmacy Act). In July 2005, when these changes came into effect, the Chief Director: Pharmaceutical Policy and Planning, requested the Rational Pharmaceutical Management Plus (RPM Plus) project, which was funded by USAID and managed by Management Sciences for Health (MSH), to conduct an audit of all public-sector pharmacy facilities in order to determine their compliance with the amended Pharmacy and Medicines Acts. The audit was conducted in eight provinces (the Western Cape had conducted its own audit earlier), and resulted in the allocation of additional resources to address identified deficiencies. One major outcome of the process was that virtually no public-sector hospital pharmacy operated without a full-time pharmacist.

Medicine pricing

Although the aim of the "Drug pricing" chapter of the NDP, namely "to promote the availability of safe and effective drugs at the lowest possible cost" was clear, the means to achieve this were not clearly outlined.[1] The NDP stated that the aim would "be achieved by monitoring and negotiating drug prices and by rationalising the drug pricing system in the public and private sectors, and by promoting the use of generic drugs".

The last of these changes – mandatory offer of generic substitution by all dispensers – was enabled by Act 90 of 1997; it was delayed by the PMA court challenge, and only brought into effect in 2003. Evidence from private-sector sales of selected pharmacological groups show that the change was anticipated by medical scheme administrators, who used mechanisms such as co-payments to promote generic substitution, even in advance of the legal change.[40] Overall, the level of generic utilisation in the private sector is only discernible from reports placed in the public domain by one medical scheme administrator, Mediscor. By 2015, 56.2% of items claimed were generic medicines, up from 38.3% in 2004.[41] Put another way, the 2015 report stated that, "in 76.5% of instances where a generic equivalent was available, the generic medicine was used". Only biosimilars are now considered to be non-substitutable.

The highly contested introduction of a single exit price (SEP) for all medicines sold in the private sector, with a mandated maximum annual adjustment (single exit price adjustment or SEPA), and separate mandated maximum dispensing fees for pharmacists and licensed dispensing practitioners, has been comprehensively reviewed.[15,16,42,43] Following reversals in the High Court and Supreme Court of Appeal, the Minister of Health prevailed in the Constitutional Court, and the SEP/SEPA/dispensing-fee system was eventually implemented.[44] Though not discernible in the NDP, other proposed interventions, such as international benchmarking, have yet to be implemented.[45] Although the methodology for pharmacoeconomic evaluations has been finalised, such submissions remain voluntary.[46,47] Regulations to control bonusing, sampling and other perverse incentive schemes have also not been finalised.[48] That said, the prohibition on bonusing and sampling, included in the Act, is in place and is a major design component of the pricing intervention.

The medicine pricing interventions that have evolved are difficult to trace to the original policy document. In essence, this has been a demonstration of what was identified by the CHP analysis as missing: a "high degree of organisational reflexivity – the ability to learn from experience" (p. 82).[9] Policy has emerged from practice, informed by engagement with stakeholders, albeit at arms' length. A degree of flexibility was evident in 2016, when the Minister of Health (on the advice of the Pricing Committee) enabled an additional maximum SEPA of 2.9%, in recognition of the effect of major currency shifts.[49] Another example of an emergent policy, not based on a principle set by the NDP, has been the use of therapeutic class tenders in the

public sector. That mechanism implies the application of therapeutic rather than generic substitution, which has yet to be enabled by legislation.

Medicines selection

The aim of this chapter of the NDP reflected the clear influence of the World Health Organization (WHO): "to promote the rational choice of drugs and associated items to be used in South Africa, in accordance with the Essential Drugs concept".[1,50] The policy called for the creation of a National Essential Drugs List Committee, appointed by the Minister of Health, which would be responsible for the selection of medicines to be used in the public sector. This is perhaps the easiest component of the policy to track, at least in terms of the creation of the national committee and the publication of standard treatment guidelines (STGs). The National Essential Medicines List Committee has been maintained, together with the requisite Expert Review Committees for each level of care, and a succession of editions of the STG/EMLs has been published. Although enabled by the National Health Act (61 of 2003), no Regulations have been issued to govern this process. A quantitative assessment of the outcomes of the public-sector selection process has been published, showing changes over time.[51] In-depth interviews with committee members have documented the refinement of selection methods over time.[52] Importantly, these committee members emphasised that "the development of an EML is only the starting point of the essential drugs programme (EDP) process; it must be effectively linked to the processes for procurement, supply, training, and monitoring and evaluation of prescribing and medicine use for it to make a positive impact and valuable contribution to better healthcare".

Although small-scale surveys of adherence to STGs have been published,[53] there has been only one nationwide attempt to assess the quality of medicines use (using the WHO/INRUD indicator methodology) in 2003.[54] Some changes from baseline surveys conducted in 1998 were discernible: e.g. the mean number of items per prescription decreased from 2.5 in 1998 to 2.2 in 2003, the percentage of medicines prescribed from the EML increased from 65% to 90%, and the percentage of encounters in which an injection was prescribed decreased from 11% to 5%, but the percentage of encounters in which an antibiotic was prescribed increased from 36% to 47%. Some assessments of the quality of medicines use in the private sector have also been conducted, using medical scheme claims databases.[55–62]

The Lancet Commission on Essential Medicines Policies has provided a comprehensive overview of the many interventions shown to advance quality use of medicines.[63] The Commission has also underscored the critical role of rational medicines selection in supporting the development of sustainable medicines benefit packages for universal health coverage (UHC). As South Africa implements National Health Insurance (NHI) (as UHC is termed locally), more attention must be paid to the use of tools such as health technology assessment (HTA) to support medicines selection.[64] Although some contact has been made with HTA agencies in other settings, such as the UK and Thailand, no formal process is yet in place. The limits of the tender system are clearly demonstrated when confronted by the need for expensive, single-source medicines such as those needed in oncology, drug-resistant tuberculosis, hepatitis C and as second- and third-line antiretrovirals. The Lancet Commission has also recommended that "governments and the main public or private payers should establish independent pharmaceutical analytics units (or equivalent) to focus on generating information for action to promote quality use". No equivalent to the Australian NPS MedicineWise has been created in South Africa, dedicated to promoting quality use of medicines and measuring the impact of attempted interventions.

As with many other areas of the NDP, there have been positive developments not envisaged in 1996, such as a mobile 'app' for the STG/EMLs. However, any attempts to reach out to the private sector have, to date, been tentative. In particular, there has been no clear articulation with the Prescribed Minimum Benefit algorithms used in the private sector.[65]

Procurement and distribution

The NDP aimed to "ensure an adequate supply of effective and safe drugs of good quality to all people in South Africa", by "promoting cost-effectiveness in the public sector and by utilizing private sector facilities where appropriate".[1] Procurement processes were influenced by the fiscal federalism entrenched from 1996, when the final Constitution came into effect. A number of ministerial committees have addressed the issue of medicines procurement.[66,67] Reporting on medicines availability in public-sector facilities has been highlighted in the Pharmaceutical Dashboard that is now a regular feature of National Health Council meetings, and technological innovations (such as the Stock Visibility System (SVS) initiative and the roll-out of the RxSolution software in all provinces) are in process. In 2015/16, through the Central Chronic Medicines Dispensing and Distribution (CCMDD) programme, just under 400 000 patients received their prescribed medicines from over 1 000 pick-up points. Although not without its challenges, the system considerably improved distribution of medicines closer to patients' homes. In addition, the SVS had been implemented in just under 2 000 clinics countrywide by 2016, while electronic stock management (RxSolution) was rolled out to hospitals in all provinces bar the Western Cape. It is noteworthy that this is the first time that a uniform stock-management system has been implemented in all public sector hospitals. All these initiatives were implemented with the support of donor-funded implementing partners.

Nonetheless, publicly accessible data on medicines availability are rare. Some evidence of withdrawal of essential medicines from the market has been documented.[68] The civil society-driven Stop Stock Outs Project (SSP) published its third report in 2016, based on telephonic surveys of public sector facilities.[69] Also in 2016, a report on the management of pharmaceuticals at national and provincial levels of the public sector was issued by the Auditor-General of South Africa (AGSA).[70] Although the AGSA noted the existence of current efforts to address the quality of pharmaceutical services, including the CCMDD programme and the Ideal Clinic initiatives, the overall assessment was critical. It was noted, for example, that while the necessary operational policies were in place, they were not implemented consistently. The AGSA was of the opinion that pharmaceutical budgets did not align with health needs, and that pharmaceutical infrastructure (both human and physical) was inadequate to meet patient needs. Inadequate performance by the provincial pharmaceutical depots was also identified.

The NDP also set out to "stimulate the national pharmaceutical industry to manufacture and market drugs on the National List of Essential Drugs, and to promote national self-sufficiency in the production of these drugs".[1] While some elements have been implemented (such as local preference policies in procurement, consistent with other national policies), concerted action in this regard is difficult to identify. There is an unresolved tension between the NDP's economic and health objectives. This tension has not been comprehensively assessed in the present analysis and warrants a separate effort. The Department of Trade and Industry's Industrial Policy Action Plan 2016/17–2018/19 notes the decision by Cipla, for instance, to invest R800 million in a new biosimilars facility at the Dube Tradeport.[71] In 2007, the 52nd National Conference of the African National Congress resolved to "explore the possibility of a state-owned pharmaceutical company that will respond to and intervene in the curbing of medicine prices".[72] The Department of Science and Technology has been investigating various options for the state-owned Khetlaphela facility at Pelindaba.[73]

The ability to assess progress with regard to the procurement and distribution of medicines, even if only for the public sector, is hampered by lack of transparency. Where progress is being made, reporting is internal (such as to the National Health Council), and it is only when reports such as that from the AGSA or from civil society are released, that insight into the performance of pharmaceutical logistics can be gleaned. The mismatch between what is reported, and what is intended, is palpable. Exactly how the systems currently in place for medicines procurement and distribution might have to be altered to fit the strictures of a funder-provider split under NHI has yet to be detailed, or even debated.

Rational use of drugs

The NDP aimed to "promote the rational prescribing, dispensing and use of drugs by medical, paramedical and pharmaceutical personnel and to support the informed and appropriate use of drugs by the community".[1] The identified interventions were "appropriate training, the provision of scientifically validated drug information for professionals and the community, the establishment of hospital therapeutic committees, good dispensing practice and an enhanced role for the pharmacist, and control of commercial marketing practices". Considerable impact on undergraduate and post-graduate curricula at health science tertiary institutions is evident, although the extent to which changes have been institutionalised in the health system remains, sadly, undocumented. Where support has been provided from donor-funded programmes, such as the USAID-funded Strengthening Pharmaceutical Systems (SPS) and Systems for Improved Access to Pharmaceuticals and Services (SIAPS) programmes executed by MSH, process indicators have been reported. Importantly, such support has resulted in significant policy decisions, at both provincial and national level; for instance, SPS and SIAPS support of the Gauteng Health Department's efforts led to publication of Gauteng Health's PTC Manual, which was subsequently disseminated provincially by the NDoH to influence possible adoption as national policy.

As mentioned, a self-regulatory Marketing Code Authority (MCA) has been established, but its code of practice does not have legal backing, and the enforceable code envisioned by section 18C of the Medicines and Related Substances Act (1965) is still not in place. Introduction of a patient information leaflet should have improved patient access to approved medicines information, but its impact has not been assessed. No other patient-directed or community-directed activities can be traced directly to the NDP or SADAP. Although the WHO has provided model medicines formularies for adaptation by national authorities, the *South African Medicines Formulary* (SAMF) remains a university-driven effort, owned by the South African Medical Association, and distributed on a for-profit basis. The AGSA's report underscores the consequences of persistent under-investment in pharmaceutical systems,[61] despite a marked increase in the number of pharmacists employed in the public sector since implementation of the occupation-specific dispensation (OSD) remuneration package.[74]

The NDP envisaged expanded "research on social and cultural factors which influence medicines usage", which would have required specific support for operational research, and deliberate engagement with academic partners as well as the responsible science councils (Medical Research Council and Human Sciences Research Council). Although there were efforts in this regard by SADAP, nothing remotely approaching the level of investment that has characterised the Australian system (NPS Medicinewise) was possible in South Africa.

Perhaps the most debated line in this chapter is one that, at first glance, is unremarkable: "At primary level prescribing will be competency, not occupation, based." That injunction has been accomplished by the amendment of section 22A of the Medicines and Related Substances Act, 1965, which recognises authorised prescribers other than medical practitioners and dentists. However, as shown above, the process is not yet complete, in particular with reference to the recognition of specialist nurse prescribers.

Recently, particular attention has been focused on the rational use of antimicrobials. In 2001, the National Antimicrobial Resistance Strategy Framework was launched in an attempt to improve "the appropriate use of antimicrobials over the next five years" in order "to manage antimicrobial resistance and limit further increases in resistant microbial infections, and improve patient outcomes".[75] It is still too early to determine if this framework will be successful.

Human resources development

The NDP aimed to "develop expertise and human resources to support the successful implementation of the policy and to promote the concepts of essential drugs and rational drug use and ensure their adoption throughout the country". One of the key proposals was to encourage the requirement of continuing competence as a basis for registration of health professionals. Continuing professional development provisions have been instituted for most health professionals, but are, inexplicably, still not finalised for pharmacists. Some progress is evident in the publication of draft qualifications for a new cadre of pharmacy-support personnel (pharmacy technicians), published for comment in late 2016.[76,77]

Research and development

The NDP aim was to "promote research that will facilitate the implementation, monitoring and evaluation of the National Drug Policy and/or meet the health care needs of the country".[1] As with the operational research envisaged as part of rational medicines use, no specific, ring-fenced funding of research specifically

intended to support the NDP was provided. Where research has been conducted, as cited in this chapter, funding has been obtained from a variety of sources. Only one nationwide assessment of the Essential Drugs Programme was conducted, in 2003.[54] Comparison with provincial baseline data from 1998 was possible, but no follow-on assessment was possible.

Technical co-operation with other countries and international agencies

The NDP envisaged "ongoing technical cooperation with international agencies, such as the WHO, and the maintenance and strengthening of this cooperation".[1] There was support for initial development of the policy document; a draft version was discussed with WHO staffers,[8] and the UK Department for International Development's support for SADAP was provided via the WHO. The extent of contact with the African regional office of the WHO has been less obvious. In the post-apartheid era, South Africa has re-established contact with such structures as the Commonwealth Pharmacists Association and the International Pharmaceutical Federation. As noted before, there is also greater involvement in international medicines regulatory harmonisation efforts. Contact has also been established with HTA agencies, including NICE International.

Traditional medicines

The NDP echoed the wording of the NDPC's terms of reference, aiming to "investigate the use of effective and safe traditional medicines at primary level". The policy details varied from the specific ("marketed traditional medicines will be registered and controlled"), to the long-term and aspirational ("a national reference centre for traditional medicines will be established"). The reference centre was instructed to compile a "national formulary of Medicines Control Council approved 'essential traditional medicines'".

A draft Policy on African Traditional Medicines for South Africa was published for comment in 2008.[78] The draft policy envisaged the establishment of a National Institute of African Traditional Medicines, although the regulation of African Traditional Medicines (ATM) was considered to fall within the ambit of a medicines authority regulatory. Nonetheless, it was argued that the "current legislation" did not cater for ATM and that *sui generis* legislation was warranted. Despite the passage of the Traditional Health Practitioners Act of 2007, no such enabling legislation has yet been developed, tabled or passed by Parliament.[79]

Monitoring and evaluation

The NDP aimed to "support the successful implementation of the National Drug Policy through establishing mechanisms for monitoring and evaluation of performance and impact that will identify possible problems and effective strategies". In particular, it was planned that a full evaluation of the NDP would take place every three years. No such evaluation has been conducted, beyond the evaluations of SADAP conducted for the donor, for which no reports were placed in the public domain. Point 9 of The Health Sector 10-point Plan for 2009–2014, was review of the NDP. The mid-term report, published in 2011, stated that "The Drug Policy was reviewed in 2009".[80] Although no new policy document was produced, the report noted the "development and passing of legislation to improve the performance of the Medicines Control Council". Although not placed in the public domain, a comprehensive report on the NDP, with detailed recommendations for future work, was developed by a task team appointed by the then Minister, Barbara Hogan, in 2009.[81]

Overall assessment

The WHO guidance for the development of national medicines policies was updated in 2001, after development of the NDP.[50] A careful, stepwise process of developing and implementing a prioritised action plan was recommended. However, as the 2002 CHP analysis pointed out, "the challenge of implementation is less a matter of following blue-prints and recipes than of 'learning by doing'" (p. 82).[9] It is clear from the assessment provided in this analysis that the NDP has, in part, not been implemented as originally envisaged. However, in significant sections of the policy, notably in relation to medicine pricing, policy detail has emerged over time. That said, the observation that "over time, the opportunities for negotiation have tended to diminish rather than expand" is still appropriate.[9] While formal opportunities for engagement, such as parliamentary hearings and opportunities to comment on draft legislation (mainly secondary), have been presented, other consultative fora (such as the National Health Consultative Forum) have largely lapsed. Much of the detailed debate now occurs in the National Health Council technical committees, with membership restricted to senior bureaucrats and political office-bearers. Where space for engagement has been created, that has been restricted to specifically mandated actors, such as the MSH-managed and USAID-funded projects (RPM Plus, SPS and SIAPS), with some academic involvement from selected pharmacy schools. Emphasis has largely been on systems-strengthening activities and the deployment of tools that have the intended effect of making essential medicines available and their use rational. What is entirely unclear is whether the original 1996 policy document is still regarded as a guide to action. That the 2009 review did not produce an updated National Medicines Policy is obvious. In the process of finalising the White Paper on NHI, careful consideration should be paid to systems for delivering affordable, quality essential medicines. The abbreviation 'NDP' now refers to the National Development Plan,[82] but a clear and comprehensive National Medicines Policy is still needed to guide this critical component of UHC.

Disclosure

The analysis provided in this chapter represents both an 'insider' and 'outsider' perspective, as the authors were intimately involved at various stages in the process. AG contributed to two external reviews of SADAP, has been a member of various ministerial task teams in this area, and currently serves on the Medicines Control Council and National Essential Medicines Committee. FS has served on various ministerial task teams and is the current chair of the Pricing Committee. BP was a member of the NDPC, has chaired two ministerial task teams, and was Chief Director: Registration, Regulation and Procurement in the National Department of Health.

References

1 South African National Department of Health. National Drug Policy for South Africa. Pretoria: NDoH; 1996.

2 Walt G, Gilson L. Reforming the health sector in developing countries: the central role of policy analysis. Health Policy Plan. 1994;9(4):353–70.

3 Republic of South Africa. Report of the Commission of Inquiry into High Costs of Medical Services and Medicines (The Snyman Commission). Pretoria: Government Printer; 1962.

4 Republic of South Africa. Report of the Commission of Inquiry into the Pharmaceutical Industry (The Steenkamp Report). Pretoria: Government Printer; 1978.

5 Republic of South Africa. Final report of the Commission of Inquiry into Health Services. Pretoria: Government Printer; 1986.

6 Republic of South Africa. Medicines and Related Substances Control Act (101 of 1965). Renamed the Medicines and Related Substances Act (101 of 1965) since 2003.

7 Republic of South Africa. Medicines and Related Substances Control Amendment Act (94 of 1991).

8 South African Department of National Health and Population Development. Draft National Pharmaceutical Policy for South Africa. Pretoria: SADNHPD; 1993.

9 Gray A, Matsebula T, Blaauw D, Schneider H, Gilson L. Policy change in a context of transition: drug policy in South Africa 1989–1999. Johannesburg: Centre for Health Policy, University of the Witwatersrand; 2002.

10 Reich MR. The politics of health sector reform in developing countries: three cases of pharmaceutical policy. Health Policy. 1995;32:47–77.

11 South African National Department of Health. White Paper for the Transformation of the Health System in South Africa. General Notice No. 667, Government Gazette No. 17910, 16 April 1997.

12 Summers R, Suleman F. Drug Policy and Pharmaceuticals In: Harrison D, editor. South African Health Review 1996. Durban: Health Systems Trust; 1996.

13 Gray A, Eagles P. Drug policy. In: Barron P, editor. South African Health Review 1997. Durban: Health Systems Trust; 1997.

14 Gray A. Equity and the provision of pharmaceutical services. In: Ntuli A, editor. South African Health Review 1998. Durban: Health Systems Trust; 1998.

15 Gray A, Suleman F. Drug policy – from macro development to health district implementation. In: Crisp N, Ntuli A, editors. South African Health Review 1999. Durban: Health Systems Trust; 1999.

16 Gray A, Matsebula T. Drug pricing. In: Crisp N, Ntuli A, Clarke E, editors. South African Health Review 2000. Durban: Health Systems Trust; 2001.

17 Bangalee V, Suleman F. Towards a transparent pricing system in South Africa: trends in pharmaceutical logistics fees. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

18 Ijumba P, Poole C, George G, Gray A. Access to antiretroviral therapy. In: Ijumba P, Day C, Ntuli A, editors. South African Health Review 2003/2004. Durban: Health Systems Trust; 2004.

19 Gray A, Gengiah T, Naidoo P. The pharmacist's assistant – a case study of a mid-level worker option. In: Ijumba P, Barron P, editors. South African Health Review 2005. Durban: Health Systems Trust; 2005.

20 Republic of South Africa. Medicines and Related Substances Control Amendment Act (90 of 1997). Government Gazette Vol. 390, No. 18505, Cape Town, 12 December 1997.

21 Pharmaceutical Manufacturers' Association v President of the Republic of South Africa. Case No. 4183/98; High Court of South Africa, Transvaal Provincial Division.

22 Dukes G, Hill S, Summers R, Bannenberg W. The medicines regulatory system in South Africa: review and proposals for reform. Pretoria: South African National Department of Health, 1998.

23 Republic of South Africa. South African Medicines and Medical Devices Regulatory Authority Act (132 of 1998).

24 Pharmaceutical Manufacturers Association of South Africa and Another: In re Ex Parte President of the Republic of South Africa and Others (CCT31/99) [2000] ZACC 1; 2000 (2) SA 674; 2000 (3) BCLR 241 (25 February 2000).

25 Republic of South Africa. Medicines and Related Substances Amendment Act (59 of 2002).

26 Report of the Ministerial Task Team on the Restructuring of the Medicines Regulatory Affairs and Medicines Control Council and Recommendations for the new Regulatory Authority for Health Products of South Africa. Pretoria: South African National Department of Health, 25 February 2008.

27 Republic of South Africa. Medicines and Related Substances Amendment Act (72 of 2008). Government Gazette, Vol. 426, No. 32148, Cape Town, 21 April 2009.

28 Republic of South Africa. Medicines and Related Substances Amendment Act (14 of 2015). Government Gazette, Vol. 607, No. 39585, Cape Town, 8 January 2016.

29 Minister of Health General Regulations to the Medicines and Related Substances Act. Government Notice No. 50, Government Gazette No. 40577, 27 January 2017.

30 Leng HMJ, Sanders D, Pollock AM. Pro-generics policies and the backlog in medicines registration in South Africa: implications for access to essential and affordable medicines. GaBI J 2015;4(2):58–63.

31 Leng HMJ, Pollock AM, Sanders D. The impact of the Medicines Control Council backlog and fast-track review system on access to innovative and new generic and biosimilar medicines of public health importance in South Africa. S Afr Med J. 2016;106(4):350–3.

32 PharmaAfrica. African Union Heads of State make a major policy decision to improve medicines regulation. 1 February 2016.

33 The Affordable Medicines Trust v the Minister of Health and Others 2005 JOL 13932 (CC).

34 Mistry v Interim National Medical and Dental Council and Others (CCT13/97) [1998] ZACC 10; 1998 (4) SA 1127; 1998 (7) BCLR 880 (29 May 1998).

35 Gray A. Prescribing and dispensing by nurses – neglected steps in the legislative process. HIV Nursing. 2010;1(2):28–31.

36 Republic of South Africa. National Health Act (61 of 2003). Government Gazette Vol. 469, No.26595, Cape Town, 23 July 2004.

37 Minister of Health. Norms and standards regulations applicable to different categories of health establishments. Government Notice No. 10, Government Gazette No. 40539, 4 January 2017.

38 Minister of Health. Medicines and Related Substances Act: Regulations: Medical devices and in vitro diagnostic medical devices. Government Notice No. 1515, Government Gazette, No. 40480, 9 December 2016.

39 Minister of Trade and Industry. Draft National Policy on Intellectual Property, 2013. General Notice No. 918, Government Gazette No. 36816, 4 September 2013.

40 Gray AL, Santa-Ana-Tellez Y, Wirtz VJ. Impact of the introduction of mandatory generic substitution in South Africa: private sector sales of generic and originator medicines for chronic diseases. Trop Med Int Health. 2016; 21(12):1504–12.

41 Mediscor. Mediscor Medicines Review 2015. Centurion: 2015.

42 Gray A, Suleman F. Pharmaceutical pricing in South Africa. In: Babar Z, editor. Pharmaceutical Prices in the 21st Century. Cham: Springer International Publishing; 2015.

43 Suleman F, Gray A. Pharmaceutical Policies in South Africa. In: Babar Z, editor. Pharmaceutical Policy in Countries with Developing Healthcare Systems. Cham: Springer International Publishing; 2017.

44 Minister of Health and Another v New Clicks South Africa (Pty) Ltd and Others (CCT 59/2004) [2005] ZACC 14; 2006 (2) SA 311 (CC); 2006 (1) BCLR 1 (CC) (30 September 2005).

45 Minister of Health Medicines and Related Substances Act. Regulations relating to a transparent pricing system for medicines and scheduled substances: (Benchmark Methodology). Government Notice No. R.354, Government Gazette No. 37625, 12 May 2014.

46 South African National Department of Health. Medicines and Related Substances Act. Publication of the guidelines for pharmacoeconomic sub-missions. Government Notice No. R.68, Government Gazette No. 36118, 1 February 2013.

47 Stander MP, Bergh M, Miller-Jansön H. A first step towards transparency in pricing of medicines and schedules substances – publication of guidelines for pharmaco-economic submissions. S Afr Med J. 2014;104(1):10–11.

48 Minister of Health. Medicines and Related Substances Act. General regulations relating to bonusing and sampling. Government Notice No. R.642, Government Gazette No. 37936, 22 August 2014.

49 Minister of Health. Medicines and Related Substances Act. Interim adjustment of single exit price of medicines and scheduled substances (SEPA) for 2016. Government Notice No. 893, Government Gazette No. 40188, 5 August 2016.

50 World Health Organization. How to develop and implement a national drug policy. 2nd ed. Geneva: WHO; 2001.

51 Perumal-Pillay VA, Suleman F. Quantitative evaluation of essential medicines lists: the South African case study. BMC Health Serv Res. 2016;16(1):687.

52 Perumal-Pillay VA, Suleman F. Selection of essential medicines for South Africa – an analysis of in-depth interviews with national essential medicines list committee members. BMC Health Serv Res. 2017;17(1):17.

53 Cassimjee M, Suleman F. Adherence to hypertension treatment guidelines in state facilities in KwaZulu-Natal, South Africa. J Eval Clin Pract. 2009;15(6):1077–81.

54 South African National Department of Health. Impact of the Essential Drugs Programme at Primary Health Care level in South Africa. Pretoria: NDoH; 2003.

55 Van Heerden JA, Burger JR, Gerber JJ. Inappropriate medicine prescribing in older South Africans: A cross-sectional analysis of medicine claims data. S Afr Med J. 2016;106(10): 1010–6.

56 Meuwesen WP, du Plessis JM, Burger JR, Lubbe MS, Cockeran M. Prescribing patterns of non-steroidal anti-inflammatory drugs in chronic kidney disease patients in the South African private sector. Int J Clin Pharm. 2016;38(4):863–9.

57 Truter I, Kotze TJ, Knoesen BC. Dispensing of the combination of amoxicillin with clavulanic acid to elderly patients: a database analysis. Value Health. 2015;18(7):A748.

58 Truter I. Anti-dementia medicine dispensing patterns: a community pharmacy database analysis. Value Health. 2015;18(7):A746.

59 Truter I. Prescribing patterns of anti-migraine medicines in South Africa using a claims database. Int J Clin Pharm. 2015;37(3):447–51.

60 Truter I, Shankar S, Bennie M, Woerkom MV, Godman B. Initiatives in South Africa to enhance the prescribing of generic proton pump inhibitors: findings and implications. J Comp Eff Res. 2015;4(2):123–31.

61 Truter I. Prescribing of drugs for Alzheimer's disease: a South African database analysis. Int Psychogeriatr. 2010;22(2):264–9.

62 Katende-Kyenda NL, Lubbe MS, Serfontein JH, Truter I. Inappropriateness of antimicrobial prescription in private primary health care settings in South Africa. S Afr Med J. 2006;96(8):704–5.

63 Wirtz VJ, Hogerzeil HV, Gray AL, et al. Essential medicines for universal health coverage. Lancet. 2017;389(10067):403–76.

64 Blecher M, Pillay A, Patcharanarumo W, et al. Health financing lessons from Thailand for South Africa on the path towards universal health coverage. S Afr Med J. 2016;106(6):533–4.

65 Nicolosi E, Gray AL. Potential costs savings from generic medicines – protecting the Prescribed Minimum Benefits. S Afr Fam Pract. 2009;51(1):59–63.

66 Gray A, Pharasi B (chair), Quinot G, Suleman F, Dubula V. Report of the Ministerial Task Team on procurement: ensuring medicines availability at facilities through innovative procurement and distribution models. Prepared for the South African National Department of Health. Pretoria: NDoH; 2013.

67 Pharasi B (chairman) et al. Medicines Procurement Reform in the Public Sector – Challenges and Opportunities for Improvement of Medicines Procurement in South Africa's Public Sector. Prepared for the South African National Department of Health. Pretoria: NDoH; 2010.

68 Wilmshurst JM, Blockman M, Argent A, Gordon-Graham E, Thomas J, Whitelaw A, McCulloch M, Ramiah M, Dyeshana H, Ireland J; Drugs and Therapeutics Committee. Leaving the party – withdrawal of South African essential medicines. S Afr Med J. 2006;96(5):419.

69 Stop Stock Outs Project. 2015 Stop Stockouts National Survey: Third Annual Report – South Africa. 2016.

70 Auditor-General South Africa. Performance audit of the management of pharmaceuticals at departments of health. Pretoria; AGSA:2016.

71 South African National Department of Trade and Industry. Industrial Policy Action Plan 2016/17–2018/19. Pretoria; DTI: 2016.

72 African National Congress. 52nd National Conference: Resolutions. 20 December 2007. [Internet]. [cited 24 April 2017]
URL: http://www.anc.org.za/content/52nd-national-conference-resolutions

73 Skosana I. New state-run pharmaceutical company to produce ARVs by 2019. Bhekisisa, 17 February 2016.

74 Day C, Gray A. Health and related indicators. In: Padarath A, Barron P, editors. South African Health Review 2017. Durban: Health Systems Trust; 2017.

75 South African National Department of Health. Antimicrobial Resistance National Strategy Framework, 2014–2024. Pretoria: NDoH; 2014.

76 South African Pharmacy Council. Qualification for pharmacy support personnel: diploma: pharmacy technician. Board Notice 196 of 2016, Government Gazette No. 40522, 23 December 2016.

77 South African Pharmacy Council. Qualification for pharmacy support personnel: occupational certificate: pharmacy technician. Board Notice 198 of 2016, Government Gazette No. 40522, 23 December 2016.

78 Minister of Health. Draft Policy on African Traditional Medicines for South Africa. General Notice No. 906, Government Gazette No. 31271, 25 July 2008.

79 Republic of South Africa. Traditional Health Practitioners Act (22 of 2007). Government Gazette Vol. 511, No. 30660, Cape Town, 10 January 2008.

80 South African National Department of Health. Progress Report on the Implementation of the 10 Point Plan of the Health Sector 2009–2014. Pretoria: NDoH; 2011.

81 Matsoso MP (chair) et al. Report of the Medical Products Technical Task Team. Prepared for the South African National Department of Health. Pretoria: NDoH; 2009.

82 National Planning Commission. National Development Plan 2030. Pretoria: National Planning Commission; 2012.

Development of the health system in the Western Cape: experiences since 1994

6

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Provincial governments in South Africa have a critical responsibility in terms of population health, yet few provincial-level analyses of health-system development have been undertaken. This chapter reports on research being conducted in the Western Cape to understand the province's particular experience of health-system transformation since 1994, set against wider national experience. The research is being undertaken collaboratively by the authors of this chapter, a team of Western Cape provincial health managers and researchers.

The chapter is structured to reflect the Western Cape's 22-year experience. The situation that faced the province in 1994 is outlined briefly, followed by a description of key features of the three health strategies that have driven provincial health-system development over time. An assessment is then presented of the overall nature and patterns of Western Cape health-system change, and the achievements and limitations of this transformation are considered. The chapter concludes with some early lessons from this experience, and relevant, international experience is considered.

This chapter reports on research being conducted in the Western Cape to understand the province's particular experience of health-system transformation since 1994.

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Introduction

The 1994 African National Congress (ANC) Health Plan[1] outlined a vision for post-apartheid health-system transformation founded on equity; this demanded radical system re-structuring, and was eventually translated into the 2003 National Health Act (NHA).[2] The 1996 Constitution,[3] meanwhile, gives national and provincial governments concurrent responsibility for health care, and the NHA gives the provincial health minister the responsibility to consider "any matter to protect, promote, improve and maintain the health of the population within the province". Thus provincial governments are both responsible for implementing national health policies and have the authority to develop health legislation for consideration by the provincial legislature. Yet since 1994, there appear to have been no specific analyses of provincial health-system development, notwithstanding an early report on provincial health-department restructuring[4] and a few cross-provincial analyses around particular health services.[5,6]

This chapter reports on ongoing research being conducted in the Western Cape (WC) to understand this province's particular experience of health-system transformation since 1994. The focus is on the system as a whole, including governance and resourcing functions, rather than on a particular health service. The research is being undertaken collaboratively by the authors of this chapter, a team of WC provincial health managers and researchers. This chapter is the first output of the larger project. It presents a descriptive but detailed overview of health-system development in the WC since 1994, highlighting critical dimensions of this experience.

Methods

The chapter draws on research data generated through document review (of strategic and annual plans and reports, and other relevant material); analysis of routine data and the *District Health Barometer*; two workshops held separately with urban- and rural-based provincial health managers; a set of detailed, key-informant (KI) interviews (with respondents from the provincial Department of Health (PDoH) at various system levels; respondents from outside the Department; and respondents with national experience); and short interviews with respondents with long-term experience in the WC health system. Through these processes, we have so far engaged with a total of 73 health-system actors in reconstructing and gathering perspectives on the experiences of the 1994–2016 period. The researchers have led data collection and analysis, but the whole team has met consistently to plan, reflect on and consider early data analyses. Key-informant interviews were conducted with informed consent, and respondents' confidentiality and anonymity have been protected by the researchers. Qualitative data analysis entailed a broad thematic analysis, with relevant coding, and triangulation across respondents and across data sets (including document reviews and quantitative data). Ethical clearance was provided by the University of Cape Town.

Findings

The situation facing the Western Cape in 1994

The WC inherited quite a different apartheid legacy from that of the other provinces. It was one of only two provinces that elected a coalition government, led by the National Party, and one of the two provinces in which the new administration was created out of a single, and fairly well-functioning, former bureaucracy (the Cape Provincial Administration (CPA)). It also had a legacy of socio-economic advantage, with the second-highest income per capita and the highest human development index,[7] which translated into better health indicators, e.g. the WC provincial infant mortality rate was more than 1.5 times lower than the national average in 1994 (27 per 1 000 live births versus 48 per1 000 live births).[8]

In terms of health services, the WC had a global reputation for innovative and high-quality hospital care and had significant 'academic health capital', in the form of three universities offering a wide range of health professional training (including two offering medical training). In resourcing terms, the province had the highest public-sector health expenditure per capita across provinces (twice that of the national average[9]), as well as the highest availability relative to population of clinics and public-sector doctors and nurses, and the second-best availability in terms of acute public hospital beds. The inclusion of private-sector resources slightly improved the WC's relative resource availability (e.g. from an eight to nine-fold difference in doctor availability compared with the province with the lowest availability[7]).

Nonetheless, as health services nationwide had been seen as "instruments of the state in achieving apartheid goals",[10] this also left its imprint on the WC.

First, the hospicentric nature of healthcare provision nationally was particularly evident in the WC. In 1992/93, 60% of total provincial hospital expenditure was spent on academic and tertiary-level acute-care hospitals (72% when tuberculosis (TB) and special hospitals are included[11]), compared with 58% spent on academic and tertiary hospital care nationally.[7] The extremely limited provision of lower-level care placed particular pressure on the three central hospitals – highlighting the need to strengthen hospital services outside Cape Town.[a,b,11]

Second, similar to the situation nationally,[12] public healthcare provision in the WC was severely fragmented between multiple authorities, preventive and curative services, and along racial lines, with particular consequences for primary care in Cape Town.[c] Private health care, meanwhile, largely targeted the higher-income and white population, although in rural areas private, part-time District Surgeons were contracted on a fee-for-service basis to provide curative primary care to 'State patients' in their own surgeries.[d,13]

Third, the racism permeating the WC provincial health sector was exemplified by the fact that none of the racially divided administrative authorities specifically took responsibility for healthcare provision to the black population, which had no residential rights in Cape Town

a Key-informant interview 22 August 2016.

b Key-informant interview 6 September 2016.

c Timeline mapping workshop with the PDoH, Cape Town 16 December 2015.

d Key-informant interview 24 June 2016_a.

prior to 1994.[d,e,f,12] Health care was "segregated on every level, through our human resources and everything"[e] even down to the minutiae of hospital administration: "every hospital had pink and green folders on a racial basis".[d]

Overall, therefore, in 1994 there simply was no 'health system' in the WC province when judged against the now widely used World Health Organization (WHO) definition of the term: "a coherently organized set of services and people seeking to promote, restore or maintain population health in a particular geographic area".[14]

A 20-year perspective on Western Cape health-system development

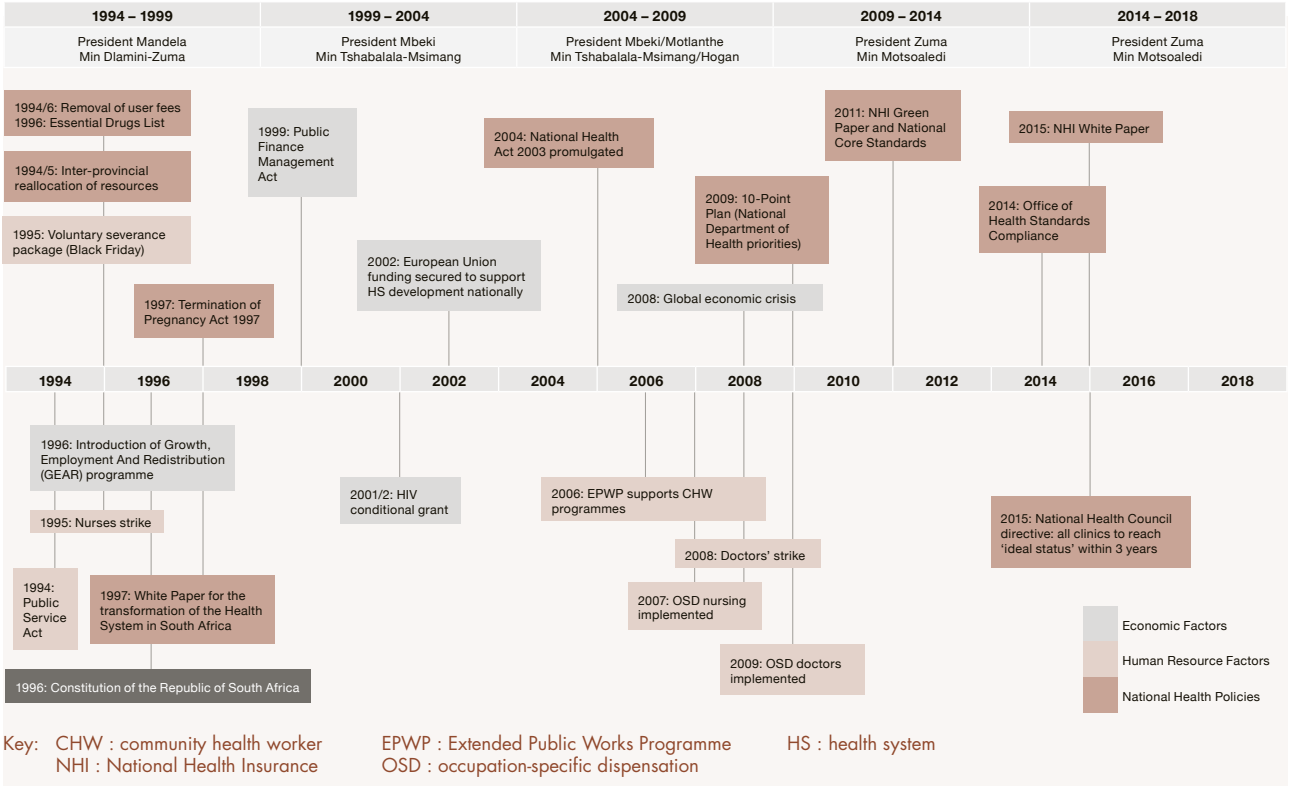
Within the context of broader political and economic change, as well as national health-policy imperatives (Figure 1), three successive provincial health strategy documents have guided WC health-sector transformation since 1994 (Table 1).

The 1995 Provincial Health Plan closely mirrored the ANC Health Plan[1] in its emphasis on implementing a primary health care (PHC) approach and supporting the integration of health within wider social development. More specifically, the 1995 plan (Table 1) proposed a service-delivery model based on comprehensive primary care services, led by clinical nurse practitioners (CNPs), organised within district sub-units integrating previously vertically organised health programmes, with referral pathways to district and regional hospitals. A specific intention was to ensure that use of academic hospitals and other 'supra-regional' services would be "limited to what is essential and no more".[11] In this early period, PHC services were strengthened through national initiatives (Figure 1), while over 120 primary care clinics were renovated and built, and over 1 000 hospital beds were closed, as the proposed 'size and shape' of the post-apartheid provincial health system was put in place.[g,h] Realisation of the HIV and AIDS burden also led the PDoH to trial delivery of the AZT (zidovudine) short-course regimen in 1999, despite wider governmental AIDS denialism[h,c] Antiretroviral therapy (ART) was later rolled out across the province, supported by donor funding (Figure 2).

The appointment of a new Head of Department (HoD) in 2002 and the national requirement to develop a Service Transformation Plan stimulated the development of the second provincial health strategy (Table 1). The goal of the Comprehensive Service Plan (CSP) was to "reshape, reprioritise and re-engineer"[d] the health system to ensure that people received care at the correct level, thus enhancing the overall affordability and efficiency of the system. Provincial respondents judged that the CSP "concretised" the PHC philosophy of the 1995 Plan, enabling the "reorientation" of the provincial health system by providing a "roadmap" for decision-making. Supporters of the CSP said that, "it galvanised us, focused us, gave us some direction … [It was] used for taking everybody along with us".[b,i,j,k]

e Key-informant interview 30 August 2016.
f Key-informant interview 1 December 2016_a.
g Key-informant interview 20 October 2016.
h Key-informant interview 12 December 2016.
i Key-informant interview 24 May 2016.
j Key-informant interview 2 September 2016.
k Key-informant interview 19 August 2016.

Figure 1: Critical contextual factors influencing provincial health system development



Key: CHW : community health worker
NHI : National Health Insurance
EPWP : Extended Public Works Programme
OSD : occupation-specific dispensation
HS : health system

Source: Timeline mapping workshops with the PDoH, Cape Town 16 December 2015 and Worcester 11 July 2016; WC Annual Reports.

Table 1: Comparison of the three Western Cape provincial health strategies after 1994

	1995 Provincial Health Plan	HealthCare 2010 + Comprehensive Service Plan (CSP)	HealthCare 2030
Vision/Mission	"To promote and maintain the optimal health of all people in the WC province through the integration of health within the broad context of social reconstruction and development, and by ensuring the provision of a balanced health system and all related services"	Secure basic access to quality services for the whole population of the province, whilst tackling the changing burden of disease (HIV and AIDS and TB) and intra- and inter-provincial inequity	"Achieving optimal health outcomes of the population requires robust upstream interventions by the whole of society and a high-quality, comprehensive health service"
Key drivers	Move towards PHC approach and decentralisation of health services Optimal service to be provided within budget limit	Build on 1995 Plan Reshape health services towards: 90% contacts at primary level, 8% at secondary level, and 2% at tertiary level Improve quality and financial sustainability of health services	Maintain service-delivery shape of HealthCare 2010/CSP A systems approach to health-system development Move from curative paradigm to one of prevention, promotion and wellness, adopting a patient-centred approach Focus on values of caring, competence, accountability, innovation, responsiveness and respect (C^2AIR^2)
Key thrusts: District Health Service (DHS) with District Hospitals (DH)	District Management Team will have responsibility for planning and management Community-level services will • encompass local CHC, linking to clinics and other services, offering comprehensive package of care, led by clinical nurse practitioner and formally accountable to community; • be organised within sub-units of districts, with clear referral pathways to district and regional services. Vertically organised programmes will be integrated into comprehensive services at each level. DHs to be upgraded	Metro DHS (Cape Town) will comprise four sub-structures, each with its own management team, reporting to the District office Five rural districts will be divided into sub-districts, with sub-district management led by DH medical superintendent and hospital to support CHCs and clinics Community-based services, including TB and HIV, to be managed as integral component of DHS but provided mainly by NPOs Two new DHs to be built in Metro, and regional hospitals to be converted to district hospitals	District level to enable service delivery, integrate decision-making and be accountable to provincial level Strengthen focus on prevention and promotion within PHC; and strengthen rehabilitation services and mental health care TB management integrated within primary, home and community-based care Manage tension between vertical programme structure and integrated service delivery Small DHs to provide full package of care
Key thrusts: Hospitals	Rationalise and restructure highly specialised services in academic hospitals; reallocate resources to PHC, district and regional services Strengthen regional hospitals outside Cape Town (George, Paarl, Worcester) to filter upwards	Retain all three academic hospitals, each with the critical mass of level 2 and 3 beds needed for teaching purposes Across the province, reduce level 3 beds and increase level 2 and 1 beds Number of level 3 beds determined by funding through National Tertiary Services Grant	Central hospitals integral to service-delivery platform; will continue to advocate for adequate conditional grant funding Level 3 and large DH (level 1) to offer mix of bed types to meet needs of immediate population General specialist (level 2) hospitals to offer outreach and support to DHs

Key: CHC : community health centre NPO : non-profit organisation PHC : primary health care

Source: Provincial Health Plan 1995,[11] HealthCare 2010,[15] and HealthCare 2030.[16]

Significant steps in District Health System[l] (DHS) development were made in line with the plan (Table 1 and Figure 2). In 2005, all primary care services in rural areas were brought under provincial management within new health districts. In Cape Town, DHS management structures were established and new managerial appointments made in 2009/10. The reclassification of some level 2 hospitals also strengthened the DHS, and as broadly envisaged in the 1995 Health Plan (Table 1), construction of two new District Hospitals began in under-served areas in Cape Town, alongside regional hospital upgrades (Figure 2). DHS human-resource development included extending the CNP cadre, appointing family medicine physicians, and developing community-based services by contracting with non-governmental organisations (NGOs), in part to employ community health workers (drawing on the external resources of the HIV/AIDS Programme and the Expanded Public Works Programme).[c,m]

Within hospitals, however, there were operational challenges in implementing the CSP's 'ideological' efforts to distinguish between level 2 and 3 care, as part of a drive to contain overall hospital expenditure and protect resources for PHC and the DHS.[i,n,o] Meanwhile, the strengthened focus on efficiency and cost containment was both praised and criticised.

The current provincial health strategy, HealthCare 2030, represents the 'third wave' of provincial health reform. Although some PDoH respondents see it as "too woolly" or "soft", for others this strategy is "aspirational", "strategic" and will support "innovation" [a,i,p,q,r]

l The term 'District Health Services' is used in some policy documents. However, in this article, the internationally recognised term 'District Health System (DHS)' is used throughout.

m Timeline mapping workshop Worcester 11 July 2016.

n Key-informant interview 25 May 2016.

o Key-informant interview 24 June 2016.

p Key-informant interview 15 June 2016.

q Key-informant interview 21 September 2016.

r Key-informant interview 22 September 2016.

Recognising that the detailed structure and resourcing guidance offered by the CSP limited the flexibility needed to respond to changing contexts, HealthCare 2030 deliberately adopted a broad health systems approach and vision. Patient-centred care and quality improvement are emphasised, as well as health promotion and prevention, and the need for wider action to address the social determinants of health. The strategy also highlights the need for "dynamic and distributed leadership"[16] to develop core organisational values and nurture employee potential. As the outgoing HoD noted in his foreword, the CSP "had not focused adequately on many 'people issues', related both to patients as well as to the staff … [but] continuous improvement in patient experience can only be achieved with caring and engaged staff".[16]

Two inter-linked and noteworthy dynamics underpinning the WC health-system development over time are: (i) reshaping the health-service platform, including the role of academic hospitals, while containing budget growth; and (ii) changing relationships between the PDoH and the universities and clinicians. In the context of considerable economic constraints[s] (Figure 1), the budgetary principle underlying the 1995 Health Plan was 'cut and grow' – that is, services and expenditure at tertiary level had to be cut to reduce overall expenditure and allow reallocation towards, and growth in, primary care and rural services.[g,h] This approach fed into the CSP and its focus on separating level 2 and 3 hospital services to protect resources for PHC, alongside the strong push for efficiency improvements. Budgetary re-allocations inevitably had potential impact on the health professions' training role of the tertiary hospitals, and indeed the 1995 Health Plan initially proposed the creation of one faculty of health sciences by merging training activities across the three universities. Not surprisingly, resource re-allocation away from academic hospitals met with considerable resistance from university managers and clinicians. However, over time, budget constraints relaxed, given average annual real growth in the provincial health budget (conditional grants and the equitable share allocation) of 5.9% compared with 5.6% nationally, for 2002/03–2008/09.[18] The much improved relationships then resulted in greater engagement by university staff and clinicians in the development of HealthCare 2030, which acknowledged central hospitals as integral to the provincial health system (Table 1).

Assessing the scope of health system transformation

Although they are different documents, the three WC strategies have focused consistently on strengthening PHC and the DHS, and have sought to develop a coherent and unitary provincial health system offering accessible, equitable, good-quality, efficient and financially sustainable services for all. The emphasis of the 1995 Plan on the leading role of the public sector in the provincial health system has been a sustained feature of health-system transformation, although the private sector was acknowledged as a strategic partner in HealthCare 2030.

In summarising key health-system developments, Figure 2 demonstrates, firstly, that system change has been *sustained over time* towards the overarching goals. Each strategy document sought to build on the previous one (Table 1), while introducing new emphases. Respondents within and outside the PDoH commented that leadership stability and depth also "made a considerable contribution in the ability to move the ship in a predetermined direction".[q] Two of the four HoDs during this period served for nine and 12 years respectively, and the 2015 senior management team together had over 150 years of WC health-management experience.[c] Strong technical leadership has been supported by what respondents from different vantage points perceive as an appropriate demarcation of boundaries and roles between the HoDs and the more frequently changing political heads; in the province, "the administration is the administration and the politics is the politics".[p] Budget growth[18] together with strategic use of external resources has also enabled health-system development, alongside efficiency improvements resulting from robust management.[d,t]

Secondly, Figure 2 shows how system-wide this transformation has been: every building block of the health system[14] has been touched by change. Strengthening PHC, in particular, required not only infrastructure development across levels of care, but also health-workforce and pharmaceutical-management developments, backed up by new roles for higher-level hospitals, governance changes and strategies to leverage additional resources and improve resource use efficiency. Efforts have also been made to develop a system that offers comprehensive health care, rather than strengthening specific health programmes towards particular disease-control goals (although the HIV/AIDS programme was initially organised vertically, and HealthCare 2030 notes the continuing need to manage this tension).

Thirdly, the need for *system-deep* transformation has also been recognised, in line with international thinking (Figure 2).[19,20] Beyond the 'hardware' developments of infrastructure, service-delivery models, resource allocations, human-resource/drug-supply innovations, and organisational changes, attention has been paid to developing the health system's 'software' – both the 'tangible software' of routine managerial processes and the 'intangible software' of values and norms.[21]

Significant attention has been paid, particularly from the CSP era, to instituting planning and management processes that have sustained system-wide implementation of strategic policy directions and initiatives. Respondents outside the Western Cape see the province as one where there is "almost military precision" in terms of policy implementation,[u] and in which managers are "held to account quite deliberately".[v] The opening of two new District Hospitals in Cape Town is noted as an indication of this capacity to implement planned change over time.[f] Working within national frameworks, annual strategic planning and review and monitoring processes have also been implemented, linked to Annual Performance and District Health Plans. Quarterly monitoring and evaluation processes, meanwhile, now support review of service-delivery targets and allow reflection on wider research and specific PDoH challenges. Bringing system actors together within and across levels, these various processes were, moreover, judged by respondents to be "very powerful for the whole department" in allowing people to think about the system as

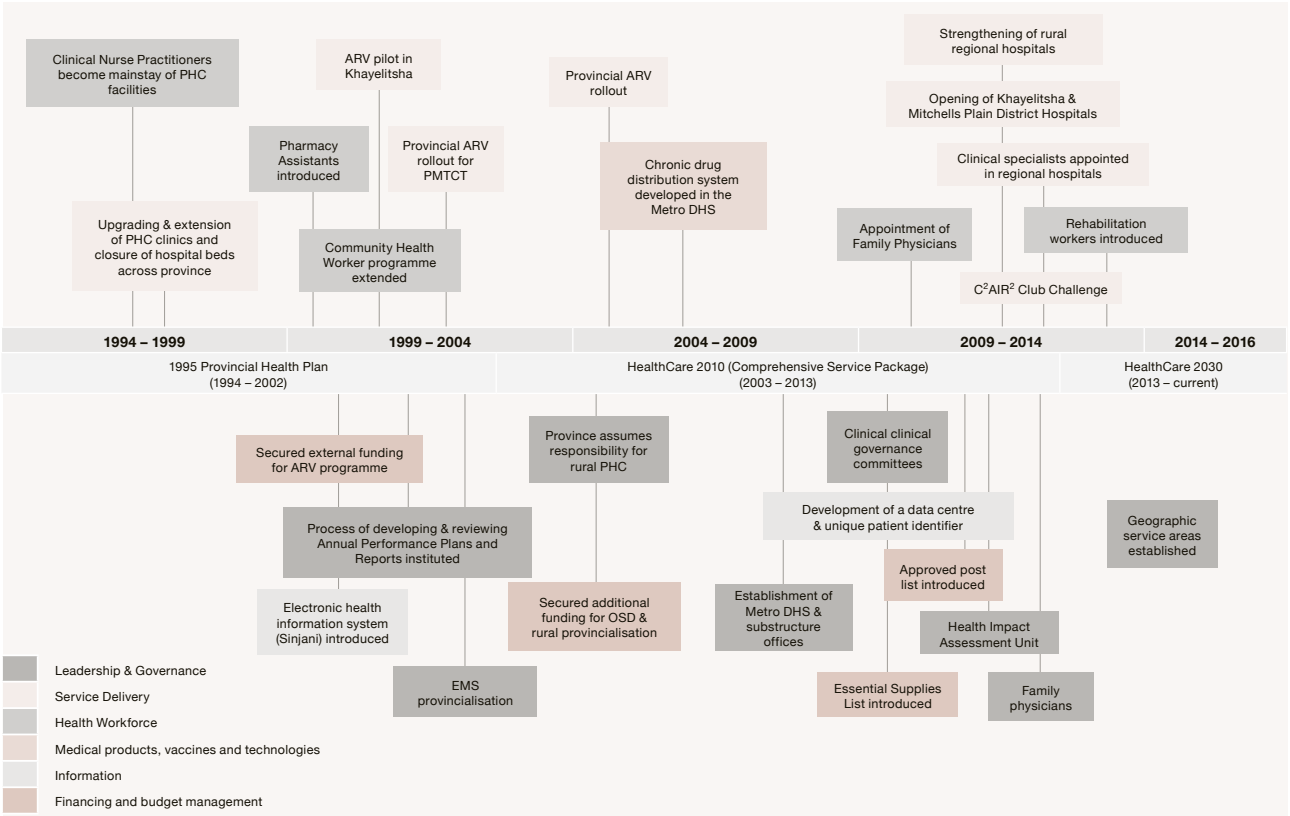
s Resulting from: the nationwide apartheid debt inherited in 1994; implementation of the Voluntary Service Package agreement (leading to the loss of 6 000 provincial health posts, including 30% of all nursing posts[17]); resource battles between sectors within the new provincial government; the health-sector decision to re-allocate resources from better to less well-resourced provinces; and the budget discipline introduced by the Growth, Employment And Redistribution (GEAR) macro-economic policy (Figure 1).

t Key-informant interview 28 October 2016.

u Key-informant interview 30 November 2016.

v Key-informant interview 1 December 2016_b.

Figure 2: Key events in Western Cape health-system development, 1994–2016



Key: ARV : antiretroviral C²AIR² : Club Challenge, a change-management initiative DHS : district health system
EMS : emergency medical services PHC : primary health care PMTCT : prevention of mother-to-child transmission of HIV
OSD : occupation-specific dispensation

Source: Timeline mapping workshops with the PDoH, Cape Town 16 December 2015 and Worcester 11 July 2016; WC Annual Reports.

a whole.[a,k,w] Information-system development, including the use of a unique patient identifier across all service platforms, has supported these processes, as has the development of in-house public-health expertise (since 2011, based within the Health Impact Assessment directorate).[c,i,w]

Financial management has, meanwhile, been strengthened by an internal audit function and relevant management tools. The Approved Post List (Figure 2), for example, has enabled hospital and district managers to make decentralised decisions about the use of their staffing budget, while retaining tight control of the total departmental budget. "As a non-financial manager, and as a CEO, you could actually understand and manage your finances and staffing, and I found that fantastic".[m] Total spending is now regularly within 1–2% of total budget, and in 2015/16 the Western Cape DoH received its 12th consecutive unqualified audit from the Auditor-General[22] (whereas the average number of unqualified audits achieved by other provinces for the nine-year period 2004/05–2012/13 ranged from seven to zero[23]).

Another area of tangible software development is the engagement of clinical expertise in system-level decision-making, notwithstanding some concerns that this engagement has reduced over time.[i,k] Family-medicine physicians now have clinical governance roles at PHC level, although they struggle to balance these roles with their service-delivery workload, and specialists based in regional hospitals (level 2 clinical heads) co-ordinate and improve patient care across the service-delivery platform in their discipline. Working through provincial clinical governance committees (PCGCs) they have the opportunity to set and share clinical standards, feed into wider policy development, and adapt national guidelines to the local setting. However, these committees differ in their functionality and effectiveness.[k,q] Five Geographic Service Areas, organised around the network of primary care clinics and district hospitals that drain to a specific regional hospital, also bring clinicians and managers together across organisational silos (including nationally demarcated budget programmes) to "design the service to look after the population in that area".[i]

Finally, each strategic plan has sought to develop the intangible software needed to sustain PHC by supporting action to address the inherited public-sector organisational culture.[4] The 1995 Health Plan focused on "ridding the department of this apartheid thing"[d] while giving practical content to the principles of health-system equity and responsiveness. HealthCare 2010 then provided a framework to operationalise these principles, and emphasised strong rational planning and robust processes of managerial accountability. HealthCare 2030 has focused attention on staff experiences of alienation and disempowerment, the need to strengthen values-based and distributed leadership, and the need to change organisational culture (Figure 2).[24] However, achieving such change is a very difficult and long-term task. For example, there is still limited diversity in the demographic profile of the PDoH managerial cadre, with only two black managers among the more than 50 director-level managers.

w Key-informant interview 9 June 2016.

The achievements and limitations of health-system transformation

Respondents working across the WC health system have certainly experienced and perceived systemic changes. Although the continuing fragmentation of urban PHC services between the PDoH and City of Cape Town remains a critical challenge, the sense of many is that: "undoubtedly, district health services have been strengthened … and also there's more of a sense that [district hospitals] should be doing more and we should understand what they are doing, and the regional hospitals are big and I think overall even that the central hospitals are actually doing more of what they are supposed to be doing as well".[i] Over time, as a respondent from outside the PDoH noted, there have been "reasonably systematic attempts to make [the system] less divided and less unequal", and now there are "decent facilities for poor people".[x]

These experiences are reflected in wider data on system-level change. Figure 3 shows the human and financial resource re-allocation towards the DHS (Programme 2) that has been achieved, indicating both an increase in overall expenditure (in real terms) and an increase in the share of total health expenditure. However, in 2015/16, the percentage of total expenditure on the DHS was still lower in the WC (39%) than the national average (45%), albeit higher than Gauteng (32%), a province that inherited a similarly large complement of academic and tertiary hospital beds. Importantly, the WC resource reallocation has been achieved while maintaining spending within budget limits.

In tandem, there have been significant (real) increases in WC per capita expenditure on the DHS and PHC (the latter slightly above the national average) and utilisation of district services.[y] Over a 12-year period (1999/2000–2010/11), there was a 60% increase in PHC utilisation, at a rate higher than population growth.[z]

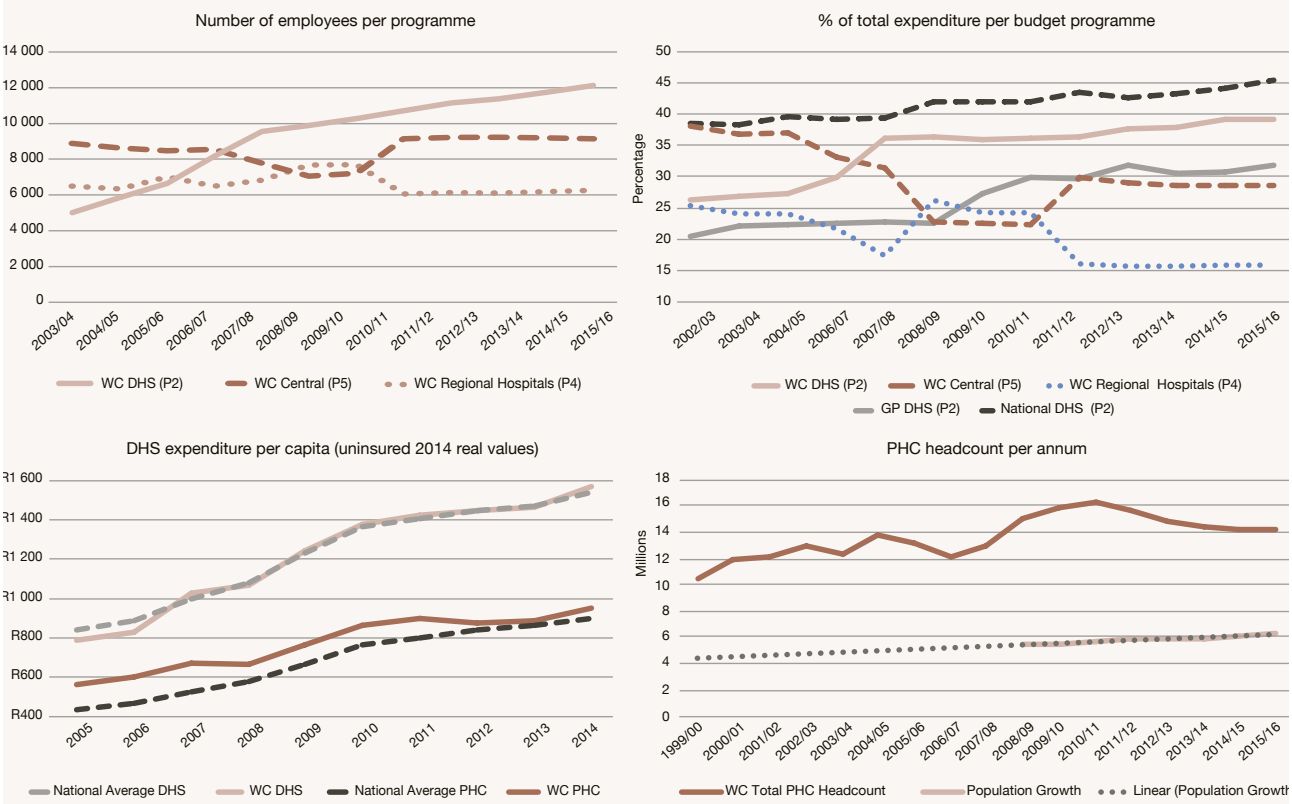
Similarly, analysis of routine data over the last five years shows a steady increase in the use of district hospitals, relative to regional and tertiary/central hospitals, where utilisation has remained static (Figure 4). These utilisation patterns are likely, moreover, to have offered particular access gains for poorer groups, given the wider evidence that district hospitals are preferentially used by these groups in South Africa.[25] A shift towards district hospital utilisation

x Key-informant interview 13 June 2016.

y A key driver of increased expenditure has been conditional grants for HIV and AIDS and TB.

z The declines in PHC headcounts in recent years are possibly due to new community-based service-delivery platforms and chronic-disease dispensing.

Figure 3: Western Cape resource reallocation to the DHS and PHC: number of employees, proportion of total health and per capita expenditure relative to national trends, and headcount per annum

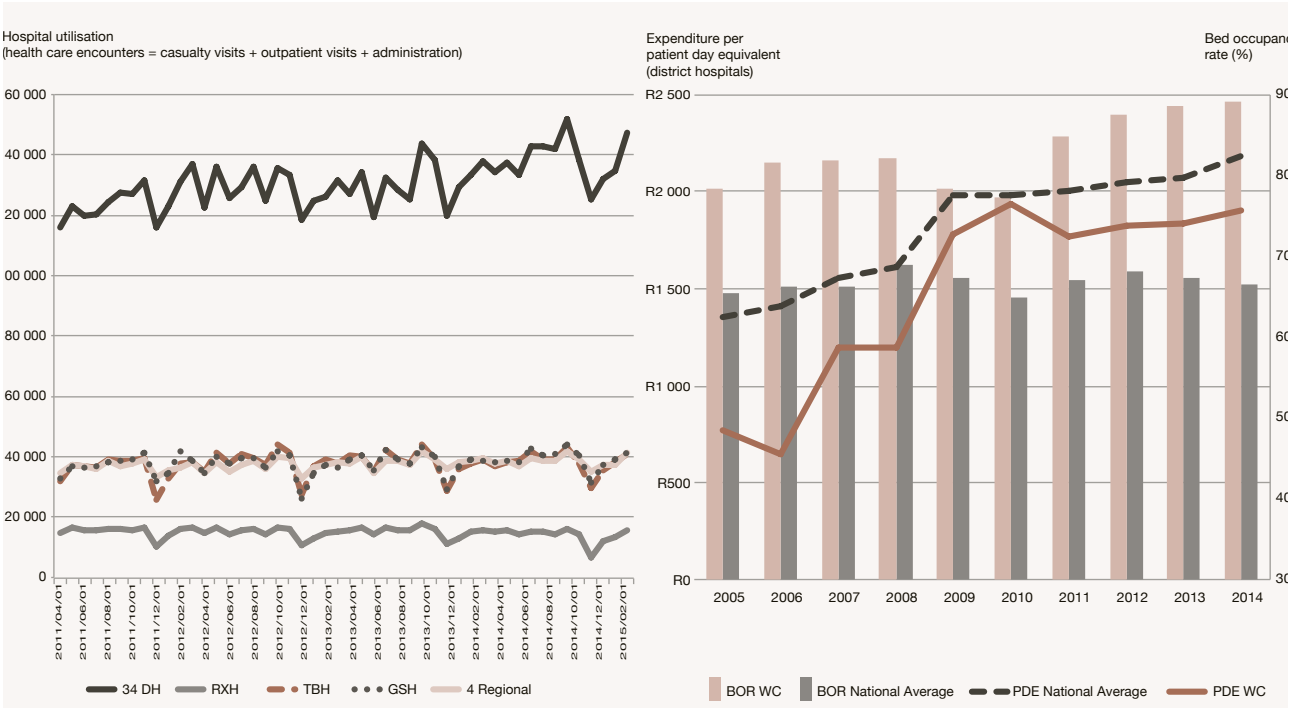


Note: different time periods in the graphs reflect availability of data.

Key: Central : central hospital (budget programme 5) DHS : district health system (budget programme 2)
Reg hosp : regional hospital (budget programme 4)

Source: WC Annual Reports (2003–2016), *South African Health Review 2011*, National Treasury Budget Annual Statements (2002–2016), *District Health Barometer* (2005–2015).

Figure 4: Western Cape district hospital utilisation and efficiency: utilisation relative to central/tertiary and regional hospitals; bed occupancy rate, and costs per patient day equivalent, relative to national trends



Key: BOR : bed occupancy rate
PDE : patient-day equivalent
DH : district hospital
RXH : Red Cross Hospital
GSH : Groote Schuur Hospital
TBH : Tygerberg Hospital.
OPD : outpatient department

Source: WC Annual Reports (2005–2014), *District Health Barometer* (2005–2014), WC Routine Facility Data (2011–2015).

is also reflected in growing bed occupancy rates, while the cost per patient-day equivalent (PDE) remains below the national level, suggesting greater efficiency than other provinces.[aa]

Three nationally accepted service-delivery indicators for which there are robust data and that reflect on system performance also show how DHS investments have been translated into improvements in programme coverage and outcomes, even if globally accepted targets have yet to be reached in some instances.

1 The Western Cape has mirrored and exceeded the national trend of increased early antenatal care (ANC), with the ANC 1st visit <20 weeks rate rising from 39% in 2005 to 66% in 2014.[26,ab]

2 TB cure rates (new smear-positive) have been consistently around 80%, compared with the 74% national average in 2013, but still below the WHO target of 85%.[26,ac]

3 By the end of 2015, close to 290 000 people had been initiated onto ART in the WC, with 210 000 remaining in care. Retention rates in the ART programme are between 80% and 85% at 12 months (compared with the WHO target of 90%), declining to between 63% and 69% at 48 months (with each new cohort showing lower retention levels). (Authors' analysis of WC Routine Facility Data)

Yet despite the improvements, many respondents noted that the WC health system still faces critical challenges of health and health-care inequity. Although decreasing over time, disparities in infant and under-five mortality across WC districts persisted in 2013.[27] There is also variation between districts in total health spending. In 2014/15, spending per uninsured/dependent person was 1.5 times greater in the City of Cape Town Metro DHS, where 64% of the provincial population reside, than in most rural districts. Meanwhile, spending variation within Cape Town was judged as likely to ignore greater health needs in Khayelitsha, and perhaps to reflect worse access to lower-level care in Eastern, Klipfontein, and Mitchell's Plain sub-districts.[28]

Many respondents were also concerned that the provincial (and national) PHC model remains bound by its past – it is an acute-care, service-delivery model not well oriented to tackling the growing non-communicable disease burden or supporting wider action to address the social determinants of health.[x,ad,q,ae] Respondents judged that re-orienting the PHC model will require the strengthening of multiple relationships within the system,[af] and will have to confront organisational barriers to learning and risk-taking – both the continuing dominance of a 'biomedical' perspective and the PDoH's 'compliance culture' (resulting from the focus on robust financial management, as well as national financial and human-resource

aa The steep increase in cost per PDE in 2009 coincided with the advent of occupation-specific dispensations and greatly increased salaries of professional staff (Figure 1).

ab In this period, antenatal care was also introduced by local government.

ac In 2013, the TB loss-to-follow-up rate (8%) in the WC was higher than the national average (6%).

ad Key-informant interview 16 September 2016.

ae Key-informant interview 26 September 2016.

af Relationships between the patient and the system, health programmes and wider service delivery, referral networks and service delivery and support services.[q,x,ad]

policy imperatives). "We've gotten to the point where we are so compliant that we can't think anymore … We lack agility."[p]

The final widely identified challenge is the failure to establish functioning processes of community engagement. While the immediate post-1994 period was characterised by significant popular engagement, the PDoH has subsequently been criticised for relying too much on formal legislative frameworks and too little on the 'risky conversations' needed to bring such frameworks alive and build trust with the community.[i,p,b,ag,r]

Conclusions and lessons

Overall, given the breadth and depth of system change described here, health-system development in the WC since 1994 can appropriately be described as 'whole system change' – that is, a series of interrelated processes of adaptation and development, working across the multiple levels of the system and engaging multiple actors (adapted from Berta et al.[29]). People working within the system are also beginning to have a sense of themselves as part of a larger whole that seeks constant improvement towards collective goals. As one respondent noted, "I think we kind of have a system at the moment that actually is performing as a health system that tries to prevent things that cause trouble for it later on, rather than just funding the trouble when it occurs".[k] From the basis of fragmented and hospi-centric services primarily offered in geographic settings that best served the needs of the white elite, the provincial health system has, therefore, become a system organised more rationally, better meeting the health needs of the broader provincial population and seeking to protect their healthcare rights.

Nonetheless, health and healthcare inequity remain critical provincial challenges. Perhaps also, as some respondents suggested, more could have been done more quickly to tackle the legacies of the past, especially given the inherited healthcare and bureaucratic capacity.

What wider lessons can be drawn from this experience?

Firstly, strengthening PHC is nationally[30,31] and internationally[19,32,33] recognised as being essential in working towards health and health-equity goals. However, it requires change at each level of the health system, so that ultimately the system as a whole is geared towards the primary level, through clinical support and referral chains that back it up. District/regional hospitals play a particularly important role in a strong, equity-oriented health system,[33] together with the integration of vertical health programmes within both service delivery and management.[34,35] Effectively managing wider partnerships – such as with the NGOs involved in home and community-based care in the WC – is also necessary, together with changes in organisational culture that value PHC.[19]

Three continuing challenges for the WC service-delivery model highlight additional lessons for PHC re-orientation elsewhere:

- the need for new PHC models better oriented to the wider health and social challenges facing populations in the 21st century;[19,34]
- relatedly, the development of inter-sectoral partnerships, and, recognising their vital role as a health resource, multiple forms of patient and community engagement;[19,34,35] and
- innovative action to address the health challenges of particularly vulnerable groups and communities.[33,34]

Secondly, as recognised internationally,[34,36] leadership and well-functioning bureaucracies are needed to drive the necessarily long-term processes of health-system development. Together they underpin the sustained implementation of coherent visions, and enable system-wide and system-deep change; in addition, leadership is needed to leverage political commitment.[33,34,36] The WC experience shows that health-system development is shaped but not necessarily bound by the legacies of the past. Leaders must take advantage of windows of opportunity to bring about change, while engaging with key health-system stakeholders; particular attention must be paid to clinicians, managing their possible resistance to change and drawing their particular perspectives into wider system decision-making.[35,36]

Separating and balancing political and bureaucratic leadership is another important governance factor, as is developing strong technical and managerial capacity by establishing district management structures with delegated decision-making power, and deepening management capacity across levels.[31,36] The WC's financial management innovations reflect wider lessons about the importance of strong planning and budgeting processes, and the importance of ensuring accountability.[34,36] However, as noted in the WC, strong central control of health-system change runs the risk of limiting innovation and risk-taking within the system. In complex systems, enabling forms of leadership that encourage continuous learning and new relationships between support services and service delivery are increasingly regarded as essential for system change,[14,37] and are new imperatives for the WC.[16]

Finally, using a wide array of public-health evidence in decision-making is important in driving health-system development, providing a shared basis for decision-making across the system and offering feedback loops to support change.[19,34–36] An important next step for the WC is to develop new forms of monitoring and evaluation that take a whole-system perspective – extending beyond services and programmes to system functions, drawing in a wider range of perspectives and knowledge, and considering not only what but also how health-system change is unfolding.

ag Key-informant interview 19 September 2016.

References

1 African National Congress. A National Health Plan for South Africa. Johannesburg; 1994.

2 The Republic of South Africa. National Health Act No 61 of 2003. Pretoria: Government Gazette South Africa; 2004.

3 Constitution of the Republic of South Africa. 108 of 1996. [cited 3 May 2017].
URL: http//www.gov.za/sites/www.gov.za/files/images/a108-96.pdf

4 Robb D, De Villiers M, Vallabjee K. Provincial restructuring. In: Barron P, editor. South African Health Review 1997. Durban: Health Systems Trust; 1997. p. 45–53.

5 Schneider H, Coetzee D, Van Rensburg D, Gilson L. Differences in antiretroviral scale up in three South African provinces: the role of implementation management. BMC Health Serv Res [Internet]. 2010;10(Suppl 1):1–9.

6 Lund C, Kleintjes S, Kakuma R, Flisher AJ. Public sector mental health systems in South Africa: inter-provincial comparisons and policy implications. Soc Psychiatry Psychiatr Epidemiol. 2010 Mar;45(3):393–404.

7 McIntyre D, Bloom G, Doherty J, Brijlal P. Health expenditure and finance in South Africa. Durban: Health Systems Trust and the World Bank; 1995.

8 Western Cape Government. 20 Year Review. Western Cape. Cape Town; 2013.

9 Gilson L, Doherty J, Mcintyre D, Thomas S, Brijlal V, Bowa C, et al. The Dynamics of Policy Change: Health Care Financing in South Africa, 1994–1999. Monograph No.66. Johannesburg: Centre for Health Policy, University of Witwatersrand/Health Economics Unit, University of Cape Town; 1999.

10 Price M. Health care as an instrument of Apartheid Policy in South Africa. Health Policy Plan. 1986;1(1):158–70.

11 Strategic Management Team. 1995 Provincial Health Plan. Cape Town; WC Department of Health; 1995.

12 Coovadia H, Jewkes R, Barron P, Sanders D, McIntyre D. The health and health system of South Africa: historical roots of current public health challenges. Lancet. 2009;374(9692):817–34.

13 Mcintyre D, Kruger E, Valentine N, Van Zyl N, Jacobs T. An evaluation of existing part-time district surgeon services and alternative mechanisms for future contracting with general practitioners. Cape Town: Health Economics Unit; University of Cape Town 1997.

14 World Health Organization. Everybody's business: strengthening health systems to improve health outcomes [Internet]. WHO's Framework for Action. Geneva: WHO; 2007.
URL: http://www.who.int/healthsystems/strategy/everybodys_business.pdf

15 Western Cape Department of Health. Healthcare 2010: Health Western Cape's plan for ensuring equal access to quality health care [Internet]. Cape Town; 2003 [cited 3 May 2017].
URL: https://www.westerncape.gov.za/annual-publication/health-care-2010

16 Western Cape Department of Health. HealthCare 2030: The Road to Wellness [Internet]. Cape Town; 2013 [cited 3 May 2017].
URL: https://www.westerncape.gov.za/assets/departments/health/healthcare2030.pdf

17 Vallabhjee K. An analysis of the voluntary severance package and its effects on the health department in the Western Cape for the financial year 1996/97. Cape Town: WC Department of Health; 1997.

18 Blecher M, Harrison S. Health Care Financing. In: Ijumba P, Padarath A, editors. South African Health Review 2006. Durban: Health Systems Trust; 2006.

19 Van Lerberghe W, Evans T, Rasanathan K, Mechbal A. The World Health Report: Primary Health Care now more than ever. Geneva: World Health Organization; 2008.

20 Sheikh K, Ranson MK, Gilson L. Explorations on people centredness in health systems. Health Policy Plan. 2014;29(suppl_2):ii1–ii5.

21 Ellokor S, Olckers P, Gilson L, Lehmann U. Crises, Routines and Innovations – the complexities and possibilities of sub-district management. In: Padarath A, English R, editors. South Africa Health Review 2012/13. Durban: Health Systems Trust; 2013.

22 Western Cape Department of Health. Annual Report 2015/2016 [Internet]. Cape Town; 2016 [cited 3 May 2017].
URL: https://www.westerncape.gov.za/assets/departments/health/annual_report_2015_16.pdf

23 Rispel LC, Jager P De, Fonn S. Exploring corruption in the South African health sector. Health Policy Plan. 2016;31(2):239–49.

24 Western Cape Department of Health. Leadership Development Strategy. Cape Town: Western Cape Government; 2016.

25 McIntyre D, Ataguba J. What do we know about poverty, inequality and health in South Africa, and what are the health system reform implications? An overview of recent research. In: Towards Carnegie III Conference, University of Cape Town. Cape Town: SALDRU; 2012.

26 Health Systems Trust. District Health Barometer [Internet]. [cited 28 Jan 2017].
URL: http://www.hst.org.za/district-health-barometer-dhb-2

27 Morden E, Groenewald P, Zinyakatira N, Neethling I, Msemburi W, Daniels J, et al. Western Cape Mortality Profile 2013. Cape Town: SA Medical Research Council; 2016.

28 Maredza M. Assessing equity in health and health care. Cape Town: University of Cape Town; 2015.

29 Berta W, Virani T, Bajnok I, Edwards N, Rowan M. Understanding whole systems change in health care: insights into system level diffusion from nursing service delivery innovations – a multiple case study. Evid Policy. 2014;10(3):313–36.

30 Naledi T, Barron P, Schneider H. Primary Health Care in SA since 1994 and implications of the new vision for PHC re-engineering. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health Systems Trust; 2011.

31 Rispel LC. Analysing the progress and fault lines of health sector transformation in South Africa. In: Padarath A, King J, Mackie E, Casiola J, editors. South African Health Review. Durban: Health Systems Trust; 2016.

32 World Health Organization Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva: WHO; 2008.

33 Gilson L, Doherty J, Loewenson R, Francis V. Challenging Inequity through Health Systems. Health Systems Knowledge Network. Johannesburg: World Health Organization Commission on Social Determinants of Health. Johannesburg: Centre for Health Policy, EQUINET, London School of Hygiene and Tropical Medicine; 2008.

34 Samuels F, Amaya A, Pose R, Balabanova D. Pathways to progress: a multi-level approach to strengthening health systems. London: Overseas Develpment Institute; 2014.

35 Best A, Greenhalgh T, Lewis S, Saul JE, Carroll S, Bitz J. Large-Scale Transformation in Health Care: A Realist View. Milbank Q. 2012;90(3):421–56.

36 Balabanova D, McKee M, Mills A. "Good Health at Low Cost": 25 years on. What makes a successful health system? London: London School of Hygiene & Tropical Medicine; 2011.

37 Baser H, Morgan P. Capacity, Change and Performance. Maastricht: European Centre for Development Policy Management; 2008.

7

Breaking new ground: lessons learnt from the development of Stellenbosch University's Rural Clinical School

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Training health professionals in rural areas increases their preparedness for rural practice and their subsequent likelihood of working in a rural area. In 2011, Stellenbosch University (SU) instituted a year-long training of final-year medical students at a rural training site. This longitudinal training model was subsequently adopted by other health professions in 2013. The nature of the training and the context within which it occurs facilitate a unique learning experience for the students, and has positive spin-offs for other role-players.

This case study presents the training model followed at SU's Rural Clinical School (RCS). Drawing on five years of research, we describe some of the ways in which the RCS training model has influenced the role-players. Key lessons learnt are outlined from both educational and health system perspectives. It is recommended that all health professions students be exposed to training in rural areas, including continuous longitudinal rotations.

The nature of the training and the context within which it occurs facilitate a unique learning experience for the students, and has positive spin-offs for other role-players.

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Introduction

Training health professionals in rural areas increases their preparedness for rural practice and their subsequent likelihood of working in a rural area[1] and now constitutes the core curriculum for undergraduate students in many countries. A range of different models of rural training exist in South Africa, the most traditional approach being in the form of short-term rotations.[2] Building on international models and on the example of Walter Sisulu University, well known for its contribution as a community-based and rurally focused medical school,[3,4] Stellenbosch University (SU) introduced longitudinal integrated clerkships (LICs). This approach to clinical training allows students to benefit from continuity of the healthcare setting and supervision, and can help to address workforce challenges.[5] In 2011, the Faculty of Medicine and Health Sciences (FMHS) at SU became the first academic institution in South Africa to send a group of medical students to its Rural Clinical School (RCS) for their entire final year, where they could select the option to follow a LIC model. Subsequently, in 2013 and 2014, the Occupational Therapy and Human Nutrition programmes also introduced longitudinal undergraduate placements for final-year students at the RCS. Currently, the RCS is the only example of a rural, decentralised, multi-professional clinical training platform in South Africa offering year-long placements.

Adoption of this approach challenges the traditional approach – shorter-rotation, discipline-specific clinical training at a tertiary training complex – in that it provides students with the opportunity to learn in a context that is closer to the healthcare needs of our country. A longitudinal and multi-disciplinary component adds a further dimension. However, the approach is not without risk and requires the commitment of financial and human resources. This chapter describes the factors that led to the conceptualisation of the RCS and the chain of events that enabled its establishment. Drawing on five years of research, we describe some of the ways in which the RCS and the activities surrounding it have influenced the students, their supervisors, hospital staff, patients and the communities at large.

The provision of health professional training in a rural context falls under the umbrella of what is often described as community-based education (CBE). Apart from seeking to encourage the retention of healthcare workers in rural areas, CBE speaks more broadly to providing students with the opportunity to train in authentic contexts that can prepare them for the provision of quality health care across the full spectrum of service. Often a space where interprofessional practice is encouraged, CBE is also typically underpinned by principles of social justice and equity.[6] This has particular relevance in the South African context where distribution of health services to communities in need is inequitable.[7] As will be seen from the discussion that follows, the nature of the training and the context within which it occurs at the RCS facilitates a unique learning experience for the students, and has significant positive spin-offs for the other role players concerned. As South Africa seeks to find sufficient and appropriate clinical training placements for the growing number of health professionals in training, while simultaneously encouraging greater numbers of graduates to work outside the large metropolitan areas, the lessons learnt at the RCS have particular relevance for both the educational and the health system.

Description of the intervention

The Ukwanda Centre for Rural Health was established in 2001. At the time of inception, all fourth-year medical students at the FMHS undertook a two-week rural rotation in Family Medicine and Primary Care. This was later increased to four weeks, as part of the CBE programme. The positive experiences recorded during these rotations were an early catalyst for the subsequent introduction in 2011 of the year-long rural rotation for final-year medical students at the RCS, centred in the Worcester regional hospital and surrounding towns. This pioneering event was the result of many years of negotiations between a wide range of stakeholders. At the time, placing students on a decentralised platform away from the academic teaching hospital for an extended period represented a significant leap of faith on the part of the FMHS, the students, and the provincial and local health department. The campus built in Worcester was equally innovative, characterised by environmentally friendly academic and accommodation structures. This infrastructure was funded by the FMHS through strategic prioritisation of its portion of the Clinical Training Grant received from the Department of Higher Education and Training. In addition, funding was provided through SU's 'Hope Project', which had been set up to support interventions with the potential to benefit society. Through a series of consultative planning workshops attended by staff from the faculty (managers, educationalists and clinicians), the curriculum was adapted to ensure flexibility and relevance. This work also led to the formulation of a list of common clinical presentations to guide student learning, and the introduction of patient portfolios as both a learning and an assessment tool. Thus, although the students were required to meet the same prescribed outcomes for their final year as their colleagues at the Tygerberg Campus, the focus of their learning and the nature of their exposure was directed towards primary care and meeting the healthcare needs of the communities in which they were placed.

Medical students select to follow one of two options. In the regional hospital option, they follow clinical rotations through specialist departments, and spend one afternoon a week in the university's service learning centre – a primary care clinic in a local underserved community where they also do home visits. In the second option, the longitudinal integrated model (a form of LIC), students spend the year in a district hospital (Ceres, Hermanus, Robertson and Swellendam) 50–100 km from the regional hospital, in groups of two or three, under the mentorship of a family physician, supported by regular visits from a programme co-ordinator and from specialists based at the regional hospital. Here students learn through their involvement primarily in the care of patients with undifferentiated problems, and the curriculum is therefore informed by the patients 'walking through the door'.[8] Although only eight students chose the RCS option in 2011 (six students at Worcester and two at Ceres on the LIC model), it has grown in popularity in the intervening years. In 2016, close to 60 fifth-year MBChB students from a group of 252 applied to attend the RCS. Only 26 (18 at Worcester, three at both Ceres and Hermanus and two at Robertson) were selected in 2017, as limitations on the numbers of student placements at the sites remains a barrier to extending this decentralised training platform further.

A unique feature of the SU RCS is adoption of the longitudinal rural training model by other health professions. Since 2013, eight Occupational Therapy students annually have been spending their

entire final year at the RCS. In 2014, Human Nutrition students joined this group, with four final-year students spending the entire year in Worcester. The remaining Human Nutrition students rotate through one or more clinical blocks for a six-week period to facilitate their rural exposure. Although not involved in the longitudinal format, final-year Physiotherapy students spend a minimum of six weeks rotating through one to three clinical blocks on the RCS platform. In addition, all final-year Speech, Language and Hearing Therapy students spend eight weeks at a time completing their Community block placement at the RCS.

The focus at the RCS is on facilitating the following overarching outcomes for all final-year undergraduate students:

- the development of graduate attributes as defined by the FMHS and reflected in the seven roles of the health professional, namely: healthcare practitioner, scholar, communicator, health advocate, collaborator, professional, and leader and manager;
- fostering of interprofessional education and collaborative practice (IPECP);
- a transformative learning experience as defined by Frenk et al.[9]

Students are encouraged to engage in the biopsychosocial and interprofessional assessment and management of patients using the International Classification of Function, Disability and Health[7] to guide holistic thinking. This framework encourages transformative learning and critical evaluation of the student's rights and duties as a member of the community and a citizen of South Africa. Some outcomes have been community re-integration for patients, formulation of sustainable support groups, home visits, and health promotion.

The RCS has collaborated with 34 state, private and non-governmental organisations in Worcester, Ceres, Hermanus and Robertson to provide platforms for contextualised undergraduate clinical training. The development and maintenance of these partnerships has taken time and effort, and the team strives to ensure that these collaborations are reciprocally beneficial. Role-players in the academic programmes have worked together to enable innovative IPECP as part of the clinical training opportunities at each of these four sites. Inventive student projects and collaborative ventures between the RCS and healthcare organisations have evolved into sustainable initiatives bringing change within communities, the university and the healthcare setting as a whole.

Lessons learnt

In the six years since the longitudinal training model was established, much has been learnt about 'taking' clinical training to decentralised and specifically rural platforms. Engagement with stakeholders has been crucial in this regard. Our research on the medical programme at the RCS has been informed by the many different role-players involved, including students, supervisors, hospital staff, university staff, facility managers, community care workers, and patients. This has enabled us to describe and understand the complex and interconnected nature of the endeavour. Rather than try to evaluate the initiative in a sterile fashion, the study adopted a modified action research approach so that the findings that emerged each year could be considered critically in terms of how they might be used to enhance the next year's training. Across the five years of the research project, over 200 interviews and 17 focus group discussions were held with successive cohorts of students, clinician educators, hospital staff, healthcare workers and other stakeholders. Four surveys were conducted with graduates, and students' final results were analysed and compared with the results of those who remained at the academic tertiary complex.

More recent work focused on the experiences of students from other disciplines, and explored the relevance of interprofessional education in this context through a series of focus group discussions and individual interviews with the relevant student groups. The following is a synthesis of the key lessons learnt from both an educational and a health system perspective:[10–15]

The educational perspective:

- The decentralised platform offers the opportunity for authentic, potentially transformative learning experiences, particularly for those students who spend a significant period at the rural training complex. Continuity in terms of care and supervision plays an important role here. Students across all disciplines described their learning as a 'humanising' experience as they came to identify with the communities within which they were placed, and the patients they came to know.[10,13]
- Linked to the above is evidence of a shift in student attitudes and behaviour, such as the adoption of professional practices that can positively influence holistic, patient-centred outcomes. In the interviews, students described how their experiences had changed their approach and attitude towards the provision of health care.[14]
- Students who were first exposed to the rural training platform in their final year and who experienced shorter rotations expressed a desire for earlier exposure in the course of their curriculum in order to prepare them better for work in a rural context.[10]
- Students also claimed enhanced confidence in their clinical skills. In particular, medical students spoke about how, as a result of their year-long experience on the rural platform, they felt well prepared to embark on their internship. This was corroborated by their intern supervisors who noticed their ability to perform patient care independently and noted this as an advantage.[11,14]
- Importantly, the analyses of student results, including comparisons between students at the RCS and the groups that remained within the tertiary academic hospital context, indicate that students who attend the RCS are not disadvantaged academically.[15]
- Many of the student interviewees at the RCS described how they needed to take responsibility for their own learning. Self-directed learning was therefore seen as both a necessary characteristic for students to cope in the RCS as well as an outcome of the experience.[13] Innovation in teaching and assessment at the RCS has had a ripple effect on thinking around student learning and the potential for incorporating more innovative assessment formats (e.g. the use of patient portfolios).

The health system perspective:

- Bringing the educational project into the health system was seen to evoke a new 'identity' for clinicians, and other role-players, as educators and collaborators.[12]
- There was a perceived enhanced 'status' for the hospital, clinic and other facilities that came with being an accredited site for clinical training. This sense of recognition is emerging strongly in more recent work being conducted. In the case of the allied health professions, this benefit extends to non-governmental organisations and private practices.
- The clinicians' own professional learning was enhanced as a result of supervising the students and through the faculty development initiatives on offer.[12] In particular, care was taken to provide clinicians at the different training sites with opportunities to enhance their clinical teaching skills. Session topics included conducting tutorials, teaching at the bedside, using approaches such as the One-minute Preceptor,[16] as well as clinical and portfolio assessment. Formative assessment events for medical students were supported by introducing use of the Mini-CEX (Mini-Clinical Evaluation Exercise) at the sites.[17]
- Students' 'extra pair of hands' helped to reduce waiting times and facilitated more in-depth and contextual patient assessment, as students had more time and the opportunity to do home visits. Patients reported a more positive experience and were generally appreciative of the care received from students.[14]
- Establishing decentralised clinical training sites, such as those within the RCS, centres on the development of mutually beneficial relationships between representatives of the health system, the community and the university. Once established, maintaining and strengthening these relationships over time was seen to be a key success factor in ensuring sustainability. Critical among these factors is recognition of the interdependence between the Department of Health, provincial health authorities and the different training institutions.
- Evidence is now emerging of graduates returning to practice at rural training sites or other rural healthcare facilities. Of the 36 medical graduates from 2011 and 2012, 12 returned to their rural training platforms to continue their professional careers. Subsequent graduates are still busy with compulsory internship and community service, a number of them at rural sites in South Africa.

Conclusions

The model of a rural clinical school is well described in Australia,[18] Canada[19] and the USA,[20] and has taken root in South Africa. The involvement of a range of health professional students further provides opportunities for teamwork and collaborative community-based interventions.[18] Continuity, fostered by placements that are of a longer duration, enables the establishment of meaningful relationships among the students (across the different professional education programmes); between the students and their supervisors; between the students and hospital staff; between the students and their patients; and between the students and the community.

In particular, the nature of the engagement with supervisors as a result of the smaller numbers of students at decentralised sites and their exposure to primary care potentially leads to a more transformative learning experience. In addition, it facilitates the collaborative care of patients and informs a better understanding of the influence context has on patient wellness, disease and disability. Furthermore, the placement of future health professionals in rural contexts for their practical training can encourage graduates to consider rural practice and lead to them being prepared for work in the public health system.

It has been suggested that a limitation of the RCS model and its potential to be scaled up is the fact that historically, only small numbers of students are placed at regional, and particularly, district hospitals. However, our experience suggests that it is these smaller numbers that facilitate the uniqueness of the clinical learning experience. To date, over 175 students from the different disciplines have passed through the RCS. While further work is needed to determine what an ideal student/clinician ratio might look like, we would argue that were educational institutions able to access more sites, many more students would be exposed to this particular form of clinical learning. The development of a vision for decentralised training, that is shared by both the departments of health and the educational institutions, would allow such initiatives to be scaled up dramatically. This would benefit the students, the facilities where they train, and the health system at large. Initiatives around the placement of students who will be returning in significant numbers from September 2018 to complete their clinical training in South Africa as part of the Nelson Mandela Fidel Castro Medical Collaboration programme, may provide impetus towards achieving this.

Ongoing research is providing more quantifiable evidence of the contribution that educational initiatives such as the RCS can have on the health system; this includes a multi-country study from sub-Saharan Africa which is currently being completed. Nevertheless, taken collectively, the current body of scholarship in the field presents a compelling argument in support of decentralised longitudinal clinical training.

As South Africa seeks to increase the number of health professions graduates and their employment in areas of need, it is incumbent on higher education institutions to ensure that students are equipped to provide quality health care effectively in a socially responsive manner.

Recommendations

Based on the findings of our research, and reflecting on these findings in the context of current literature in the field, we recommend that:

- all healthcare professional students in South Africa be exposed to training in rural and underserved areas through the course of their curriculum;
- the option of longitudinal rotations across the different health professions be developed where this does not currently exist, and expanded where this exists already; and
- the education and health sectors jointly explore ways in which more rural clinical training sites can be established, with a view to responding to the human resources for health needs in South Africa.

References

1 Wilson N, Couper I, De Vries E, Reid S, Fish T, Marais B. Inequitable distribution of healthcare professionals to rural and remote areas. Rural Remote Health. 2009;9:1060.

2 Doherty JE, Couper I. Strengthening rural health placements for medical students: Lessons for South Africa from international experience. S Afr Med J. 2016;106(5):524–7.

3 Kwizera EN, Igumbor EU, Mazwai LE. Twenty years of medical education in rural South Africa – experiences of the University of Transkei Medical School and lessons for the future. S Afr Med J. 2005;95(12):920–4.

4 Enoch N. Kwizera EN, Iputo JE. Addressing social responsibility in medical education: The African way. Med Teach. 2011;33(8):649–53.

5 Worley P, Couper I, Strasser R, et al. A typology of longitudinal integrated clerkships. Med Educ. 2016;50(9):922–32.

6 Ataguba JE, Akazili J, McIntyre D. Socioeconomic-related health inequality in South Africa: evidence from General Household Surveys. Int J Equity Health. 2011;10(1):48.

7 World Health Organization. A practical manual for using the International Classification of Functioning, Disability and Health (ICF). Geneva: WHO, 2013.

8 De Villiers M, Conradie H, Snyman S, Van Heerden B, Van Schalkwyk S. Experiences in developing and implementing a Community-Based Education strategy – a case study from South Africa. Community based education in health professions: Global perspectives Cairo: World Health Organization Regional Office for the Eastern Mediterranean 2014;176:206.

9 Frenk J, Chen L, Bhutta ZA, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. Lancet. 2010;376(9756):1923–58.

10 Pillay M, Bester J, Blaauw R, et al. Allied health professional rural education: Stellenbosch University learners' experiences: research. Afr J Health Prof Educ. 2016;8(2):169–73.

11 Voss M, Coetzee J, Conradie H, Van Schalkwyk S. 'We have to flap our wings or fall to the ground': The experiences of medical students on a longitudinal integrated clinical model. Afr J Health Prof Educ. 2015;7(1):119–24.

12 Blitz J, Bezuidenhout J, Conradie H, de Villiers M, van Schalkwyk S. 'I felt colonised': emerging clinical teachers on a new rural teaching platform. Rural Remote Health 2014;14:2511. Epub 2014/05/08.

13 Van Schalkwyk SC, Bezuidenhout J, Conradie HH, et al. 'Going rural': driving change through a rural medical education innovation. Rural Remote Health 2014;14:2493. Epub 2014/05/08.

14 Van Schalkwyk SC, Bezuidenhout J, De Villiers MR. Understanding rural clinical learning spaces: Being and becoming a doctor. Med Teach. 2015;37(6):589–94.

15 Van Schalkwyk S, Kok N, Conradie H, Van Heerden B. Academic achievement of final-year medical students on a rural clinical platform: Can we dispel the myths? Afr J Health Prof Educ. 2015;7(1):115–8.

16 Neher JO, Gordy KC, Meyer B, Stevens N. A five-step "microskills" model of clinical teaching. J Am Board Fam Pract. 1992;5:419–24.

17 Norcini JJ. The Mini Clinical Evaluation Exercise. The Clinical Teacher 2005;2:25–30.

18 Walters L, Seal A, McGirr J, et al. Effect of medical student preference on rural clinical school experience and rural career intentions. Rural Remote Health 2016;16:3698.

19 Strasser R, Lanphear J, McCready W, Topps M, Hunt D, Matte M. Canada's new medical school: the Northern Ontario School of Medicine: Social accountability through distributed community engaged learning. Acad Med. 2009;84(10):1459–64.

20 Erickson JS. Rural medical education in the WWAMI region: Instituting a rural longitudinal medical school curriculum in association with a rural longitudinal integrated community clerkship experience. Int J Child Health Hum Dev. 2011;4(1):91–100.

Addressing social determinants of health in South Africa: the journey continues

8

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With the recent change from the Millennium Development Goals to the 17 new Sustainable Development Goals, the focus of the global development agenda is expanding: there is attention on a broader set of social determinants and, importantly, a specific sensitivity to equity, which could have a substantial effect on health. Addressing social determinants is a cornerstone in the National Department of Health's Primary Health Care Re-engineering Strategy, and an approach that is embedded in the country's National Development Plan. However, the translation of this policy commitment to programmatic action at different levels in the health system and in partnership with other sectors remains elusive.

This chapter draws on evidence collated by the World Health Organization Commission on the Social Determinants of Health, complemented with empirical evidence from South Africa to strengthen the contextual sensitivity of the analysis, in order to identify the social determinants impacting on the major components of the burden of disease in South Africa. Obesity is used as a case study to illustrate how action to address these determinants is required at different levels in the health system, and in partnership with other sectors.

The evidence is then used to interrogate the National Development Plan and the PHC Re-engineering Strategy as two major policy instruments that have the potential to address social determinants. The particular limitations of both policy initiatives are identified, and the chapter proposes how the health sector can take on a stronger advocacy role both within government and beyond to support the broader international health and development agenda.

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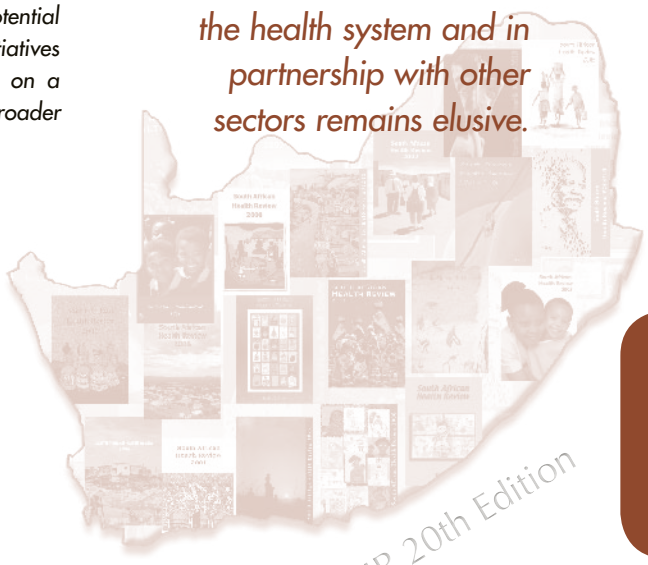

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Introduction

Two decades ago, the 1997 White Paper for the Transformation of the Health System in South Africa[1] set out a post-apartheid vision of a health system built on the primary health care (PHC) approach.[2] This commitment to PHC, which focused on social determinants, was ratified in the Health Act (61 of 2003),[3] but has proved difficult to implement.[4,5]

Meanwhile, on the global front, social determinants have risen to the forefront of the development agenda.[6] First came the United Nations Millennium Declaration in 2000. While three of the eight goals were achieved globally, progress was uneven within and across countries.[7] The United Nations Conference on Sustainable Development (also known as Rio+20) initiated an inclusive intergovernmental process with strong civil society participation which crafted the post-2015 development agenda, leading to an expanded set of 17 new Sustainable Development Goals (SDGs).[6] From the perspective of social determinants, this signalled a welcomed shift from a specific focus on health outcomes to their underlying factors – even though fundamental internal contradictions within the SDGs have been noted by some.[8] This echoes the findings and recommendations of the World Health Organization (WHO) Commission on the Social Determinants of Health[9] which, within the health field, represented a major evidence-based public shift in thinking, challenging purely biomedical notions of disease, and recognising instead the role played by global and national political economies in creating health inequities, – the "unfair and avoidable difference in health status seen within and between countries".[10]

We understand social determinants to be: "the circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness".[10] We also differentiate between the socio-economic living and working conditions (societal factors) and the structural factors that shape the economic and social environments at both national and supranational levels. These include, but are not limited to, economic and social policies: legislation, labour and industrial policies, terms of trade and investment, development assistance, and conditionalities imposed by external financial institutions in relation to debt and loans. These economic and social policies are in turn strongly influenced by political power and control over decision-making structures and institutions at both local and global levels.[11]

Within the current South African context, a focus on social determinants remains high on the health agenda. South Africa exemplifies stark social inequities, which translate into a high burden of premature mortality, and marked health inequities. For example, estimates of the infant mortality rate (IMR) from the 2011 Census in the predominantly rural Eastern Cape Province is 40.3 per 1 000 live births – double that of the Western Cape with an IMR of 20.4 per 1 000 live births.[12] There are also significant differences within provinces. For example, the maternal mortality in facility ratio is 56 per 100 000 live births in urban Cape Town and 371 per 100 000 live births in the rural district of the Central Karoo in the same province.[12]

Addressing social determinants is a cornerstone in the National Department of Health's PHC Re-engineering Strategy.[5] The question is how to translate this commitment to addressing social determinants into a programme of implementable action across levels of the health system and in co-ordination with other sectors. In this chapter we describe the methods and conceptual framework used to assemble evidence of the key social determinants driving the burden of disease in South Africa, and the evidence of action to address these determinants. We use this evidence to interrogate the National Development Plan (NDP) and the PHC Re-engineering Strategy as two major policies that have the potential to address social determinants, both across sectors and within the health sector. Finally, opportunities to strengthen action on the social determinants of health in South African policy and programme implementation are explored.

Methods

Drawing on existing literature, we analysed the underlying causes of the major burden of disease in South Africa. South Africa faces a quadruple burden of disease, with major HIV and tuberculosis (TB) epidemics, maternal and child mortality levels that are higher than the global average, a growing prevalence of non-communicable diseases (NCDs), and high levels of violence and injuries. This is reflected in the leading causes of premature mortality listed in Table 1.[12] Much of this premature mortality is preventable.

Table 1: Leading causes of all-age premature mortality in South Africa, 2013

Cause of all-age premature mortality	Percentage
HIV and AIDS	15.5
TB	12.4
Lower respiratory infections	8.3
Diarrhoeal diseases	5.7
Cerebrovascular disease	4.6
Hypertensive heart disease	3.3
Ischaemic heart disease	3.3
Diabetes mellitus	2.8
Road injuries	2.6

Source: Massyn et al., 2015.[12]

We clustered health problems, as in the Priority Public Health Conditions Knowledge Network of the WHO Commission on Social Determinants of CSDH[13] and selected three categories of problems that represent most of South Africa's burden of disease: childhood illnesses; NCDs (cerebrovascular disease, hypertension, ischaemic heart disease and diabetes); and HIV. We acknowledge the limitation of omitting violence and injury. We drew from the evidence in the WHO CSDH to identify the major social determinants impacting on these three selected categories, and complemented this with empirical evidence from South Africa.

Next, taking obesity as one example of an important factor contributing to NCDs in South Africa,[14] we consulted the literature to identify recommended action required at different levels in the health system, and in partnership with other sectors. The risk of illness increases with modest increases in weight, starting from a body mass index (BMI) of about 21 kg/m^2.[15] The enormity of the problem in South Africa is evident in the results of the 2012 South African National Health and Nutrition Examination Survey

(SANHANES–1),[16] with 31% of men and 64% of women falling into the overweight or obese categories (BMI 25 kg/m^2 or more). In the context of the PHC Re-engineering Strategy, we considered what this would mean for practice in the field, including the human-resource skills mix and supervision needed, and the health-system development required. Finally, looking beyond the health sector to national policy concerning other sectors that influence health, we considered the implications for the NDP,[17] which has the potential to address social determinants by 2030.

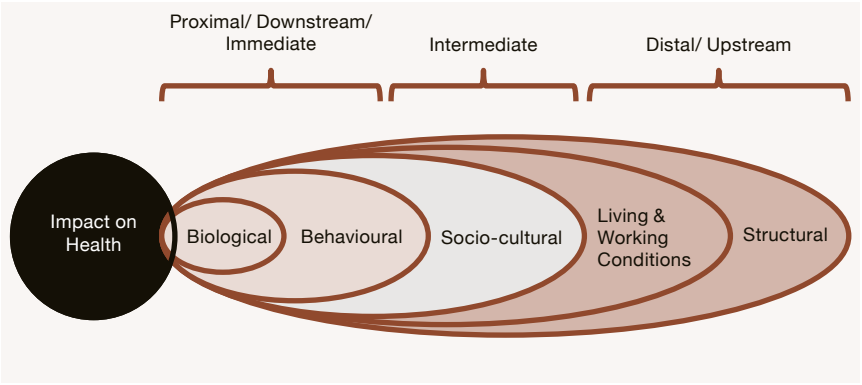
The analysis used a framework adapted from the Western Cape Burden of Disease Reduction Project[18] as shown in Figure 1, which represents the social determinants of health as distal or upstream factors influencing health. In addition to the social determinants, there are also the biological and behavioural factors, which in various other frameworks[19,20] are called proximal, downstream or immediate. We have included a category of socio-cultural factors, which are intermediate between behavioural and societal factors.

We concur with Krieger[21] that these terms do not imply a spatiotemporal distribution of causes. People who live in poverty experience the reality and consequences of poverty directly and immediately. Rather, the terms (distal/proximal and downstream/upstream) relate to different levels of causation which comprise different orders of hierarchically linked systems and processes that impact on health. Krieger reminds us that "all levels co-occur simultaneously, even though some levels may be more causally relevant than others to phenomena occurring at any given level". She further notes that class, race and gender compound inequity at every level. This is particularly relevant in the South African context, with geographical location (specifically the urban/rural divide) being another dimension.[22] Krieger also proposes that a conceptual understanding of the impact of social determinants should incorporate a life-course model as the impact of each level manifests differently, starting in utero, through infancy and all life stages, to old age. This model has been found to be helpful in designing maternal, child and newborn health programmes.[23] It is driven by the idea that the health of individuals and populations is influenced by an interaction between determinants at different levels, and that their timing and sequencing during the life course is critical.[24] While Krieger is critical of the proximal and distal framework, suggesting that it can create a split focus of accountability, we find it conceptually useful in challenging the biomedical paradigm to look beyond the individual to a broader understanding of the political economy of health, and have therefore adopted these terms in this chapter.

Findings: Unpacking the determinants of ill-health driving the burden of disease in South Africa

Tables 2–4 show the results of the analysis of the determinants of ill-health based on the application of our conceptual framework; the spread of factors is shown for each health problem across a range of upstream and downstream determinants. While medical services are important in preventing and treating the more proximal factors, there is a clear need for broader complementary interventions to address intermediate and distal factors. As the analysis moves beyond the proximal factors, the tables show that there is a confluence of a small number of social determinants of the main causes of premature mortality in South Africa: poor housing, inadequate water and sanitation, a sub-optimal food environment, high levels of alcohol and substance abuse, low levels of social cohesion, and inadequate health-system response across the three clusters. This has important implications as, in addition to health programme-specific responses, it suggests a need for an overarching plan that appreciates the synergies possible in addressing the social determinants. Furthermore, the social determinants operate at different levels (global, national, sector-specific, and local). This suggests that a set of different actions, operating at different levels, is required to address the social determinants.

Figure 1: Framework of determinants of health



Source: Adapted from the Western Cape Burden of Disease Study, 2007.[18]

Table 2: Major determinants of child ill-health in South Africa, 2017[25–33]

Proximal – downstream – immediate	
Co-morbidities	Low birth weight, under-nutrition and HIV infection lead to impaired immunity Maternal malnutrition, HIV-positive status, depression Smoking tobacco and other substances and/or drinking alcohol during pregnancy Infectious disease
Behavioural	Lack of exclusive breastfeeding and poor complementary feeding Poor hand-washing before preparation of food and after defaecation Insufficient recognition of severity of illness and care-seeking Late access to ANC (and resultant late diagnosis of preventable or manageable conditions) and poor access to nutritional support and PMTCT
Socio – cultural – intermediate	Lack of appropriate health education for caregivers – particularly in low socio-economic environments Women's decision-making power and access to resources is limited.
Distal – upstream – social determinants	
Living and working conditions	Household food insecurity Inadequate drinking water and/or sanitation facilities Overcrowding and poorly ventilated structures Poor quality of early childhood care and education Lack of community safety and security resulting in physical, sexual and emotional violence and neglect Barriers to accessing effective, quality health services (including ante- and postnatal care, immunisation, growth monitoring and IMCI) and other essential child protection services Poor maternal education Low levels of income
Structural	Inadequate collaborative institutional and governance arrangements between health and other sectors to support the implementation of the country's progressive child development and protection statutory frameworks Neo-liberal policies resulting in the reduction of social provisioning Inequity in political power and resource distribution

Table 3: Major determinants of diet-related non-communicable disease (hypertension, diabetes and cerebrovascular disease) in the South African disease profile, 2017[34–46]

Proximal – downstream – immediate	
Host	Genes Age Thrifty phenotype hypothesis
Co-morbidities	Obesity Increased abdominal girth Hypertension
Behavioural	Tobacco use Physical inactivity Diet high in sugar, salt and fat Excessive alcohol consumption Limited health education and behaviour change communication about a healthy and varied died and reducing (for example) the salt content of food
Socio – cultural – intermediate	Social exclusion and lack of social support Perceived lack of control and inequity Cultural perceptions about body size and fear of becoming thin and being identified as HIV-positive
Distal – upstream – social determinants	
Living and working conditions	Decreased opportunity to exercise in urban settings Local food environment provides limited access to healthy foods at affordable prices Visible marketing of fast-food products (including sugar-sweetened beverages) and advertising of fast-food outlets predominate over information on a healthy diet in the media. Inequitable access to effective, quality and comprehensive health services (that includes a focus on health promotion, disease prevention and referral for curative care, i.e. an integrated approach to the management of NCDs and other chronic conditions) School-procurement policies and worksite wellness programmes do not include a focus on healthy eating. Occupation Literacy

Structural	Accelerated urbanisation
	Policy contradictions between national health policies on NCDs and national trade and investment policies – with the latter promoting the influx of large amounts of processed foods and sugary beverages
	Unregulated promotional marketing of unhealthy products by transnational corporations
	Inadequate regulations in relation to standardised nutritional labelling required on food and drink products
	Although imminent, there has to date (February 2017) been no taxation on sugar-sweetened beverages.
	'Big food' (i.e. the large commercial entities) dominate the food and beverage environment.
	Trade liberalisation and neoliberal policies lead to job insecurity, and loss of social security leading to stress.

Table 4: Major determinants of HIV in young girls and women in South Africa, 2017[47–61]

Proximal – downstream – immediate	
Host	Biological vulnerability of (especially young) women
Co-morbidities	STIs
	People living with HIV (not on ART) at risk of TB
Behavioural	Non-use of condoms; not getting tested for HIV; non-disclosure of HIV-positive status
	Coercive and forced sex
	Alcohol and/or drug use reduces healthy decision-making
Socio – cultural – intermediate	Patriarchal gender norms and relationship power inequity (including child marriage) reduce the agency of young girls and women to negotiate safer sex
	Cultural beliefs around MMC
	Age-disparate and intergenerational sexual coupling between young women and older men
	HIV-related stigma prevents people living with HIV from accessing health services
	Multiple concurrent sexual partners
Distal – upstream – social determinants	
Living and working conditions	Livelihood insecurity
	Transactional/ commercial sex
	Marginalised communities (e.g. refugees) living in a non-health enabling environment
	Public safety (e.g. on public transport) not present for girls and women. Limited access to HIV-risk reduction services and commodities (e.g. pre- and post-exposure prophylaxis, condoms and HIV testing and counselling)
Structural	Sex trafficking
	Systemic rape used as a weapon of gang warfare or conflict
	Weak legislative and justice sector responses to violence against women and girls
	Discriminatory legislation for people living with HIV
	Migrant labour systems and the enforced separation of families
	Unequal access to education and economic opportunities

Obesity as a case study: moving from determinants to action

There is now evidence that early breastfeeding contributes to reducing the propensity for adult obesity. However, this is currently not promoted effectively as an intervention, with rates of exclusive breastfeeding at six months still being extremely low.[62] In addition, the national SANHANES[16] study revealed that a high percentage of South Africans demonstrate unhealthy dietary behaviour in that they consume excessive amounts of sugar and fat. In 2010, South Africans consumed 254 Coca-Cola products per person per year, an increase from around 130 in 1992 and 175 in 1997, and compared with a worldwide average of 89 products per year. Carbonated drinks are now the third most commonly consumed food/drink item among very young urban South African children (aged 12–24 months) – less than maize meal and brewed tea, but more than milk.[63,64] A combination of local material and socio-cultural factors play a significant role in food-consumption patterns.

In addition to these socio-cultural considerations, the SANHANES study identified key influences on food-purchasing choices, with the most significant being food price. Other important factors include taste and how long the item resists spoilage. Clearly, rational economic and social considerations underpin the swing to processed and packaged foods, which contain excessive amounts of salt, fat and sugar.

Easier access to food has been facilitated in South Africa by the rapid expansion of supermarkets, which now account for an increasing proportion of food purchases.[65] Whole and fresh foods are more expensive than processed foods when compared on both a weight and an energy basis.[66] These national structural factors are shaped by neo-liberal policies, where global trade is unregulated and dominated by transnational corporations (TNCs), including in the food industry. These corporations now dominate all the nodes in the food value chain – agricultural inputs, farm production, food processing and manufacture, and retail, including in South Africa.[67] In the 1980s, TNCs expanded into the manufacture of processed foods such as snacks and soft drinks, their growth and spread being accelerated by the deregulation of investment and trade, overseen by institutions such as the International Monetary Fund, World Bank and World Trade Organization. Of the 100 governments and corporations with the highest annual revenues in 2014, 63 were corporations and 37 were governments.[68,69]

Action at global level can include:

- dissemination of positive examples of improved nutritional outcomes associated with policies such as tax on sugary drinks (Mexico)[70] and school-feeding legislation (Brazil);[71]
- support of initiatives to increase corporate taxation and regulate tax avoidance; and
- measures to raise public awareness about the increasing dominance and unaccountability of TNCs and their associated detrimental impacts on health.

Action at national level can include:

- fiscal measures (e.g. tax on sugary beverages);[72]
- food labelling and regulation of food advertising;
- policy congruence between ministries (e.g. healthy food options and information, education and communication, information, education and communication, physical activity possibilities in schools, supported by the Department of Health;[73] and
- health education/mass media.[74]

Action at local level can include:

- urban planning (e.g. recreational spaces[73] and retail environments;[65]
- support of early childhood feeding practices[75] and household food gardens; and
- school and workplace nutritional interventions.

This case study shows that a social-determinant approach to a health problem such as obesity reveals a set of contributing factors beyond those acting at the immediate level of the individual (i.e. in the case of obesity, beyond dietary choices). A social-determinant approach draws attention to population and community-level factors, such as socio-cultural influences and the food environment created by both local and global factors. This wider analytical lens is necessary to begin planning a coherent programme of action that works across levels to promote health. This case study further illustrates how different actions are required at global, national and local levels, and how a range of actors at each level have specific sets of responsibilities. Such terms as 'inter-sectoral action' and 'health in all policies' denote such activities.

Evaluating how the NDP promotes a social-determinant approach

The NDP[17] aims to eliminate poverty and reduce inequality by 2030. Its vision is to raise the living standard of all South Africans to a minimum level. It was developed by a presidentially appointed National Planning Commission, which conducted a diagnostic assessment, and then consulted widely through public fora as well as in meetings with Parliament, the judiciary, national and provincial departments, local government and other stakeholders. The NDP sees national development as a non-linear process requiring a multidimensional framework, which requires "a combination of increasing employment, higher incomes through productivity growth, a social wage and good quality public services".[17] It thus seeks to create a virtuous cycle of growth and development.

The NDP is broadly aligned with the SDGs, and as such might seem promising in addressing the social determinants of health. The NDP chapter on health (Chapter 10) outlines support for a phased introduction of national health insurance (NHI), as well as the PHC Re-engineering Strategy. In particular, the chapter promotes a much stronger focus on community health workers (CHWs); it is suggested that CHWs need to be recruited in large numbers and trained to perform a wider range of tasks, thus forming the base of the health pyramid. In addition to rendering health care more accessible and equitable, this PHC system will create more jobs and indirectly improve health by reducing the prevalence and depth of poverty.[17] The chapter acknowledges the roles of other sectors but, as shown in Box 1, it tends to focus on proximal factors and the immediate environment when listing the priority interventions – associated with the social determinants of health – that are required to achieve the health goals of the NDP's 2030 vision.

Box 1: Proposed interventions to address the social determinants of health, South African National Development Plan 2030

Implement a comprehensive approach to early life by developing and expanding existing child-survival programmes
Collaborate across sectors to ensure that the design of other sectoral policies take impact on health into account
Promote healthy diet and physical activity, particularly in the school setting

Source: National Planning Commission,2011.[16]

The NDP has the potential to address social determinants; however, apart from the proposal to increase employment of CHWs, little thought is given in the NDP to how *different sectors* can work together to produce positive health outcomes. Nor is attention given to how *different spheres of government* can work together – connecting action *across both levels and sectors*. Some social determinants are the remit of local government (water, sanitation), some are provincial responsibilities (basic education, school nutrition programme), and others are national responsibilities (higher education and trade). The lack of clarity on relationships and alignments between sectors undermines the potential for co-ordinated action and advocacy at different levels. It jeopardises the training of health workers required to implement the PHC Re-engineering Strategy, where demand is in the health sector but supply falls under education.

Notwithstanding its noble aims, the NDP is ultimately underpinned by a neo-liberal agenda that could plausibly undermine its sectoral aims. The NDP seeks to reposition South Africa so as to benefit from what it understands to be major shifts in global trade and investment that are reshaping the world economy and international politics. Indeed, opportunity is linked to the expectation that, within the next decade, Africa will be the only low-wage region. The success of the plan is dependent on whether the intention to triple the size of the economy by 2030 can be realised. Some fear that export-led growth, i.e. economic growth based primarily on the extraction and export of raw materials such as minerals and agricultural products, will drive unemployment, limit the social agenda and undermine decent work, including in health. Another aspect of the neo-liberal agenda is a reduction in government spending, currently evident in the growing austerity measures imposed on the health sector.[76]

Evaluating how the PHC Re-engineering Strategy promotes a social-determinant approach

A 'four-stream' approach to PHC re-engineering has been adopted by the National Department of Health (NDoH), with a commitment to the district health system as the institutional vehicle to manage implementation. The four streams are: a system of community outreach referred to as Ward-based Outreach Teams (WBOTs); School Health Teams; District Clinical Specialist Teams (focused on maternal and child health); and contracting of private general practitioners for clinical care. Of the four streams, the WBOTs and School Health Teams are best placed to begin addressing the social determinants of health.

When fully implemented, each of the 4 277 electoral wards in the country should have one or more WBOTs, comprising a professional nurse (as team leader) and six CHWs, with additional support from Environmental Health and health-promotion practitioners. The main function of WBOTs is to promote good health and prevent ill health. In fulfilling this mandate, WBOTs in a number of provinces have engaged other sectors such as Social Development, the Social Security Agency of South Africa (SASSA) and the Department of Home Affairs around access to social grants; they have also participated in inter-sectoral 'war rooms' at community level, and have worked closely with local political structures. Notwithstanding these actions, training and scope of practice to date have not focused on sensitisation to social determinants or the development of skills required for community mobilisation.[77] In practice, the work of WBOTs is centred on household follow-up and support, rather than community-level action. There is considerable potential for WBOTs to further promote local action on the social determinants of health – whether in food environments, pedestrian safety, or access to services from other sectors (such as policing, grants, health promotion at schools, etc.) However, in order to achieve this, the value of such roles must be recognised, and they must be actively supported through appropriate training and remuneration.

School Health services are the second stream of PHC re-engineering, and are enabled by an Integrated School Health Policy.[78] With the services starting in schools in quintiles 1 and 2 (the poorest schools), they are wellplaced to mitigate poverty and its sequelae. Frameworks from the Department of Basic Education on comprehensive learner support provide the potential to work intersectorally with educators, schoolchildren, parent bodies, various government sectors and local communities in addressing social determinants.[78] However, establishment of School Health Teams has been slow and the programmatic focus is severely limited, with screening of learners occurring only at key times (e.g. developmental screening in grades R and 1). Sexual and reproductive health education to supplement the life-skills programme is one service that has been prioritised; this is a proximal behavioural intervention that should be supported by more holistic youth-empowerment programmes.

In sum, although the PHC Re-engineering Strategy importantly focuses on the use of CHWs organised in WBOTs and School Health services, it is weak in terms of its approach to community involvement, civic engagement and inter-sectoral collaboration. It also does not sufficiently recognise the crucial nature of a developmental approach to deal with issues relating to the social determinants, either within the health sector (for example, by linking to the work of environmental health practitioners who represent an important interface with communities, and who are wellplaced to address selected social determinants such as water, sanitation, storm-water drainage and dumping at a local level),[77] or in other sectors.

Where to in the next 20 years?

South Africa has a clear commitment to address social determinants; the challenge is to move into action. Looking forward 20 years takes us beyond the current NDP vision for 2030. While the NDP offers some possibilities to address social determinants, it unlikely to succeed if the growth required to raise employment and generate funds to fuel improvements in living standards is not achieved. We therefore need to reassess the reality of year-on-year less-than-expected-growth, which has been a feature of our economy for the last decade,[78] and to think about how different sectors will work together.

Also, clearly within its remit, the NDoH must re-examine the PHC Re-engineering Strategy. While the current strategy provides the possibility for local action to address social determinants, there has not been sufficient attention to, and investment in, building the human-resource capacity needed at this level. WBOTs, School Health Teams and specialist teams must be fully staffed. The work of addressing social determinants cannot be left to CHWs alone; all health-worker cadres at PHC level should receive training in order to understand a social-determinant approach and to build the skills required for advocacy and meaningful and effective inter-sectoral engagement. In particular, WBOTs should link at sub-district level with Environmental Health practitioners who fall under local government and who are responsible for environmental health; they also should link with the Department of Social Development which is responsible for social welfare and support. Equally of concern is the inability of the current the PHC Re-engineering Strategy to initiate the sort of national-level action that is required by health and other sectors. In the era of globalisation, policy-level national action is required to address social determinants, in addition to local action. As shown in the case study presented on obesity, a range of fiscal and legislative measures are needed to regulate the food trade, for example. In this regard, it is encouraging that a National Health Commission is planned that will have responsibility for developing a 'Health-in-all-Policies' strategy. There is also a role for the use of mass media to raise awareness in the population of the role of key social determinants of health. An aware and engaged citizenry is crucial to both the improvement of health behaviours, and to influence government to protect and promote health through the introduction and strengthening of fiscal, developmental and regulatory policies concerning the food environment, living and working environments and social-support structures. Finally, there is a need for action at global level, also beyond the remit of local health provision, to call transnational companies to account. Here again, the health sector has to find its voice and take on a stronger advocacy role within national government and beyond, if it is truly to join the struggle to address the social determinants of health.

Recommendations

Building on the principles and potential of the country's NDP and the PHC Re-engineering Strategy, we recommend that action on the social determinants of health in South African should be strengthened as follows:

Firstly, a social-determinant approach should be used as an analytical lens to understand population- and community-level factors that influence health.

Secondly, an overarching plan should be constructed that highlights and addresses the social determinants of health common to the main causes of premature mortality in South Africa: poor housing, inadequate water and sanitation, a suboptimal food environment, high levels of alcohol and substance abuse, low levels of social cohesion, and an inadequate health-system response.

Thirdly, greater dialogue should be initiated between sectors and, importantly, how different ministries can realistically work together and how action can be aligned and connected across levels of government and across sectors. This requires attention to organisational structures, processes and relationships that ensure alignment of planning and implementation across levels of government and between sectors, ministries and departments.

In this regard, greater consideration should be given to how such action can be taken both at national level (for example, in considering how fiscal measures can be established to address the negative consequence of globalisation), and at local level (for example, by considering how communities can be involved in determining how local resources are used for the 'common good' to improve health).

Lastly, it is recommended that the PHC Re-engineering Strategy be re-examined so that it makes provision for funding, processes and structures that can support active collaboration and action across sectors – with the active engagement of civil society – to extend the current, somewhat limited, policy and programmatic practice associated with inter-sectoral action for health. In this regard, links are needed urgently between the 'four streams' of the PHC Re-engineering Strategy at sub-district level and other stakeholders, such as Environmental Health practitioners and front-line staff employed by other ministries in the government's Social Protection, Community and Human Development cluster (such as Social Development, Water and Sanitation, and Human Settlements).

Related to this, there should be growing recognition within the NDoH and allied ministries that the work of addressing the social determinants of health cannot be left to the CHWs alone – as is currently suggested in the NDP. What is required instead is the training of all cadres, particularly those working at a primary level of care, or at first point of contact with citizens in the context of other ministries and departments, so that there is a greater understanding within the civil service of what is required for advocacy and effective inter-sectoral engagement.

The NDoH can exercise leadership by playing an advocacy and educational role in this regard as it has clearly articulated understandings of the inter-sectoral nature of the social determinants of health, as well as evidence of the sort of action across levels and sectors that is required to promote health and well-being.

References

1 South African National Department of Health. White Paper for the transformation of the health system in South Africa. Pretoria: Government of South Africa; 1997.

2 World Health Organization. Declaration of Alma-Ata. In: International Conference on Primary Health Care, Alma-Ata, USSR, 6–12 September 1978. Geneva: WHO; 1978.

3 Goverment of South Africa. National Health Act 61 of 2003. Government Gazette Vol.469, No. 26595. Cape Town: Government Printers; Pretoria; 2004.

4 Development Bank of South Africa. A roadmap for the reform of the South African health system. Johannesburg: DBSA; 2008.

5 Naledi T, Barron P, Schneider H. Primary Health Care in SA since 1994 and implications of the new vision for PHC re-engineering. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health Systems Trust; 2011.

6 United Nations General Assembly. Transforming our World: the 2030 Agenda for Sustainable Development. Vol. A/70/L.1. New York: United Nations; 2015.

7 United Nations. The Millennium Development Goals Report 2015. New York: United Nations; 2015. [Internet]. [cited 27 April 2017].
URL: https://visit.un.org/millenniumgoals/2008highlevel/pdf/MDG_Report_2008_Addendum.pdf [incorrect URL?]

8 Hickel J. The Problem with Saving the World. The Jacobin Magazine. [Internet]. [cited 1 August 2015].
URL: https://www.jacobinmag.com/2015/08/global-poverty-climate-change-sdgs/%0AThe [the link goes to the magazine, not the article]

9 World Health Organization Commission on Social Determinants of Health. Closing the gap in a generation: Health equity through action on the social determinants of health. Geneva: WHO; 2008.

10 World Health Organization. Social determinants of health. [Internet]. [cited 3 March 2017].
URL: http://www.who.int/social_determinants/sdh_definition/en/

11 Ottersen OP, Dasgupta J, Blouin C, et al. The political origins of health inequity: Prospects for change. Lancet. 2014;383(9917):630–67.

12 Massyn N, Peer N, Padarath A, Barron P, Day C. District Health Barometer 2014/15. Durban: Health Systems Trust; 2015.

13 Blas E, Kurup AS, editors. Equity, social determinants and public health programmes. World Health Organization. Geneva: WHO; 2010. p.11–29.

14 Puoane T, Tsolekile L, Caldbick S, Igumbor E, Meghnath K, Sanders D. Chronic Non-communicable Diseases in South Africa: Progress and challenges. In: Padarath A, English R, editors. South African Health Review 2012. Durban: Health Systems Trust; 2012. p.115–26.

15 Rigby N. Commentary: Counterpoint to Campos et al. Int J Epidemiol. 2006;35(1):79–80.

16 National Planning Commission. National Development Plan: Vision for 2030. Pretoria: Government of South Africa; 2011.

17 Shisana O, Labadarios D, Rehle T, Simbayi L, Zuma K, Dhansay A, et al. South African National Health and Nutrition Examination Survey (SANHANES-1). Cape Town: HSRC Press; 2013.

18 Western Cape Burden of Disease Reduction Project, Final Report 2007. Cape Town; June 2007. [Internet]. [cited 27 April 2017].
URL: https://www.westerncape.gov.za/text/2007/10/cd_volume_1_overview_and_executive_summaries180907.pdf

19 Birn A-E, Pillay Y, Holt TH. Textbook of Global Health. Oxford: Oxford University Press; 2009.

20 UNICEF. Strategy for improved nutrition of children and women in developing countries. Indian J Pediatr. 1991;58:13–24.

21 Krieger N. Proximal, distal, and the politics of causation: What's level got to do with it? Am J Public Health. 2008;98(2):221–30.

22 Coovadia H, Jewkes R, Barron P, Sanders D, McIntyre D. The health and health system of South Africa: historical roots of current public health challenges. Lancet. 2009 Sep 11;374(9692):817–34. [Internet]. [cited 27 April 2017].
URL: http://linkinghub.elsevier.com/retrieve/pii/S014067360960951X

23 Bustreo F, Chestnov O, Knaul M, Carvalho A De, Merialdi M. At the crossroads: transforming health systems to address women's health across the life course. Bull World Health Organ. 2013;91:622.

24 Defo BK. Beyond the "transition" frameworks: the cross-continuum of health, disease and mortality framework. Glob Health Action. 2014;7(24804):1–16. [Internet]. [cited 27 April 2017].
URL: http://dx.doi.org/10.3402/gha.v7.24804

25 Ataguba JE-O, Day C, McIntyre D. Explaining the role of the social determinants of health on health inequality in South Africa. Glob Health Action. 2015;8(1):28865. [Internet]. [cited 3 March 2017].
URL: http://www.scopus.com/inward/record.url?eid=2-s2.0-84948808017&partnerID=tZOtx3y1

26 Fang X, Fry D, Ganz G, Casey T, Ward C. The social and economic burden of violence against children in South Africa. Report to Save the Children South Africa. Georgia State University and the Universities of Cape Town and Edinburgh; 2016.

27 Sanders D, Reynolds L, Eley B, et al. Decreasing the burden of childhood disease: Final report of the Childhood Diseases Workgroup, Western Cape Burden of Disease Reduction Project. Vol.7. Cape Town: University of the Western Cape; 2007.

28 Sanders D, Bradshaw D, Ngongo N. The status of child health in South Africa. South Africa Child Gauge 2009/2010. [Internet]. [cited 27 April 2017].
URL: http://www.ci.org.za/depts/ci/pubs/pdf/general/gauge2009-10/south_african_child_gauge_09-10.pdf

29 South African Human Rights Commission (SAHRC), UNICEF. Poverty traps and social exclusion among children in South Africa. Pretoria: SAHRC; 2014.

30 Chopra M, Daviaud E, Pattinson R, Fonn S, Lawn JE. Saving the lives of South Africa's mothers, babies, and children: can the health system deliver? Lancet. 2009 Sep 5;374(9692):835–46. [Internet]. [cited 23 January 2014].
URL: http://www.ncbi.nlm.nih.gov/pubmed/19709729

31 UNICEF. Structural Determinants of Child Well-being. In: An Expert Consultation Hosted by the UNICEF Office of Research 22–23 June 2012. New York: UNICEF; 2012. [Internet].
URL: https://www.unicef-irc.org/publications/pdf/structural_determ_eng.pdf

32 South African National Department of Health. Strategic Plan for Maternal, Newborn, Child and Women's Health (MNCWH) and Nutrition in South Africa 2012–2016. Pretoria: NDoH; 2012.

33 Sanders D, Chopra M. Key challenges to achieving health for all in an inequitable society: the case of South Africa. Am J Public Health. 2006 Jan;96(1):73–8. [Internet]. [cited 2 August 2011].
URL: http://www.pubmedcentral.nih.gov/articlerender.fcgi?a?rtid=1470444&tool=pmcentrez&rendertype=abstract

34 Loring B, Robertson A. Obesity and inequities. Copenhagen; 2014. [Internet].
URL: http://www.euro.who.int/__data/assets/pdf_file/0003/247638/obesity-090514.pdf

35 South African National Department of Health. Strategic Plan for the Prevention and Control of Non-Communicable Diseases. Pretoria: NDoH; 2013. [Internet].
URL: https://www.health-e.org.za/wp-content/uploads/2013/09/NCDs-STRAT-PLAN-CONTENT-8-april-proof.pdf

36 Spires M, Delobelle P, Sanders D, Puoane T, Hoelzel P, Swart R. Diet-related non-communicable diseases in South Africa: determinants and policy responses. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

37 Wandai M, Day C. Trends in risk factors for non-communicable diseases in South Africa. Durban: Health Systems Trust; 27 May 2015. [Internet].
URL: http://www.hst.org.za/sites/default/files/Trends_NCD_SA_HST_28Aug2015.pdf

38 Puoane T, Steyn K, Bradshaw D, et al. Obesity in South Africa: the South African demographic and health survey. Obes Res. 2002;10(10):1038–48. [Internet].
URL: http://dx.doi.org/10.1038/oby.2002.141%5Cnhttp://www.ncbi.nlm.nih.gov/pubmed/12376585%5Cnhttp://onlinelibrary.wiley.com/doi/10.1038/oby.2002.141/abstract%5Cnhttp://onlinelibrary.wiley.com/doi/10.1038/oby.2002.141/full

39 Whiting D, Unwin N, Roglic G. Diabetes: equity and social determinants. In: Blas E, Kurup AS, editors. Equity, social determinants and public health programmes. Geneva: World Health Organization; 2010. p. 77–94.

40 Mayosi BM, Lawn JE, Van Niekerk A, Bradshaw D, Abdool Karim SS, Coovadia HM. Health in South Africa: Changes and challenges since 2009. Lancet. 2012;380(9858):2029–43. [Internet].
URL: http://dx.doi.org/10.1016/S0140-6736(12)61814-5

41 Yach D, Hawkes C, Gould CL, Haman KJ. The global burden of chronic diseases: overcoming impediments to prevention and control. JAMA. 2004;291(21):2616–22.

42 Schneider M, Bradshaw D, Steyn K, Norman R, Laubscher R. Poverty and non-communicable diseases in South Africa. Scand J Public Health. 2009;37:176–186.

43 Thow AM, Sanders D, Drury E, et al. Regional trade and the nutrition transition: Opportunities to strengthen NCD prevention policy in the Southern African development community. Glob Health Action. 2015;8(1):1–10.

44 Igumbor EU, Sanders D, Puoane TR, et al. "Big food," the consumer food environment, health, and the policy response in South Africa. PLoS Med. 2012;9(7).

45 Okop KJ, Mukumbang FC, Mathole T, Levitt N, Puoane T. Perceptions of body size, obesity threat and the willingness to lose weight among black South African adults: a qualitative study. BMC Public Health. 2016;16(1):365. [Internet].
URL: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4850665&tool=pmcentrez&rendertype=abstract

46 Mvo Z, Dick J, Steyn K. Perceptions of overweight African women about acceptable body size of women and children. Curationis. 1999;22(2):27–31.

47 Abdool Karim Q, Baxter C. The dual burden of gender-based violence and HIV in adolescent girls and young women in South Africa. S Afr Med J. 2016;106(12):1151–3.

48 Abdool Karim Q, Sibeko S, Baxter C. Preventing HIV infection in women: a global health imperative. Clin Infect Dis. 2010;50(Suppl. 3):S122–9. [Internet].
URL: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3021824&tool=pmcentrez&rendertype=abstract

49 Gupta GR, Parkhurst JO, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. Lancet. 2008;372(9640):764–75.

50 Ogden J, Gupta GR, Fishersupc WF, Warnersupd A. Looking back, moving forward: Towards a game-changing response to AIDS. Glob Public Health. 2011;6(Suppl. 3):285–92. [Internet].
URL: http://www.scopus.com/inward/record.url?eid=2-s2.0-84857078513&partnerID=40&md5=f90725e57d8e8fd9f762fcc880173fbc

51 Gibbs A, Willan S, Misselhorn A, Mangoma J. Combined structural interventions for gender equality and livelihood security: a critical review of the evidence from southern and eastern Africa and the implications for young people. J Int AIDS Soc. 2012;15(Suppl. 1):17362.

52 Edwards AE, Collins CB. Exploring the influence of social determinants on HIV risk behaviors and the potential application of structural interventions to prevent HIV in women. J Health Dispar Res Pract. 2014;7(SI2):141–55. [Internet].
URL: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4848455&tool=pmcentrez&rendertype=abstract

53 Chersich MF, Rees HV. Vulnerability of women in southern Africa to infection with HIV: biological determinants and priority health sector interventions. AIDS. 2008;22(Suppl. 4):S27–40. [Internet].
URL: http://www.ncbi.nlm.nih.gov/pubmed/19033753

54 Kim JC, Pronyk PM, Barnett T, Watts C. Exploring the role of economic empowerment in HIV prevention. AIDS. 2008;22:57–71. [Internet].
URL: http://dx.doi.org/10.1097/01.aids.0000341777.78876.40

55 Jewkes RK, Dunkle K, Nduna M, Shai N. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: A cohort study. Lancet. 2010;376(9734):41–8. [Internet].
URL: http://dx.doi.org/10.1016/S0140-6736(10)60548-X

56 Leclerc-Madlala S. Age-disparate and intergenerational sex in southern Africa: the dynamics of hypervulnerability. AIDS. 2008;22(Suppl. 4):S17–25.

57 UNAIDS. The Gap Report. Geneva: UNAIDS; 2013.

58 Schoepf BG. Women, AIDS, and Economic Crisis in Central Africa. Can J Afr Stud. 1988;22(3):625–44.

59 Sanders D, Sambo A. AIDS in Africa: the implications of economic recession and structural adjustment. Health Policy Plan. 1991;6(2):157–65.

60 Parker W, Makhubele B, Ntlabati P, Connolly C. Concurrent Sexual Partnerships Amongst Young Adults in South Africa: Challenges for HIV prevention communication. Johannesburg: Centre for AIDS Development, Research and Evaluation; 2007.

61 Jana M, Nkambule M, Tumbo D. Multiple and Concurrent Sexual Partnerships in Southern Africa. A Ten Country Research Report. 2008. [Internet]. URL: http://www.soulcity.org.za/research/target-audience-research/multiple-and-concurrent-sexual-partnerships-in-southern-africa

62 Siziba LP SJ, Siziba L. Low rates of exclusive breastfeeding are still evident in four South African provinces. S Afr J Clin Nutr. 2015;28(4):170–9.

63 Hawkes C. Marketing activities of global soft drink and fast food companies in emerging markets: a review. Globalization, diets and noncommunicable diseases. Geneva: World Health Organization; 2002. p. 1–78.

64 Theron M, Amissah A, Kleynhans IC, Albertse E, MacIntyre UE. Inadequate dietary intake is not the cause of stunting amongst young children living in an informal settlement in Gauteng and rural Limpopo Province in South Africa: the NutriGro study. Public Health Nutr. 2007;10(4):379–89.

65 Battersby J, Peyton S. The geography of supermarkets in Cape Town: Supermarket expansion and food access. Urban Forum. 2014;25:153–64.

66 D'Haese M, Van Huylenbroeck G. The rise of supermarkets and changing expenditure patterns of poor rural households: case study in the Transkei area, South Africa. Food Policy. 2005;30(1):97–113.

67 Chen W, Yijie L, Feifei C. At the bottom of the foodchain: small operators versus multinational corporations in the food systems of South Africa, Mexico, Brazil, India and China. Cape Town: Social Resources Institute; 2016.

68 Fortune Global 500. [Internet]. [cited 3 March 2017]. URL: http://fortune.com/global500/

69 CIA World Fact Book. [Internet]. [cited 3 March 2017]. URL: https://www.cia.gov/library/publications/the-world-factbook/fields/2056.html

70 World Health Organization. Putting taxes into the diet equation. Bull World Health Organ. 2016;94:233–308. [Internet]. URL: http://www.who.int/bulletin/volumes/94/4/16-020416/en/

71 Sidaner E, Balaban D, Burlandy L. The Brazilian school feeding programme: an example of an integrated programme in support of food and nutrition security. Public Health Nutr. 2013;16(6):989–94. [Internet]. URL: http://www.ncbi.nlm.nih.gov/pubmed/23218237

72 Manyema M, Veerman LJ, Chola L, et al. The potential impact of a 20% tax on sugar-sweetened beverages on obesity in South African adults: A mathematical model. PLoS One. 2014;9(8):e105287.

73 Kohl HW, Craig CL, Lambert EV, et al. The pandemic of physical inactivity: global action for public health. Lancet. 2012;380(9838):294–305.

74 Abrahams Z, Temple N, Mchiza Z, Steyn N. A Study of Food Advertising in Magazines in South Africa. J Hunger Environ Nutr. 2016;1–13.

75 Rollins NC, Bhandari N, Hajeebhoy N, et al. Breastfeeding 2: Why invest, and what it will take to improve breastfeeding practices? Lancet. 2016;387(10017):491–504.

76 Rural Health Advocacy Project. Causes, implications and possible responses to the implementation of staffing moratoria in the public health system in South Africa during times of budget austerity. Johannesburg: RHAP; 2016.

77 Cleary S, Schaay N, Botes E, Figlan N, Lehmann U, Gilson L. Re-imagining community participation at the district level: lessons from the DIALHS collaboration. In: Padarath A, King J, English R, editors. South African Health Review 2014/15. Durban: Health Systems Trust; 2015. p. 1–18.

78 Industrial Development Corporation. South African economy: An overview of key trends since 1994. Department of Research and Information. December 2013. p. 1–30. [Internet]. URL: http://www.idc.co.za/reports/IDC R&I publication - Overview of key trends in SA economy since 1994.pdf

Towards a migration-aware health system in South Africa: a strategic opportunity to address health inequity

9

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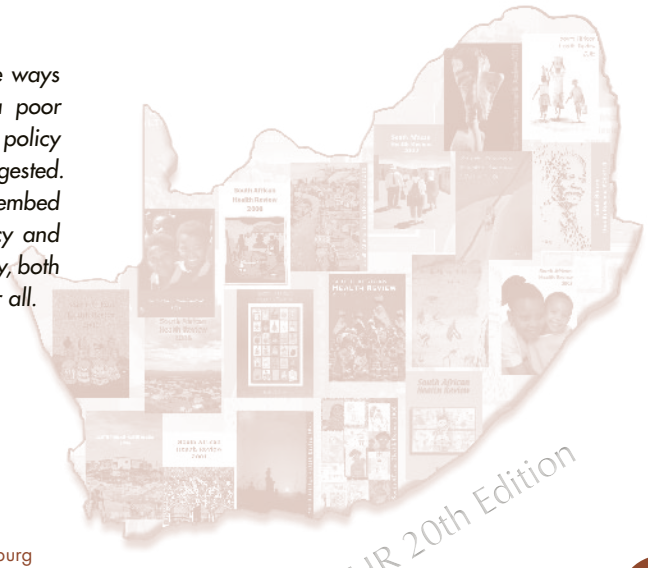
Similar to the rest of the region, South Africa has a high prevalence of communicable diseases, an increasing non-communicable disease burden, and diverse internal and cross-border population movements. Healthy migration should be good for social and economic development, but in South Africa, current health responses fail to address migration adequately. A review was done of the available data in order to provide recommendations for improved health-systems responses to migration and health in the country, and we drew on our experience in relevant policy processes.

The findings show that addressing migration and health is a priority globally and locally. The number of people moving internally within South Africa far exceeds the number of cross-border migrants. Contrary to popular assumptions, internal migration presents greater governance, health-system, and health-equity challenges than cross-border migration, but current responses do not recognise this. Our findings show why recognising migration as a determinant of health assists in addressing associated health inequities. Data suggest that a healthy migrant effect, and a subsequent health penalty prevail in South Africa. Evidence shows that both non-nationals and South African nationals who move within the country face challenges in accessing health care; of particular concern is the lack of a co-ordinated strategy to ensure continuous access to treatment, care and support for chronic conditions.

Migration impacts the South African public healthcare system but not in the ways often assumed, and sectors responsible for improving responses have a poor understanding of migration. The need for better data is emphasised, existing policy responses are outlined, and strategic opportunities for intervention are suggested. Recommendations are made for migration-aware health systems that embed population movement as central to the design of health interventions, policy and research. Such responses offer strategic opportunities to address health inequity, both nationally and regionally, with resulting health and developmental benefits for all.

Evidence shows that both non-nationals and South African nationals who move within the country face challenges in accessing health care; of particular concern is the lack of a co-ordinated strategy to ensure continuous access to treatment, care and support for chronic conditions.



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Introduction

This chapter provides an overview of the associations between migration and health in South Africa, and calls for the urgent development of 'migration-aware'[a] health systems: a whole-system response whereby population movement is embedded as a central concern in the design of health interventions policy, and research.[1] Healthy migration is good for development,[2] but current responses within public-health systems – including for communicable and non-communicable diseases, and maternal and child health – do not engage adequately with migration.[1,3,4] The resulting health inequities undermine the developmental opportunities of migration.[1,5] In the absence of a migration-aware approach to health and health-systems planning, inequities will persist and South Africa will struggle to meet its key health targets. These targets include the UNAIDS 90:90:90 targets[6] and those associated with the Sustainable Development Goals (SDGs), including that of universal health coverage.[7] Adopting a migration-aware approach in South Africa will support initiatives to address inequities in health, and provide strategic opportunities for both primary health care (PHC) re-engineering initiatives, and implementation of National Health Insurance (NHI).

Setting the scene

Like many other countries globally, South Africa must develop improved responses to the governance of both international and internal migration,[8,9] including in relation to public health, population health, and health-systems planning.[10–12] As elsewhere, these population movements are mostly linked to the search for improved livelihood opportunities,[11] but also include moving in order to seek safety from conflict or natural disasters.[13,14] Migration is high on political and public agendas globally, including in South Africa, and many unfounded assumptions associated with political scaremongering and the scapegoating of foreign nationals persist.[15] At the centre of these debates within South Africa are important questions related to the development of comprehensive responses that will address the associated, yet competing, political concerns of (im)migrant welfare (including public-health concerns), social cohesion, xenophobia, and the often over-emphasised and unsubstantiated rhetoric surrounding national security.[16]

While not officially acknowledged within the World Health Organization's (WHO) social determinants of health (SDH) framework, migration is increasingly acknowledged to be a key determinant of health.[17,18] It has been suggested that this lack of recognition within the SDH framework has contributed to the global failure to engage with migration in efforts to improve health and address health inequities.[5] In 2008, the World Health Assembly (WHA) passed Resolution 61.17 on the Health of Migrants.[19] The Resolution calls on Member States, including South Africa, to improve their response to health and migration through an operational framework based on four key components: monitoring of migrants' health; policy and legal frameworks; migrant-sensitive health systems; and partnerships, networks and multi-country frameworks.[19,20] In its current iteration, the Resolution is very health-systems focused. This limitation has been acknowledged, and the recent Global Consultation on Migrant Health explored ways to 'reset the agenda'.[21]

In this chapter, we draw on our review of existing evidence and experience in current policy processes to show that working towards the development of migration-aware responses nationally and regionally will provide an important and strategic opportunity to address health inequities in South Africa, with health and developmental benefits for all.[1,22]

Methodology

Following the approach of a previous contribution in the *South African Health Review* (SAHR),[23] and drawing on our respective professional experience, a rapid analysis was done of key policy documents and relevant literature produced between 2006 and 2016, including published and unpublished reports from international organisations. The review draws on recently published work and work in press by the authors, with additional literature searches conducted using ScienceDirect and Google Scholar. Each author has over 10 years' experience researching and/or working on migration and health issues, including participation in relevant policy processes at local, national, regional and international levels.[b]

Key findings

Key findings of the review are presented, and implications of the findings are considered. Despite some progress, the review shows that understanding of population mobility remains limited within the South African health sector.[3,24] As a result, negative, unsubstantiated assumptions linking migration and health prevail, including claims that over-inflate the prevalence of cross-border migration, and that incorrectly associate non-nationals with the spread of communicable diseases and with over burdening the South African public healthcare system.[1,25] While evidence highlighting the importance of working to establish migration-aware health policies and responses exists,[22] very little effort has gone into providing evidence-based recommendations and guidelines for the development of concrete migration and health-policy solutions and programmes that could assist in developing migration-aware responses to health in this country.[1,10,22] An overview of the seven key findings is presented in detail below.[c]

1 The movement of South African nationals presents greater governance, health-system and health-equity challenges than the movement of cross-border migrants

Despite popular assumptions to the contrary, the largest population of migrants within South Africa are South African nationals who move within the country, often between provinces.[26,27] For example, in Gauteng, 44% of the population are South Africans born in another province, and only 7–8% are estimated to be cross-border migrants.[26] Challenging the popular notion that South Africa is 'overwhelmed' by immigrants, analysis of data from the 2012 Quarterly Labour Force Survey shows that South African nationals make up over 90% of those employed in every sector, including in self-employment.[28] South Africa has a long history of migration, mostly associated with labour migration and the search for improved

a This chapter draws on the idea of migration-aware health systems proposed by Vearey, 2014.[1]

b Further details on these processes can be found online at https://goo.gl/p0qlbW

c A summary can be found online at https://goo.gl/D1B9CR

livelihood opportunities. In the post-apartheid era, migration into and within South Africa has increased due to changes in immigration regulations. Cities, previously inaccessible to most South Africans and immigrants, are now home to many internal and cross-border migrants.[2]

While media reports often suggest otherwise, South Africa is home to a much smaller number of refugees (individuals who have been granted refugee status and who hold a Section 24 permit) and asylum-seekers (people who have applied for refugee status and who hold a Section 22 permit) than is commonly presumed. According to the Green Paper on International Migration published by the Department of Home Affairs in June 2016, there are approximately 100 000 refugees and 80 000 asylum-seekers in South Africa, and over 91 000 applications for work-related temporary-residence visas were received between 2010 and 2013.[16]

While conclusive data are not available on irregular migrants, South Africa (like other countries) is home to a number of undocumented cross-border migrants. These are individuals who for various reasons are currently without the documentation required to be in the country legally. Evidence shows that this is associated with challenges in accessing documentation, such as renewal of asylum permits or visa extensions, and as a result of South Africa's restrictive Immigration Act, which makes it difficult for lower-skilled workers to regularise their stay.[25,29] Lack of documentation – itself a determinant of poor health[4] and a persistent 'daily stressor'[30] – has a range of negative health impacts, including challenges in accessing health care and emotional distress.[4,25,30]

There is no evidence to support the idea that people move over large distances in order to seek health care.[11] However, due to the high prevalence of population movements within the country, South African public healthcare users have a long history of mobility.[11] Despite this, the South African health system does not respond adequately to the movement of people.[1,3,11]

2 Response to migration and health is a global, regional and national priority

Globally, there is momentum towards a proactive, long-term strategy to address migration and health.[20] Following the 2008 WHA Resolution on the Health of Migrants[19] and global consultations on migration and health in 2010 and 2017,[20,21] there has been increasing recognition that healthy migration can occur when government systems integrate migration and mobility in their planning agendas.[2,9] South Africa has been involved in the development and adoption of the 2008 Resolution; has participated actively in various regional and global forums on migration, health and development; and as a member of the Foreign Policy and Global Health (FPGH) initiative[31] has engaged with health concerns during disasters and conflicts.

3 Migration is associated with inequities in health and is a social determinant of health

Migration is increasingly recognised as a determinant of health as it interacts with health outcomes and influences health inequities in multiple ways.[4,5,17,18,32] Figure 1 highlights the key ways in which migration determines health in South Africa, and highlights opportunities for intervention.

Figure 1: A summary of the structural determinants of health inequity and the social determinants of health experienced by internal and cross-border migrants in South Africa

<table>
<tr><td colspan="2">Structural determinants of health inequity: factors determining distribution and exposure to social determinants of health</td><td>Social determinants of health: social causes of (ill)health</td><td rowspan="4"></td></tr>
<tr><td>Socio-economic and political context</td><td>Structural determinants and socio-economic position</td><td>Intermediary determinants</td></tr>
<tr><td>Governance (role of different spheres of government, including local government)
Policies and the political structure
Macro economic policies (labour market structure)
Public policies (labour, housing, land, health, education, social protection, immigration policy, refugee policy)
Legal status and documentation
Culture and societal values (how health is valued, how migration is valued and viewed)
Epidemiological conditions</td><td>Social structure/social position (in destination; inclusion, exclusion, marginalisation)
Gender
Ethnicity
Nationality
Education
Occupation
Income (urban livelihood activities)
Migration status</td><td>Urbanisation experience (migration experience, place in the city)
Material circumstances (living and working conditions, food availability, access to secure tenure, access to social grants, household structure, environmental conditions, access to basic services)
Psychosocial factors (fear of police, detention and deportation, safety, fear of violence, experience of trauma, stress, dependents, hunger)
Behaviours and biological factors
Health system (accessibility, affordability, acceptability; plural system: public, private, traditional, non-governmental)</td></tr>
<tr><td colspan="2">Social cohesion and social capital
Social cohesion/integration; bridging, bonding and linking capital</td><td>Impact on equity in health and wellbeing</td></tr>
</table>

Source: Vearey, 2013.[4]

4 Migration impacts the public healthcare system in South Africa

Migration impacts the public healthcare system in South Africa, but not in ways often assumed: public healthcare users are mobile for reasons other than healthcare-seeking and there is no evidence of people moving in order to access health care.[1,11] However, border areas present specific challenges as individuals may cross national borders in order to access their geographically closest healthcare facility.[11] Our review showed that access to public health care is problematic for non-nationals[1,4,22] and internal migrants living on the urban periphery.[33] These access challenges are shaped by documentation (or lack thereof); languages spoken; and discrimination by healthcare providers.[11,25]

There is some evidence of self-selection, namely of healthier individuals migrating, primarily in the context of south-north migration.[34,35] Some studies have suggested that migrants arrive with healthier diets and lifestyles, and are therefore initially less likely to have diet-related chronic illness.[36,37] Over time, the health of migrants converges with that of the host population.[38] Existing evidence suggests a 'healthy migrant' effect in South Africa, with healthy working-age individuals moving to seek improved livelihood opportunities in urban and peri-urban areas.[39,40] An urban health penalty appears to be present in that migrants struggle to access the benefits of city living/positive determinants of health.[33] This results in individuals losing their 'healthy-migrant' benefit and returning home when they are too sick to work, presenting a burden on the (predominantly rural) households and healthcare systems they came from.[39,41–43] This potentially creates a cycle of health inequity: healthy individuals move in response to (rural) family members getting sick, then return home in need of support themselves. This is particularly the case where migrants and their households are separated from extended family and the support typically provided in times of illness.[44]

5 Strategic opportunities exist to develop a migration-aware health system in South Africa and regionally

Various policy processes provide strategic opportunities to influence the development of a migration-aware health system in South Africa and regionally, namely a whole-system response whereby population movement is embedded as a central concern in the design of health interventions, policy and research.[1] Our review highlights that different opportunities exist within policy processes under way at international, regional (the Southern African Development Community (SADC)), and national levels, as discussed below.[d]

Internationally, the 2008 WHA Resolution is the most important framework calling for action on migration and health at global level.[19,20] However, its limitations have been noted, and the 2017 Global Consultation on Migrant Health aimed to 'reset the agenda' to make more informed recommendations to guide intervention.[21]

Regionally, the 15 SADC Member States represent diverse socio-economic contexts and epidemiological profiles; this presents a challenge to the development of harmonised and co-ordinated responses to diverse population movements and communicable diseases at regional level. For example, each Member State has different legislation relating to the rights of cross-border migrants to access healthcare, including HIV treatment.[45] Our rapid review of policies within the SADC indicates that migration and mobility are not addressed effectively in public-health responses. The 2009 SADC Framework for Population Mobility and Communicable Diseases remains in draft form.[46] This Framework is currently being considered by Member States based on the findings and recommendations from a regional consultancy exploring financing models for migration and communicable diseases within the region.[47] However, progress in this regard is slow. South Africa has contributed to promoting regional health through regional policy and cross-border healthcare initiatives, including the SADC HIV and AIDS Cross Border Initiative,[48] the Elimination 8 Strategic Plan,[49] Mozambique, South Africa and Swaziland (MOSASWA),[50] and TB in the Mines (TIMS).[51]

At national level, equity in access to health services is a fundamental objective of the South African healthcare system.[52] The National Health Act and the South African Constitution guarantee everyone access to life-saving care, but debate remains regarding healthcare access beyond life-saving care.[53] According to national legislation, refugees and asylum-seekers should be treated as South African citizens in terms of access to free public health care, while other non-citizens, including those with work or study permits, usually have to pay a 'foreign fee'.[25] Emergency health care is guaranteed for all, but variation in practice has been observed.[54,55]

Individuals who move – including those with well-planned, predictable seasonal movements – may experience challenges in accessing chronic medication. For example, healthcare users who know that they are travelling, or who return 'home' during the year, or who are involved in mobile work (such as taxi drivers) may be unable to access refills elsewhere. Pregnant women also face challenges; they may attend antenatal care in one location, go 'home' to have the baby, then return again to the first location. During these periods of movement between facilities, healthcare providers struggle to offer continuous care, which presents a challenge to healthcare users and providers alike.

The current roll-out of electronic unique patient identifiers[56,57] is an opportunity to establish an integrated information system enabling the National Department of Health to produce timely and accurate data for nationals (including those who do and do not move) and non-South African nationals. The unique patient identifier includes an electronic medical health record of the patient's place of origin, demographics and medical history, and will be used to ensure accurate linking of clinical transactions with the correct records.[56,57]

6 Improved data are needed to develop and implement migration-aware health system responses in South Africa

In addition to the on-going political challenges associated with developing improved data systems on migration, there are also complex conceptual, methodological and technical challenges involved, including the lack of a universally agreed definition of the term 'migrant',[20,58] resulting in unhelpful, non-specific definitions.[59]

d Further details can be found online at https://goo.gl/p0qlbW

7 Good practice examples are scarce, but those identified in the review present opportunities for scaling-up

Regional responses include SADC led initiatives to address migration, labour and health, including responses to malaria, TB and HIV and attempts to address the harmonisation of treatment protocols, surveillance and epidemic preparedness.[48,50,60–62]

Responses at national level are limited, but there has been recent mobilisation around the establishment of a national migration and health forum,[63] and migration has been recognised in the National Strategic Plan (NSP) on HIV, STIs and TB.[64,65]

From our rapid review, it appears that local-level responses are the most successful approaches to migration and health.[66] Migrant Health Forums (MHFs), namely inter-sectoral forums that involve civil society and State structures, are of particular importance here.[67,68] Several initiatives involving partnerships between international organisations, local (district-level) civil society and district health services have also shown promise; however, these examples focus almost exclusively on cross-border migration and we had difficulty in identifing interventions designed to support the health of internal migrants. Of note is recent research suggesting that in lieu of formal policies and programmes, frontline healthcare workers are finding ways to innovate in order to support healthcare access for migrants, particularly in relation to facilitating continuity of care in HIV treatment.[11]

Identified initiatives include tailored, local-level responses for domestic workers and farm workers, including the piloting of 'health passports' (patient-held records);[69,70] an antiretroviral therapy (ART) referral protocol for migrants moving between South Africa and Zimbabwe;[71] and the provision of ART through mobile clinics to migrant farm workers in Limpopo and Mpumalanga.[69,71] Research is needed urgently to explore whether these initiatives can be adapted to engage with internal migration, and their potential to be scaled up beyond local level.

Conclusion

South Africa is home to a diverse migrant and mobile population, and the country faces multiple health concerns. Recognition that the migration of South African nationals far outweighs the number of cross-border migrants moving into and within the country is critical in understanding and responding effectively to the ways in which migration mediates health. Importantly, responses should address local contexts as migration profiles differ greatly between and within districts. As argued here, progress towards achieving health targets is dependent on the development and implementation of co-ordinated, evidence-informed responses that engage with migration and mobility. Such a 'migration-aware' health-system response is a whole-system response, with population movement embedded as a central concern in the design of interventions, policy and research.[1] These health-system responses should, in the first place, engage with and respond to the movement of South African nationals within the country, including within and between provinces and districts; this includes both seasonal and circular migratory patterns between and within urban, rural and peri-urban areas. Secondly, such a system should be able to respond to the movements of the smaller population of cross-border migrants and South African nationals who move between different countries in the region. A 'migration-aware' health system will contribute to achieving universal health coverage, and will have developmental and public-health benefits for all who live, work and move within and through South Africa and the southern African region.[1,22]

Recommendations

South Africa should work to develop a national migration and health co-ordinating network and policy; this can be done by drawing on the experience of Sri Lanka,[72] drawing on existing policy processes at local and national level, and in consultation with multiple stakeholders. Furthermore, as the incoming chair of the SADC in August 2017, South Africa should take the lead in ensuring the finalisation, ratification and implementation of the regional framework for communicable diseases and population mobility.[46] Table 1 shows specific recommendations for action to develop migration-aware health systems in South Africa.

Table 1: Key recommendations for the development of a migration-aware health system in South Africa, 2017

Health system strengthening		
Building block	**What is needed?**	**Who should act?**
Improve delivery of healthcare services to migrant and mobile users (including health promotion and education, preventive care and screening, continuity of treatment for chronic conditions, curative and palliative care, and access to medical technologies)	• Adopt a migration-aware approach: a whole-health system response whereby population movement is embedded as a central concern in the design of interventions, policy and research. • Strengthen and ensure that PHC reform initiatives integrate a migration-aware response as a key feature, including the implementation of unique identifiers. • Ensure that responses to migration and mobility are integrated into the existing healthcare system to avoid institutionalising social exclusion, to ensure quality control, and to guarantee sustainability and scale-up of responses. • Develop tailored interventions to meet the needs of certain migrant groups, **where evidence indicates that this is necessary**, including scaling up the provision of mobile clinic and outreach services at district level for migrant farm workers. • Work to implement a co-ordinated regional response to cross-border migration and communicable diseases, with an emphasis on ensuring continuity of access to treatment for chronic diseases regardless of immigration status. • Strengthen internal referral and cross-border referral systems, communication and co-ordination mechanisms so that migrants are not left behind. • Scale up pilot projects and tested interventions to support continuity of access to treatment for migrant healthcare users, including patient-held records ('health passports), standardised referral letters and treatment roadmaps. • Ensure that in all SADC countries there is no distinction or discrimination between locals and foreigners when providing health services and medical products and technologies.	• NDoH (SA) • Voluntary organisations and NGOs serving migrant communities • Private sector • Traditional health practitioners • Other Government agencies • Other SADC Member States and their institutions • SADC and other SADC healthcare providers
Stewardship	• Develop a multi-sectoral approach that recognises migration as a determinant of health, based on the principle of "equity and health in all policies". • Develop interventions to strengthen networks between different stakeholders, such as national, provincial and local Migrant Health Forums (MHFs) (inter-sectoral forums that involve civil society and state structures). • Provide outreach to share information about the public healthcare system and ways to make care accessible to internal and cross-border migrants. • Foster international, bilateral and regional co-operation on health-protection mechanisms concerning migrants. • Develop a whole-of-government, comprehensive, consultative and evidence-based approach: a National Migration and Health Policy Framework. • Establish an Inter-Ministerial Committee that will guide and ensure effective implementation and monitor implementation of the National Migration Health Policy Framework, including development and implementation of national standards that prohibit discrimination within the healthcare system. • Establish a Migration Health Task Force comprising technical focal points from key government and non-government agencies that would contribute actively to migration health-development programmes. • Establish a Regional Migration and Health Forum comprising technical focal points from key government and non-government agencies that would contribute actively to migration health development programmes at SADC level. • Ensure participation in regional and global forums on migration health to ensure gathering, documentation and sharing of information and best practices.	NDoH (SA) Voluntary organisations and NGOs serving migrant communities Private sector Traditional health practitioners Other Government agencies Universities, colleges, education centres and professional associations Other SADC Member States and their institutions SADC and other SADC institutions
Financing	• Reduce financial barriers to health care for the less well-off by limiting out-of-pocket payments and promoting universal coverage, through implementation of National Health Insurance (NHI). • Use equity-oriented health impact assessments to help articulate the relationship between policy measures, health outcomes, costs and benefits. • Finalise and implement the Health Financing Mechanism for migrants in the SADC Region to ensure protection of the health of cross-border mobile people in the face of communicable diseases, including source, transit and destination communities. • Ensure involvement of the private sector in health care both as a direct provider of services, and as a provider of finance through workplace and prepayment schemes. • Ensure access to health services and financial protection for migrants through various innovative mechanisms such as portable social security schemes, employer-based health insurances or tax-based schemes. • Mitigate the burden of out-of-pocket health spending and move towards prepayment systems that involve pooling of financial risks across population groups. • Develop or strengthen bilateral and multilateral social-protection agreements between source and destination countries, which include healthcare benefits, and the portability thereof.	NDoH (SA) Treasury Voluntary organisations and NGOs serving migrant communities Private sector Other Government agencies Universities, and research institutions Medical aid schemes Other SADC Member States and their institutions SADC and other SADC institutions

Health system strengthening		
Building block	**What is needed?**	**Who should act?**
Health information	Commission a National Research Study on Migration and Health. Develop and implement a unique identifier system that is inclusive of different forms of internal and cross-border migration. Establish a SADC Regional Migration and Health Information and Reporting Monitoring and Evaluation System. Roll out electronic unique patient identifiers to include information for internal and cross-border migrants. Establish an integrated health-information system that will enable the NDoH to produce timely and accurate data for nationals (including those who do and do not move) and for non-South African nationals.	NDoH (SA) Stats SA Voluntary organisations and NGOs serving migrant communities Private sector Traditional health practitioners Other Government agencies Universities and research institutions Other SADC Member States and their institutions SADC and other SADC institutions

References

1 Vearey J. Healthy migration: A public health and development imperative for south(ern) Africa. S Afr Med J. 2014 Jul 3;104(10):663–4.

2 Segatti A, Landau L, editors. Contemporary Migration to South Africa: A Regional Development Issue. Washington, DC: World Bank; 2011. [Internet]. [cited 24 June 2015]. URL: http://elibrary.worldbank.org/doi/book/10.1596/978-0-8213-8767-2

3 Vearey J. Migration and health in South Africa: implications for development. In: Segatti A, Landau L, editors. Contemporary Migration to South Africa: A Regional Development Issue. Washington, DC: World Bank; 2011.

4 Vearey J. Migration, urban health and inequality in Johannesburg. In: Bastia T, editor. Migration and Inequality. London: Routledge; 2013.

5 Ingleby D. Ethnicity, Migration and the "Social Determinants of Health" Agenda. Psychosoc Interv. 2012 Dec;21(3):331–41.

6 UNAIDS. 90-90-90: An ambitious treatment target to help end the AIDS epidemic. Geneva: UNAIDS; 2014. Report No.: UNAIDS / JC2684.

7 United Nations. Transforming our world: the 2030 Agenda for Sustainable Development. A/RES/70/1. New York: United Nations; 2015.

8 Landau LB, Segatti A, Freemantle I. Urbanisation and Migration: The Governance of Mobility and Spatial Inequalities. In: State of the Nation: South Africa. Pretoria: Health Sciences Research Council Press; 2013.

9 Landau LB, Segatti A, Misago JP. Planning and participation in cities that move: Identifying obstacles to municipal mobility management. Public Adm Dev. 2013 May;33(2):113–24.

10 Walls HL, Vearey J, Modisenyane M, et al. Understanding healthcare and population mobility in southern Africa: The case of South Africa. S Afr Med J. 2015 Nov 24;106(1): 14–15.

11 Vearey J, de Gruchy T, Kamndaya M, Walls H, Chetty-Makkan C, Hanefeld J. Exploring the migration profiles of primary healthcare users in South Africa. J Immigr Minor Health. 2016. DOI: 10.1007/s10903–016–0535–7.

12 Gushulak BD, MacPherson DW. The basic principles of migration health: population mobility and gaps in disease prevalence. Emerg Themes Epidemiol. 2006 May 4;3:3.

13 Internal Displacement Monitoring Centre. IDMC Grid 2016 – Global Report on Internal Displacement. IDMC; 2016. [Internet]. [cited 6 November 2016]. URL: http://www.internal-displacement.org/globalreport2016/

14 United Nations Population Division/Department of Economic and Social Affairs [Internet]. [cited 13 December 2016]. URL: http://www.un.org/en/development/desa/population/migration/data/estimates2/estimates15.shtml

15 The Lancet Infectious Diseases. Migration and Health. Lancet Infect Dis. 2016;16:867.

16 South African Department of Home Affairs. Green Paper on International Migration in South Africa. Government Gazette. No. 40088. Pretoria: Department of Home Affairs; 2016.

17 Davies A, Basten A, Frattini C. Migration: A social determinant of migrants' health. Eurohealth. 2010;16(1): 10–2.

18 Castañeda H, Holmes SM, Madrigal DS, Young M-ED, Beyeler N, Quesada J. Immigration as a Social Determinant of Health. Annu Rev Public Health. 2015;36(1):375–92.

19 World Health Assembly. World Health Assembly Resolution 61.17: Health of Migrants. Geneva: WHA; 2008.

20 World Health Organization. Health of migrants: the way forward: report of a global consultation. Madrid, Spain, 3–5 March 2010. Geneva: WHO; 2010. [Internet]. [cited 13 December 2016]. URL: http://apps.who.int/iris/handle/10665/44336

21 World Health Organization, International Organization for Migration, and the Democratic Socialist Republic of Sri Lanka. 2nd Global Consultation on Migrant Health: Resetting the Agenda. Geneva: WHO and IOM; 2016.

22 Vearey J. Mobility, migration and generalised HIV epidemics: a focus on sub-Saharan Africa. In: Thomas F, editor. Handbook on Migration and Health. Cheltenham: Edward Elgar Publishing; 2016.

23 Scheibe A, Richter M, Vearey J. Sex work and South Africa's health system: addressing the needs of the underserved. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

24 Vearey J. Challenging urban health: towards an improved local government response to migration, informal settlements, and HIV in Johannesburg, South Africa. Glob Health Action. 2011 Jun 9;4(0). [Internet]. [cited 17 December 2015]; URL: http://www.globalhealthaction.net/index.php/gha/article/view/5898

25 Vearey J. Learning from HIV: Exploring migration and health in South Africa. Glob Public Health. 2012 Jan;7(1):58–70.

26 Statistics South Africa. Census in brief. Report No. 03–01–41. Pretoria: Statistics South Africa; 2012.

27 Moultrie T, Dorrington R, Budlender D. Migration in South Africa: An analysis of the 2011 South African census data. Johannesburg: African Centre for Migration & Society, University of the Witwatersrand; 2016 (unpublished).

28 Statistics South Africa. Quarterly Labour Force Survey. Pretoria: Statistics South Africa; 2012.

29 Landau LB. Protection and Dignity in Johannesburg: Shortcomings of South Africa's Urban Refugee Policy. J Refug Stud. 2006 Aug 10;19(3):308–27.

30 Vearey J, Nunez L. Exploring the Psychosocial and Health Rights of Forced Migrants in Johannesburg: The Impact of "Daily Stressors" on the Emotional Wellbeing of Forced Migrants. Johannesburg Centre for the Study of Violence and Reconciliation. 2011. [cited 16th January 2017] URL: http://www.migration.org.za/uploads/docs/report-29.pdf

31 World Health Organization. Foreign Policy and Global Health. [Internet]. [cited 18 January 2017]. URL: http://www.who.int/trade/Foreignpolicyandhealth/en/

32 Malmusi D, Borrell C, Benach J. Migration-related health inequalities: Showing the complex interactions between gender, social class and place of origin. Soc Sci Med. 2010 Nov;71(9):1610–9.

33 Vearey J, Palmary I, Nunez L, Drime S. Urban health in Johannesburg: the importance of place in understanding intra-urban inequalities in a context of migration and HIV. Health Place. 2010;16:694–702.

34 McDonald JT, Kennedy S. Insights into the "healthy immigrant effect": health status and health service use of immigrants to Canada. Soc Sci Med. 2004 Oct;59(8):1613–27.

35 Uitenbroek DG, Verhoeff AP. Life expectancy and mortality differences between migrant groups living in Amsterdam, The Netherlands. Soc Sci Med. 2002 May;54(9):1379–88.

36 Flores G, Brotanek J. The healthy immigrant effect: a greater understanding might help us improve the health of all children. Arch Pediatr Adolesc Med. 2005 Mar;159(3):295–7.

37 Akresh IR. Dietary assimilation and health among Hispanic immigrants to the United States. J Health Soc Behav. 2007 Dec;48(4):404–17.

38 Antecol H, Bedard K. Unhealthy assimilation: why do immigrants converge to American health status levels? Demography. 2006 May;43(2):337–60.

39 Ginsburg C, Bocquier P, Béguy D, et al. Healthy or unhealthy migrants? Identifying internal migration effects on mortality in Africa using health and demographic surveillance systems of the INDEPTH network. Soc Sci Med. 2016 Sep;164:59–73.

40 Mathee A, Naicker N. The socioeconomic and environmental health situation of international migrants in Johannesburg, South Africa. S Afr Med J. 2016 Jan;106(1):70–5.

41 Clark SJ, Collinson MA, Kahn K, Tollman SM. Returning Home to Die: Circular labour migration and mortality in rural South Africa. Scand J Public Health. 2007;35(Suppl. 69):35–44.

42 Collinson MA, Wolff B, Tollman SM, Kahn K. Trends in Internal Labour Migration from Rural Limpopo Province, Male Risk Behaviour, and Implications for the Spread of HIV/AIDS in Rural South Africa. J Ethn Migr Stud. 2006;32(4):633–48.

43 Collinson MA. Striving against adversity: The dynamics of migration, health and poverty in rural South Africa. Glob Health Action. 2010;3(5080).

44 Hunter-Adams J. Mourning the support of women postpartum: The experiences of migrants in Cape Town, South Africa. Health Care Women Int. 2016 May 4;37(9):1–15.

45 International Organization for Migration. Migrants' right to health in southern Africa. Pretoria: IOM; 2009. [Internet]. [cited 17 January 2017].
URL: http://www.peacepalacelibrary.nl/ebooks/files/326057773.pdf

46 Southern African Development Community (SADC) Directorate for Social and Human Development and Special Programs. SADC Policy Framework for Population Mobility and Communicable Diseases in the SADC Region: Final Draft, April 2009. [Internet]. [cited 16 January 2017].
URL: HttpwwwarasainfofilespubSADC20PolicyFrameworkFINAL pdf. 2009

47 Oxford Policy Management. Developing Financing Mechanisms to support the Implementation of the draft "Policy Framework for Population Mobility and Communicable Diseases in the SADC Region". Draft Proposals for Financing Mechanisms and Involvement of the Private Sector. 2015. Unpublished report. [cited 16th January 2017].
URL: http://www.opml.co.uk/projects/financial-assessment-sadc-policy-framework-population-mobility-and-communicable-diseases.

48 Southern African Development Community. SADC HIV and AIDS Cross Border Initiative – a Global Fund Project. Gaborone: SADC; 2012. [Internet]. [cited 16 January 2017].
URL: https://www.k4health.org/sites/default/files/SADC_Cross_Border_Initiative_2012.pdf

49 Elimination 8. Elimination 8 Strategic Plan: 2015–2020. Windhoek: Elimination 8; 2015. [Internet]. [cited 16 January 2017].
URL: http://www.shrinkingthemalariamap.org/files/content/resource/attachment/E8%20Strategic%20Plan%20(2015-2020).pdf

50 Moonasar D, Maharaj R, Kunene S, et al. Towards malaria elimination in the MOSASWA (Mozambique, South Africa and Swaziland) region. Malar J. 2016;15:419.

51 TB in the Mining Sector in Southern Africa (TIMS). [Internet]. [cited 16 January 2017].
URL: http://www.timssa.co.za/Whoweare/AboutTIMS.aspx

52 Oliver A, Mossialos E. Equity of access to health care: outlining the foundations for action. J Epidemiol Community Health. 2004 Aug 1;58(8):655–8.

53 United Nations. Report of the Special Rapporteur on the human rights of migrants, Jorge Bustamante. New York: United Nations; 2011. [Internet]. [cited 16 January 2017]. Report No.: A/HRC/17/33/Add.4.
URL: https://documents-dds-ny.un.org/doc/UNDOC/GEN/G11/130/36/PDF/G1113036.pdf?OpenElement

54 Human Rights Watch. No healing here: violence, discrimination and barriers to health for migrants in South Africa. New York: Human Rights Watch; 2009. [Internet]. [cited 18 January 2017].
URL: https://www.hrw.org/sites/default/files/reports/SAwithcover.pdf

55 Crush J, Tawodzera G. Medical Xenophobia and Zimbabwean Migrant Access to Public Health Services in South Africa. J Ethn Migr Stud. 2014 Apr 3;40(4):655–70.

56 South African National Department of Health. Strategic Plan 2014–2019. Pretoria: NDoH; 2014. [Internet]. [cited 16 January 2017].
URL: https://www.health-e.org.za/wp-content/uploads/2014/08/SA-DoH-Strategic-Plan-2014-to-2019.pdf

57 South African National Department of Health. eHealth Strategy South Africa. Pretoria: NDoH; 2012. [Internet]. [cited 16 January 2017].
URL: https://www.health-e.org.za/wp-content/uploads/2014/08/South-Africa-eHealth-Strategy-2012-2017.pdf

58 Urquia ML, Gagnon AJ. Glossary: migration and health. J Epidemiol Community Health. 2011 May;65(5):467–72.

59 Gushulak B. Monitoring migrants' health. Background Paper, National Consultation on Migrant Health. WHO and IOM. Madrid; 3–5 March 2010.

60 Southern African Development Community Directorate for Social and Human Development and Special Programs. Declaration on Tuberculosis in the Mining Sector. 2012. [cited 16 January 2017]
URL: http://www.stoptb.org/assets/documents/news/Declaration%20on%20Tuberculosis%20in%20the%20Mining%20Sector2012English.pdf

61 Caholo E. Regional Integration in the Context of HIV and AIDS, TB and the Malaria: The Case of SADC. Presentation at the XIX International AIDS Conference, Washington DC 22 July 2012. [cited 16 January 2017]
URL: http://docslide.net/documents/regional-integration-in-the-context-of-hiv-and-aids-tb-and-malaria-the-case-56cb6ee535273.html

62 Southern African Development Community. Harmonised Surveillance_Framework for HIV and AIDS, Tuberculosis and Malaria in the SADC Region. Gaborone: SADC; 2009. [Internet]. [cited 16 January 2017].
URL: https://www.sadc.int/files/9214/1171/8930/Harmonised_Surveillance_Framework_forHIV_and_AIDS_Tuberculosis_and_Malariain_the_SADC_Region.pdf

63 Vearey J. 3rd South African Consultation on Migration and Health. 2016. [Internet]. [cited 12 January 2017].
URL: https://healthmigrationresearch.wordpress.com/2016/11/22/3rd-south-african-consultation-on-migrationhealth/

64 South African National AIDS Council (SANAC). National Strategic Plan on HIV, TB and STIs 2017–2022, Summary. Pretoria: SANAC; 2017. [Internet]. [cited 6 April 2017]. URL: http://www.hst.org.za/sites/default/files/NSP%202017-SUMMARY.pdf

65 South African National AIDS Council (SANAC). National Strategic Plan for HIV, TB and STIs (2012–2016). Pretoria: South African National Department of Health; 2012.

66 Vearey J, Segatti A. Building regional migration governance in Southern Africa: A case study of the South African public health response. Regional governance of migration and social policy conference; 19 April 2012; University of Pretoria.

67 Vearey J, Thomson K, Sommers T, Sprague C. Commentary: Exploring local-level responses to migration and urban health in Hillbrow: the Johannesburg Migrant Health Forum. BMC Public Health (in press).

68 Sommers T, Vearey J, Sprague, C. Migrant Health Forums: Exploring the Role of Advocacy Coalitions in Strengthening Local-Level Responses to Healthy Migration in South Africa. Unpublished manuscript. 2017.

69 International Organization for Migration. Emerging Good Practices in Migration and HIV Programming in Southern Africa. Pretoria: IOM; 2011. [Internet]. [cited 16 January 2017]. URL: https://southafrica.iom.int/system/files/drupal-private/Emerging_Practices_WEB.pdf

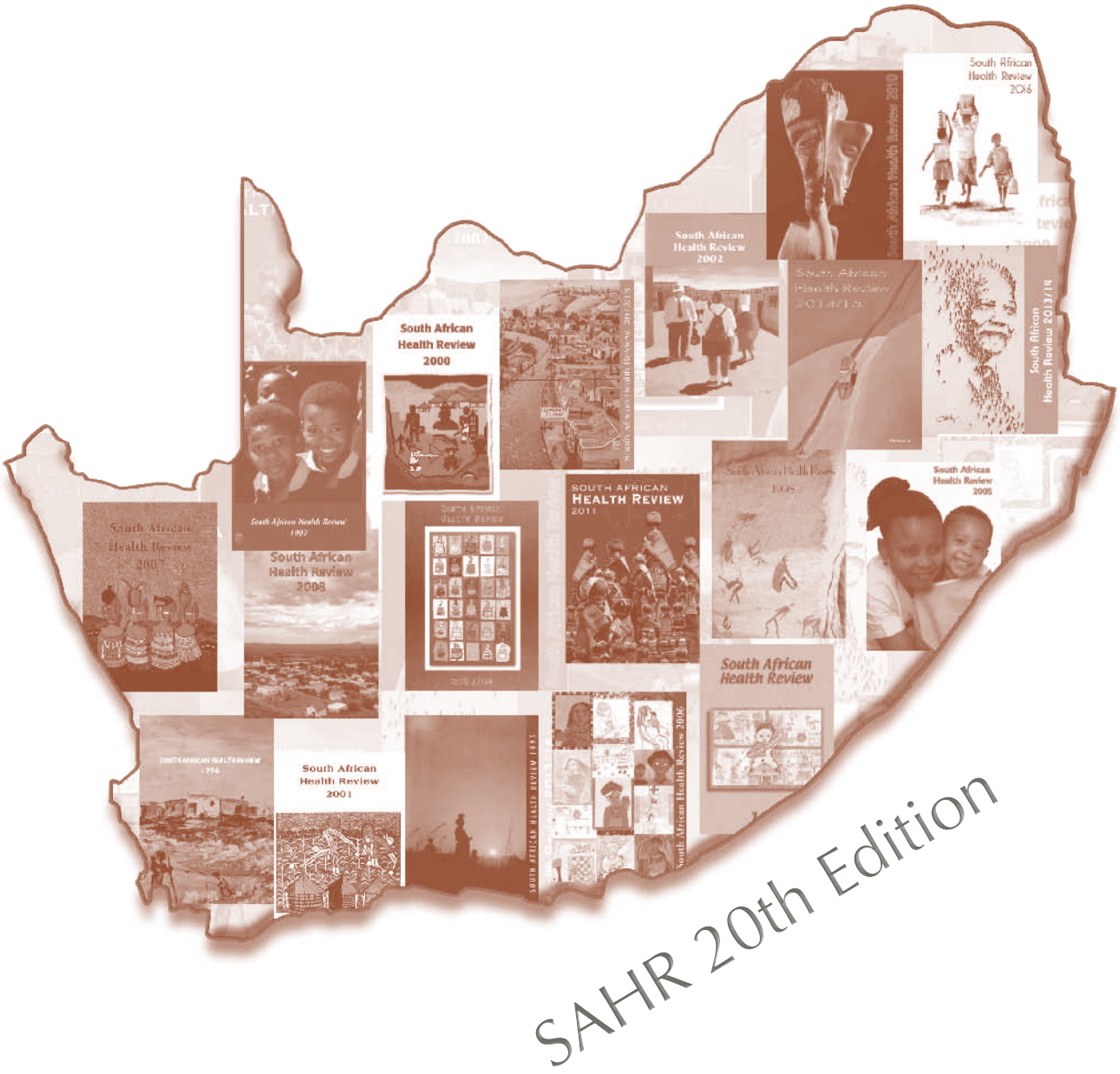
70 Ripfumelo HIV Prevention and Care Programme for Farm Workers in South Africa/International Organization for Migration. [Internet]. [cited 16 January 2017]. URL: https://southafrica.iom.int/programmes/ripfumelo-hiv-prevention-and-care-programme-for-farm-workers-in-south-africa

71 Médecins Sans Frontières. Providing antiretroviral therapy for mobile populations: Lesson learned from a cross border ARV programme in Musina, South Africa. Cape Town: MSF; 2012.

72 Wickramage K, Mosca D, Peiris S, editors. Migration health research to advance evidence based policy and practice in Sri Lanka. Volume 1. Philippines: IOM; 2017.

Health systems issues: micro

Health systems issues: micro



South Africa's hospital sector: old divisions and new developments

10

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The hospital sector in South Africa mirrors deep inequalities in the country as a whole. The private, for-profit hospital sector is well resourced and caters to a population that tends to be wealthier, urban and more likely to be formally employed. The public-hospital sector, catering to the majority of South Africans, faces lower human-resourcing ratios, financial constraints and ageing infrastructure.

This chapter contextualises the development of the two sectors, describes the current divide, and considers the implications in terms of equity, access and quality of care.

A unique dataset of quality-accreditation-survey scores was used, which allowed for analysis of the two sectors according to a common yardstick. These data reflect a wide array of structure- and process-related quality indicators; in addition, the patient perspective reflected in data from the General Household Survey was used to illustrate the quality differential. The research provides evidence of the polarisation between public and private facilities: private facilities consistently scored above public facilities across a range of accreditation categories, and there was far greater variability in the scores achieved by public facilities. The same polarised relationship was found to hold across key sub-components of the scores, such as management and leadership of hospitals in the two sectors.

We conclude that there is a need for the measurement of health outcomes across the system. Policy attention is required in terms of accountability and quality improvement. A focus on improving value in the system will, by necessity, have to engage with the discrepancies between the sectors.

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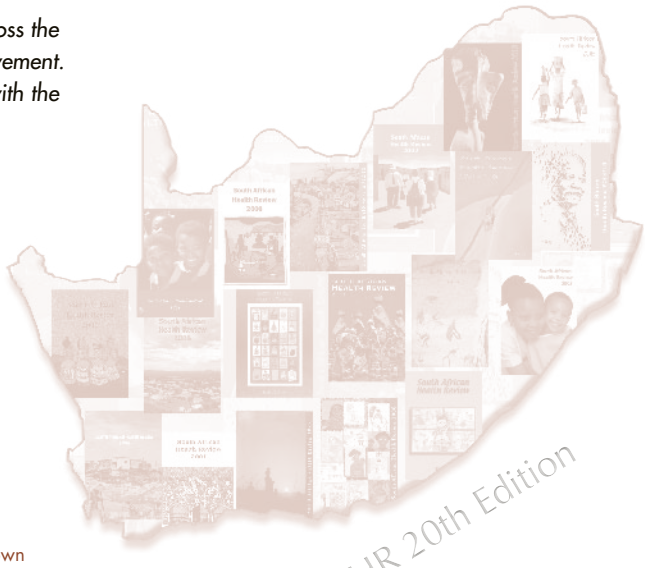

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Introduction

Deep-rooted and structural inequality is present in the economic and societal fabric of South Africa, including in the delivery of health services. The current healthcare system is born out of the country's apartheid legacy, and consequently there are systemic, and often stark, differences in healthcare outcomes by race[1,2] and geography, e.g. by province[3] or different neighbourhoods in the same city.[4]

The hospital sector is split along private and public lines. This chapter considers the equity of this structure in terms of populations served and access to facilities, and addresses the question of whether there are differences in the quality of care delivered by the two hospital sectors.

With the assistance of the Council for Health Service Accreditation of Southern Africa (COHSASA), it has been possible to compile a unique dataset, for the period 2001–2015, that includes information on both hospital sectors. The Council conducts quality accreditation surveys, which allowed for analysis of the two sectors according to a common yardstick.

This dataset and data from the General Household Survey (GHS) were analysed against the descriptive background of the two sectors, to consider whether quality differentials accentuate inequity in the health system. This has important policy implications as the country moves towards a system of National Health Insurance (NHI), with the underlying promise of increased equity in access to quality care.[5]

Two sectors

Health services in South Africa were racially segregated as a result of the Public Health Amendment Act of 1897.[2] The creation of the Bantustans after 1948 further entrenched these differences.[2] Each Bantustan[a] had its own health department but these were under-resourced compared with health departments in the rest of the country.[2] In the late 1980s, there were twice as many hospital beds per capita for the white population as for the black population.[6] Between 1976 and 1989, the total supply of hospital beds decreased from 4.7 per 1 000 of the total population to 3.7 per 1 000.[6]

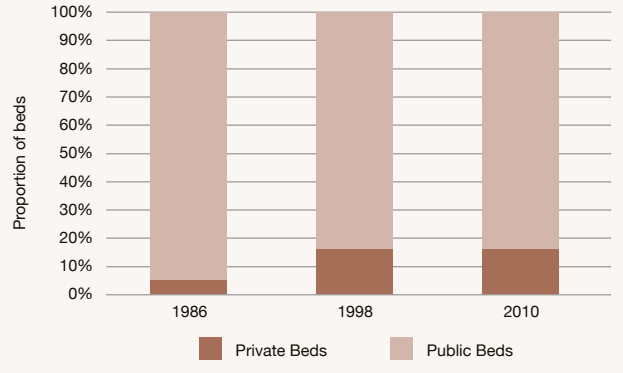
Between 1984 and 1989, there was a deterioration in public hospitals as a result of weak macro-economic conditions limiting investment in facilities,[7] an exodus of staff emigrating and leaving for the private sector (at least in part for financial reasons),[7] and an increase in the supply of private hospitals.[6]

The post-apartheid policy focus of the National Department of Health (NDoH) was on primary care – this may also have de-emphasised the role of hospitals.[8] At the same time, there was growth in the proportion of beds located in the private sector, as shown in Figure 1. The private hospital sector has also consolidated over time. Today, more than three-quarters of private hospital beds are owned by three large for-profit hospital groups.[9,10]

Private facilities largely serve those covered by voluntary private healthcare-financing vehicles (medical schemes);[11] these individuals constitute 16% of the population.[12,13] Coverage patterns are determined inter alia by formal employment[14] and affordability.[15]

a Territories set aside for the black population in South Africa, as part of a policy of separate development.

Figure 1: Proportion of beds in the private and public hospital sectors in South Africa, 1986–2010



Source: van den Heever, 2012.[7]

Medical-scheme coverage is concentrated in the top two income quintiles,[16] which in turn means that private hospitals tend to provide care to a more affluent population. Private hospitals are largely located in major metropolitan areas and hence serve a more urban population.[10]

The private hospital sector has been criticised for driving increases in healthcare expenditure over time,[10,16,17] as well as for being expensive by international standards.[18] It certainly constitutes a financially significant component of the health sector – expenditure on private hospitals accounted for 37% of annual medical scheme expenditure in 2013.[19]

By contrast, public hospitals provide care to the 84% of South Africans who are uninsured, albeit with approximately 70% of the country's usable hospital beds.[20,21] The public sector as a whole accounts for only half of total expenditure on healthcare,[20] and is therefore financially constrained in comparison to the private sector. The sector also faces lower human-resourcing ratios[22] and ageing infrastructure.[23] While public facilities have the right to levy user fees that are tiered on a means-tested basis, the reality is that care is largely free at the point of service. Revenue collected is less than 1% of total public-sector expenditure, and is primarily collected from institutional funders.[15]

Hospitals in the public sector can be categorised as follows: district health services manage district hospitals; provincial health services manage regional, tertiary and specialised hospitals; and central hospitals operate on a national level to provide both general and highly specialised services.[24]

The two sectors differ fundamentally in terms of their incentives, objectives and key stakeholders.[25] Other differences include:

- Employment of clinical staff: the public sector employs doctors, the private sector does not;[10]
- Rationing mechanisms: care in the public sector tends to be rationed both explicitly, via care protocols and formularies, and implicitly, via waiting lists and queues, while rationing in the private sector tends to be explicitly defined by the funders of care;[26]
- Input costs: the public sector has access to State tender prices for pharmaceutical products;[27] and

- Outputs: for example, public facilities tend to see large numbers of outpatients,[25] while private hospitals see a far higher proportion of surgical cases than public hospitals.

Methods

Household survey data

The GHS is an annual, nationally representative household survey administered by Statistics South Africa.[28] It is described as "an omnibus household-based instrument aimed at determining the progress of development in the country".[28] It measures the provision of services and level of household well-being across six areas: education, health and social development, housing, household access to services and facilities, food security, and agriculture.[28]

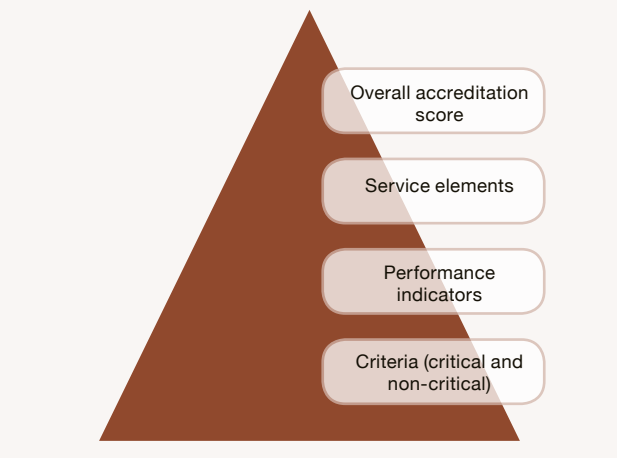
Bivariate analysis of the GHS data in this chapter provides a descriptive picture of how user complaints and visits differed between the two sectors.

Accreditation data

The COHSASA data reflect a wide array of structure and process-related quality indicators; these measures have the benefit of being standardised across both sectors. The dataset consists of COHSASA accreditation scores given to 145 public-sector and 35 private-sector hospitals over the period 2001–2015.

The COHSASA accreditation surveys have a tiered structure, illustrated in Figure 2.

Figure 2: Tiered structure of the COHSASA survey of public- and private-sector hospitals in South Africa, 2001–2015



Source: Personal Communication.[b]

The COHSASA overall accreditation score is calculated based on an algorithm that weights the scores of the criteria (which are considered measurable elements). These are aggregated to give a score for the performance indicators, which are then aggregated to give the scores for each of the service elements. The aggregation of the service-element scores results in the overall facility score. A facility must achieve an overall score greater than 80%, and critical criteria must all be compliant for a facility to achieve accreditation.

b Personal Communication: Cheryl Adams, Knowledge Management and System Coordinator, COHSASA, 30 January 2017.

Over the years, surveys were conducted on various versions of the accreditation standards. All versions were made comparable to a set of standards 6.6, the latest set of standards, by matching comparable service elements.

Analysis of accreditation data

The first survey score (referred to as the baseline survey score) for each hospital was used in our analysis. This smaller subset was available for 141 public hospitals and 26 private hospitals, for the period 2001–2014. The baseline reflects an initial assessment of the performance of each hospital before participation in the accreditation process. Thus the baseline survey score is more indicative of the underlying differences between the public- and private-sector facilities than the scores influenced by the COHSASA accreditation process.

Of the 41 service elements, only 26 were comparable across public- and private-sector facilities as the remaining 15 have limited applicability in the private sector. The average scores and variation in scores were compared across the public and private sectors at both an aggregate level and individually for the 26 common service elements.

Limitations

Household surveys like the GHS are always reliant on recall, which is regarded as a limitation, but given that hospitalisation is a memorable event, this is not considered a significant concern in this case.

One of the key questions about the COHSASA dataset is how representative the sample is of public hospitals in South Africa, given that participation in accreditation may not be random. For the most part, the decision to participate lies with the province and not with individual hospitals.

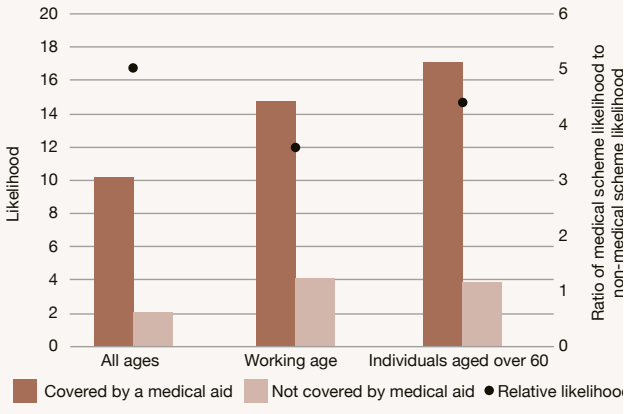
Given these concerns, an analysis was done of how various factors influence the likelihood of participation in public-hospital accreditation. A linear probability model was used. For the purposes of this analysis, we matched hospitals and feeder communities via the Census 2011.[29] Larger hospitals were found to be more likely to participate and remote hospitals less likely to participate than urban hospitals. Hospital type (district, regional, tertiary) did not influence the probability of participation. The effects of feeder-community per-capita income; employment rate; and access to piped water, potable water, toilets, electricity and refuse removal were not consistently statistically significant predictors of participation. The sample of participating hospitals is relatively representative of South African hospitals, with a slight over-representation of urban and larger hospitals. Nonetheless, it still provides valuable insight into differences between the two sectors.

Differentials in access

If medical scheme coverage is used as a proxy for those making use of private hospitals, data from the GHS can be used to discern patterns in access.

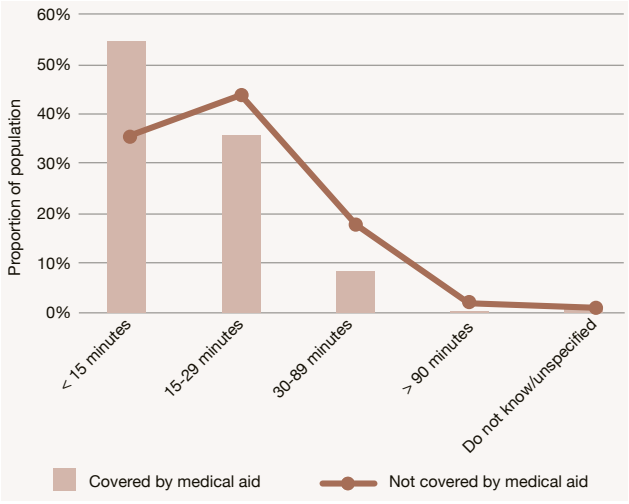
It is clear from the GHS that the likelihood of accessing a hospital is far higher for those with medical scheme cover than it is for those without (Figure 3). This holds across age groups.

Figure 3: Likelihood of accessing a hospital for those with and without medical scheme coverage in South Africa, 2010–2013



Source: General Household Survey, 2010–2013.[30–33]
Based on responses to the question "If anyone in this household gets ill and decides to seek medical help, where do they usually go first?"

Figure 4: Travel time to a health facility for those with and without medical scheme coverage in South Africa, 2015



Source: General Household Survey, 2015.[36]

The differential in access exceeds the differential in the supply of usable beds per 1 000 lives: those with medical scheme cover reported being five times as likely to access a hospital, while there were approximately twice as many beds per capita in the private sector.[c] This may be due to other factors such as differentials in the average length of stay, the staffing ratio per bed[d] and the extent of gate-keeping in the two sectors. The public sector operates on a referral model (although there is evidence that referral steps are frequently bypassed[34]), while access to tertiary care for medical scheme beneficiaries is largely unfettered.

There were also differentials in geographical access, as illustrated in Figure 4 it was found that those covered by medical schemes are far more likely to be within a 15-minute radius of a health facility. Those who can afford medical scheme cover are also more likely to live in urban areas, and private hospitals are concentrated in these areas. By contrast, the public sector has to serve a far more geographically dispersed population. This inequity echoes the findings of other studies; for example, McLaren, Ardington and Leibbrandt found that black South Africans were three times as likely as white South Africans to live more than five kilometres from a primary health care facility.[35]

The differential in access to hospitals was found to carry through to utilisation of care: the number of bed days per 1 000 covered lives in the private sector is close to double that in the public sector.[e] Higher levels of utilisation in the private sector are unlikely to reflect a higher burden of disease. The burden of HIV and tuberculosis (TB) falls largely on the public sector, with relatively low levels of HIV prevalence in the medical scheme population.[12] Both infectious disease and trauma have a strong relationship with poverty,[37] and we would therefore expect that the public sector faces a greater burden. The true differential in the burden of non-communicable disease between the two sectors is unknown, and will vary by disease due to differences in the underlying risk factors. Higher levels of access in the private sector can translate into higher diagnosis rates. There is some evidence that poor and rural communities are disproportionately affected,[38] and that poor South Africans tend to underestimate their health needs.[39]

Quality of care across the two sectors

Given the inequitable distribution of financial and human resources[40] between the two sectors, it would be reasonable to expect the quality of care in the private sector to be higher. The private sector is widely perceived to offer higher and more consistent quality of care[41] – this translates into the willingness to purchase (increasingly expensive) medical scheme cover.[42] However, this is not to say that the private sector is without faults of its own. The high levels of resourcing in the private sector can lead to waste and over-utilisation. For example, the rate of Caesarean sections performed in the private sector (70.8%) far exceeds the rate in both the public sector (24.7%) and global norms.[20,43,44]

Care in the private sector tends to focus on curative, hospicentric services, with preventive and palliative approaches comparatively neglected.[45,46] In addition, care in the private sector tends to be highly fragmented, with little co-ordination of care between providers.[47]

c Assuming that private hospitals are used by medical scheme beneficiaries, and public hospitals are used by uncovered citizens.

d For example, there are were three anaesthetists in Mpumalanga in 2008.[22] This limits the available surgical capacity regardless of the number of available surgical beds in the Province.

e Based on data from the District Health Information Software and the Council for Medical Schemes.

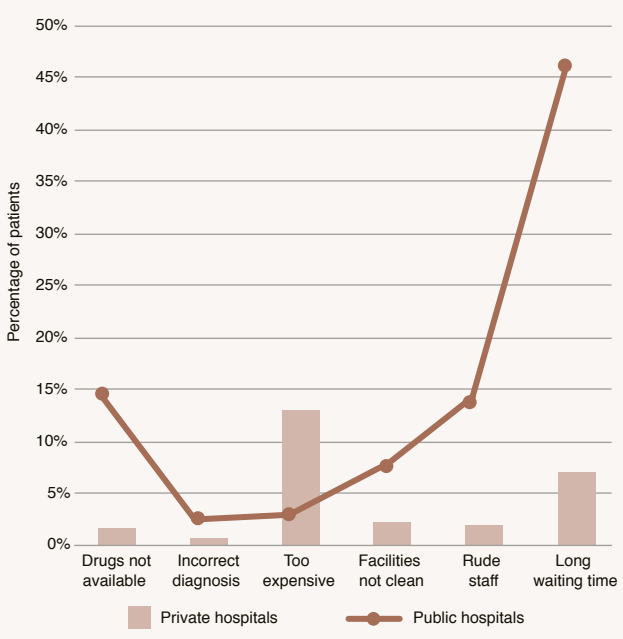
The patient perspective

Respondents in the GHS reported higher levels of problems in public hospitals than in private hospitals, other than in the area of care being too expensive (Figure 5). It is to be expected that some of the reported problems are correlated with health outcomes (for example, cleanliness, drug availability and incorrect diagnosis). Long waiting times may also have impacted adversely on outcomes because the high time cost of a clinic visit may result in patients delaying healthcare consultations, resulting in delays in diagnosis and treatment.[48] However, the relationship will depend on the point in the care process at which patients have to wait, and the relative waiting lists for emergency, elective and non-elective care.[49]

Quality differentials are also reflected in the levels of patient satisfaction reported in the GHS (based only on those who declared themselves ill). Eighty-eight per cent of medical-scheme patients reported being either "very satisfied" or "somewhat satisfied" as opposed to 83% of non-medical-scheme patients (Figure 6).

Given that medical-scheme patients tend to have higher income levels than non-medical-scheme patients, and are paying for cover, we may expect that their expectations will be higher (i.e. if we adjust for expectations, the gap is likely to be greater).[51] However, it is also possible that patient satisfaction is potentially skewed by shorter waiting times and better 'hotel' amenities in the private sector. Higher levels of utilisation in the private sector may also mean that on average, the acuity of care required is lower.

Figure 5: Problems experienced by patients at public and private hospitals in South Africa, 2009–2010



Source: General Household Survey, 2009[50] and 2010.[33]
Based on responses to the question "Did you experience any of the following during your most recent visit to the health worker/facility that you normally use?"

Figure 6: Level of satisfaction among medical-scheme and non-medical-scheme patients who are ill in South Africa, 2015

Source: General Household Survey, 2015.[36]

Health outcomes

While the patient perspective on healthcare quality is revealing, it is important to measure quality of care in other ways too. For example, health outcomes such as mortality rates can be measured and reported,[52,53] as can adverse events such as hospital-acquired infections.[54]

While there are some statistics available on health outcomes, these are not consistently reported across both sectors. For example, there are reports of a large number of avoidable maternal, neonatal and child deaths in the public sector, a substantial proportion of which are related to failures in the health system.[55–57] Unfortunately, maternal deaths in the private sector are not assessed in the same way.

In the private sector, the three large hospital groups all publish key quality measures in their annual financial statements, albeit at a group-wide level. However, the choice of measures and the detail on how they are defined differ between the groups.

The key issue is that there is an absence of comparable, published quality measures in either sector for intra- and inter-sectoral comparisons.

Structure and process

In the absence of meaningful measurement of health outcomes, it is possible to measure the structure of care provided, and the processes in place to deliver care.[58] In South Africa this is undertaken by both the Office of Health Standards Compliance (OHSC) and COHSASA.

The OHSC has developed National Core Standards as minimum standards for all healthcare establishments. The standards are part of the regulatory process prescribed in the National Health Amendment Act[59] and are assessed during mandatory inspections by the OHSC.

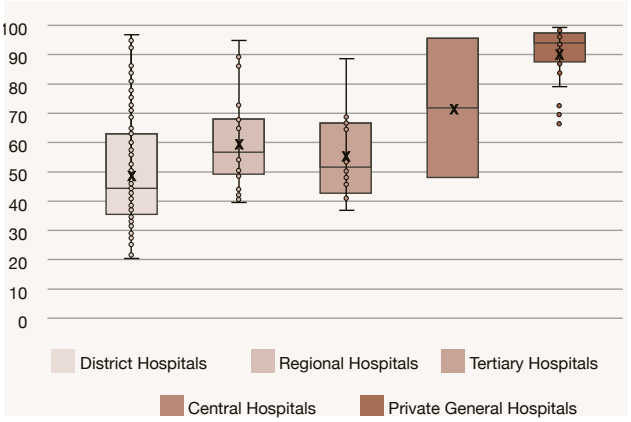
The OHSC conducted inspections of 1 427 public hospitals and clinics over a four-year period up to 31 March 2016. The results show that only 89 of these facilities met the pass mark of 70%. Unfortunately, the details of the facility scores have not been published.[60]

The accreditation process undertaken by COHSASA is voluntary and has a developmental component. The overall aim of accreditation is to improve the quality of care provided by hospitals by assessing the structure, functions and processes of the hospitals against standards. Organisations that apply for the accreditation process include individual hospitals, hospital groups, provinces and ministries of health in different African countries.

The two systems, namely mandatory minimum standards and a process for quality improvement, can be complementary as part of the overall strategy to improve health services across South Africa.

Figure 7 shows a box-plot of the accreditation scores for both public and private hospitals.

Figure 7: Accreditation scores for public and private hospitals in South Africa, 2001–2014



Source: COHSASA, 2001–2014.[61]

Private-sector scores are on average higher than public-sector scores,[f] and there is less variation between scores across individual facilities within the private sector.

Figure 8 compares the disaggregated scores for individual service elements. The service elements are sorted according to average public-sector scores (from lowest to highest).

It is clear that the relationship between the public and private hospital sectors holds across sub-components of the accreditation score. The scores differed significantly at the 5% level across all service elements. The largest differences in the average score were for the following elements (shaded grey in the figure):

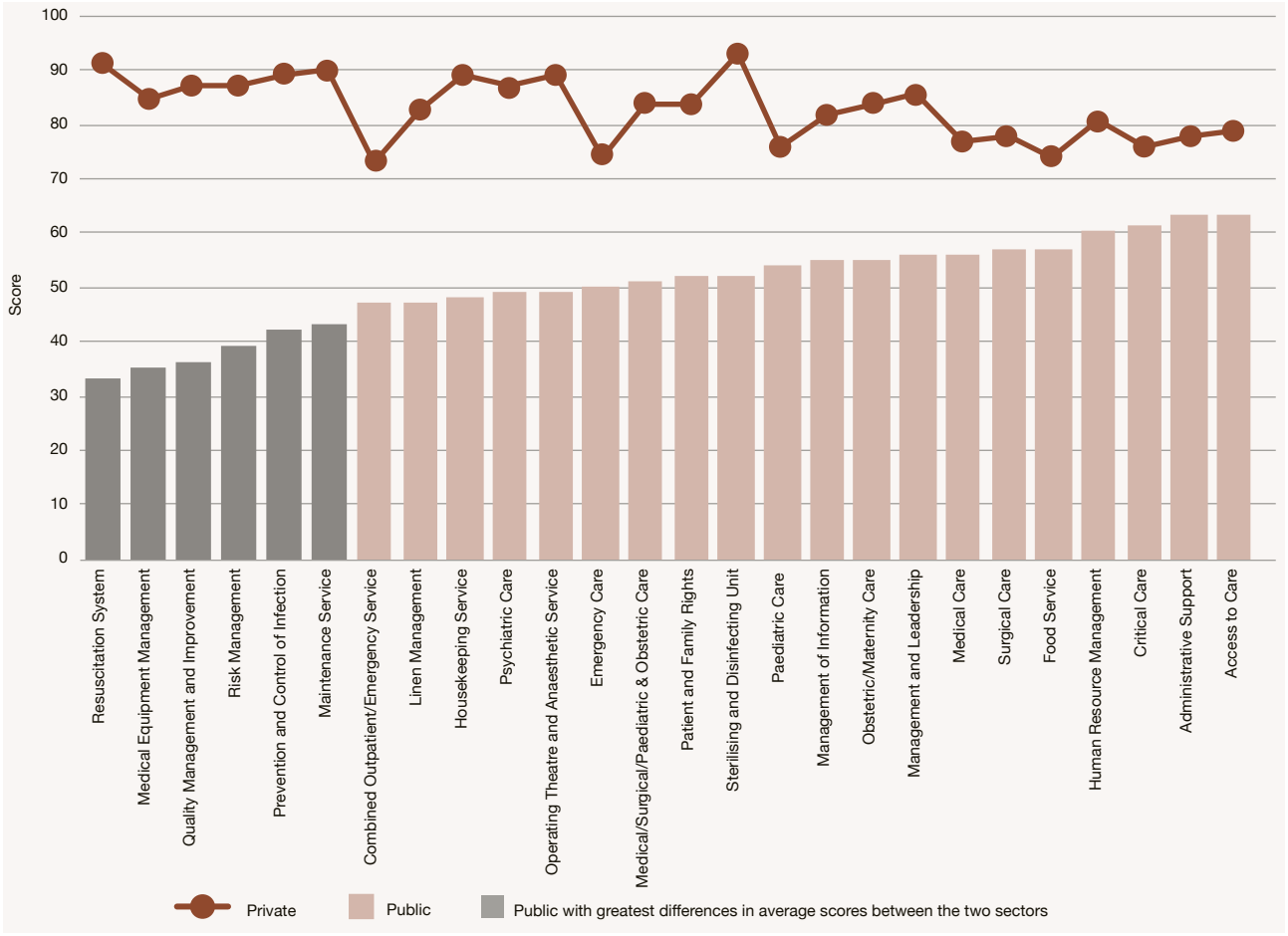
- resuscitation system;
- medical equipment management;
- quality management and improvement;
- risk management;
- prevention and control of infection; and
- maintenance service.

The extent of the differences in score for these service elements was large – on average a 50-point difference for these six elements. This result is especially concerning because of the relationship between these particular elements and patient safety. While all service elements potentially influence patient safety, these six elements have a more direct relationship with patient safety.

As with the overall accreditation scores, the scores for individual service elements were not only higher but also more consistent across private hospitals, indicating that the private hospitals are a more homogeneous group. This is illustrated in Figure 9.

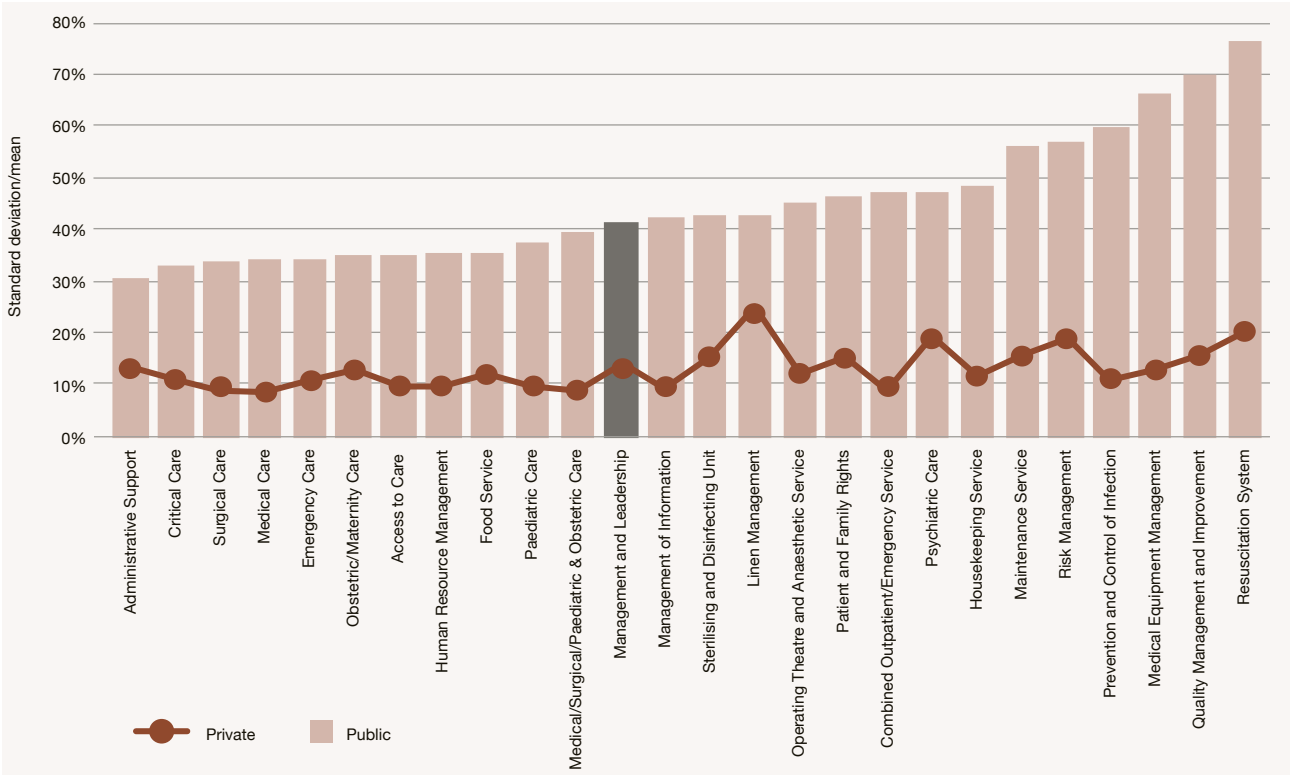
f Statistically significant at the 5% level.

Figure 8: Comparison of average service element scores for the public and private health sectors in South Africa, 2001–2014



Source: COHSASA, 2001–2014.[61]

Figure 9: Comparison of public and private hospital sector variation (standard deviation over mean) for each service element, South Africa, 2001–2014



Source: COHSASA, 2001–2014.[61]

The management and leadership service element is worth noting, as this would be expected to influence other aspects of quality.[62–64] Private hospitals scored on average 30 points higher than public hospitals on this element. The standard deviation relative to the mean was 14.3% for private health facilities, as opposed to 41.1% for public health facilities.

Discussion

Polarisation

South Africa has two vastly different hospital sectors. The private, for-profit sector is better resourced than the strained public sector, both financially and in terms of human resources per capita. Unsurprisingly, given the resourcing differences, data from the GHS show that users of public hospitals report higher levels of problems and lower levels of satisfaction than users of private hospitals. User experiences of hospitals matter, as this is likely to influence health-seeking behaviour and adherence to treatment.

Analysis of COHSASA accreditation data indicate an evident quality differential between public and private facilities: private facilities consistently score above public facilities across a range of accreditation categories, and there is far greater variability in the scores between public facilities.

The quality differential indicated by accreditation data support patient reports in the GHS. The accreditation data also highlight key differences between the two sectors across dimensions that relate to patient safety, and therefore cannot be ignored.

The low levels of variation in the service element scores for private hospitals point to a consistency in leadership, management, systems and incentives across hospitals. By contrast, the wide range of public-sector scores points to a variety of challenges across regions and levels of hospitals – not least of which are resource challenges.

Measurement of health outcomes

Given that the ultimate aim of the health system is to improve health outcomes, the absence of consistent, facility-level measurement of health outcomes across both sectors is concerning.

There remains a question about the relationship between accreditation scores and health outcomes, particularly because there is a lack of evidence in the literature that a relationship exists between accreditation scores and health outcomes.[65–68] Preliminary findings of the authors' own work show that a negative relationship may exist between perinatal mortality and accreditation scores for hospitals that score above 70%.

Policy implications

Quality differentials are both a symptom of structural inequality in the South African healthcare system, and an obstacle to planned health reforms. While it is essential to alleviate inequality, it is likely to be a challenging process for South Africa to bring the two sectors closer together. In particular, those with access to private care are likely to resist giving that up if quality differences between the two sectors persist. In 2009, McIntyre et al. found that individuals were willing to contribute to the public system only if they could be assured of the quality of the system.[69] Merely purchasing care from the private sector is unlikely to be a viable solution, given the urban concentration of private facilities and, by implication, the absence of these facilities in rural areas.

If the National Health Insurance Fund were to purchase care from the private sector, and quality differences were to persist, careful thought would have to be given to which patients are able to access private care. Unless this is done carefully, pluralistic purchasing is likely to raise equity concerns.

Conclusions and recommendations

While many of the reforms in the South African public health sector to date have focused on decentralisation, one of the implications of our analysis is that homogeneous approaches to hospital processes, policies and systems could assist in minimising variation in these factors across facilities.

As part of the reform, quality-improvement institutions that work across both the public and private sectors are essential. The OHSC is an important first step, but a further focus on both accountability and quality improvement (as opposed to measurement) is required. While the OHSC is currently able to identify problems, it is still unclear whether it can hold facilities sufficiently accountable, and as a regulator it is not mandated to facilitate the necessary improvement strategies. Consistent and transparent measurement of quality (particularly process and outcomes measures) would go some way towards improving accountability. One possibility would be collaboration between the private hospital association (Hospital Association of South Africa (HASA)), COHSASA and the OHSC in identifying and then publishing the results for the same quality measures across both sectors on an annual basis.

In a resource-constrained context, value[g] is more relevant than quality alone. The issues facing the public and private sectors are dramatically different – hence interventions are needed that both raise the minimum standard for all hospitals, and reduce waste and over-utilisation.

It is clear that quality improvement in the public-hospital sector is a vital part of the journey to universal coverage. Public-sector quality improvement is necessary for greater trust in the public-hospital system. Changing the financing of the system alone is likely to be insufficient to achieve universal access to quality care.

g Taking into account both quality of care and the cost of delivering that care.

References

1 Bradshaw D. Determinants of health and their trends. In: Barron P, Roma-Reardon J, editors. South African Health Review 2008. Durban: Health Systems Trust; 2008.

2 Coovadia H, Jewkes R, Barron P, Sanders D, McIntyre D. The health and health system of South Africa: historical roots of current public health challenges. Lancet. 2009;374(9692):817–34.

3 Statistics South Africa. Mortality and causes of death in South Africa, 2013: Findings from death notification. Statistical release P0309.3 Pretoria: Statistics South Africa; 2014.

4 Groenewald P, Bradshaw D, Daniels J, Matzopoulos R, Bourne D, Blease D, et al. Cause of death and premature mortality in Cape Town, 2001–2006. Cape Town: South African Medical Research Council; 2008.

5 Republic of South Africa. National Health Insurance for South Africa: Towards Universal Health Coverage. Pretoria: Government Printer; 2015.

6 Heunis J. Hospitals and hospital reform in South Africa. Pretoria: Van Schaik Publishers; 2004.

7 van den Heever A. Review of competition in the South African health system. Pretoria: Competition Commission; 2012.

8 Kautzky K, Tollman SM. A Perspective on Primary Health Care in South Africa. In: Barron P, Roma-Reardon J, editors. South African Health Review 2008. Durban: Health Systems Trust. 2008.

9 Genesis. Healthcare market background paper. Pretoria: Competition Commission; 2012.

10 Matsebula T, Willie M. Private Hospitals. In: Harrison S, Bhana R, Ntuli A, editors. South African Health Review 2007. Durban: Health Systems Trust; 2007.

11 Ranchod S, Childs B, Abraham M, Taylor R. International benchmarking of hospital utilisation: how does the South African private sector compare? SAAJ 2016;16 69–90.

12 Council for Medical Schemes. Annual Report 2015–2016. Pretoria: Council for Medical Schemes; 2016.

13 Statistics South Africa. Mid-year population estimates 2016. Pretoria: Statistics South Africa; 2016.

14 Smith A, Burger R. Explaining the demand for medical scheme membership: implications for National Health Insurance (NHI). ESSA 2013 Biennial Conference; Bloemfontein, South Africa, 2013

15 Erasmus D, Ranchod S, Abraham M, Bloch J, Carvounes A, Dreyer K. Challenges and opportunities for health finance in South Africa: a supply and regulatory perspective. Johannesburg: FinMark Trust; 2016.

16 McIntyre D. Private sector involvement in funding and providing health services in South Africa: Implications for equity and access to health care. Regional Network for Equity in Health in East and Southern Africa (EQUINET); 2010.

17 Phaswana K, Govuzela M, Thsehla E, de Villiers A. Research Brief 1 of 2008. Evaluation of Medical Schemes' Cost Increases. Pretoria: Council for Medical Schemes; 2008.

18 Lorenzoni L, Roubal T. International Comparison Of South African Private Hospitals Price Levels. Paris: OECD Publishing; 2015.

19 Econex. Private hospital expenditure and relation to utilisation – observations from the data. Stellenbosch: Econex; 2015.

20 Day C, Gray A. Health and Related Indicators. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

21 Econex. The South African Private Healthcare Sector: Role and Contribution to the Economy. Stellenbosch: Econex; 2013.

22 South African National Department of Health. Human Resources for Health South Africa. HRH Strategy for the Health Sector: 2012/13 – 2016/17. Pretoria: NDoH; 2011.

23 Republic of South Africa. Improving health infrastructure 2016. [Internet]. [cited 27 March 2017]. URL: http://www.gov.za/ABOUT-SA/Health.

24 Western Cape Government. Department of Health Annual Performance Plan 2012/2013. Cape Town: WC-DoH; 2012.

25 Ramjee S. Comparing the Cost of Delivering Hospital Services across the Public and Private Sectors in South Africa 2013. [Internet]. [cited 27 March 2017]. URL: https://www.insight.co.za/wp-content/uploads/2015/07/Comparing-the-cost-of-hospitalisation-across-the-public-and-private-sectors-in-South-Africa-October-24.pdf.

26 Econex. Rationing as a response to supply side constraints. Stellenbosch: Econex, 2010.

27 Berger J, Hofmeester N, Makhado M, Miot J, Moller H, Pharasi B, et al. Medicines Procurement Reform in the Public Sector. Pretoria: National Department of Health; 2010.

28 Statistics South Africa. General Household Survey 2015 Statistical Release P0318. Pretoria: Statistics South Africa; 2015.

29 Statistics South Africa. Census. [datasets]. Pretoria: Statistics South Africa; 2011.

30 Statistics South Africa. General Household Surveys [datasets]. Pretoria: Statistics South Africa; 2013.

31 Statistics South Africa. General Household Surveys [datasets]. Pretoria: Statistics South Africa; 2012.

32 Statistics South Africa. General Household Surveys [datasets]. Pretoria: Statistics South Africa; 2011.

33 Statistics South Africa. General Household Surveys [datasets]. Pretoria: Statistics South Africa; 2010.

34 Mojaki M, Basu D, Letskokgohka M, Govender M. Referral steps in district health system are side-stepped. S Afr Med J. 2011;101(2):109.

35 McLaren ZM, Ardington C, Leibbrandt M. Distance decay and persistent health care disparities in South Africa. BMC Health Services Research. 2014;14(1):541.

36 Statistics South Africa. General Household Surveys [datasets]. Pretoria: Statistics South Africa; 2015.

37 Doolan K, Ehrlich R, Myer L. Experience of violence and socioeconomic position in South Africa: a national study. Plos One. 2007;2(12):e1290.

38 Househam K. Africa's burden of disease: The University of Cape Town Sub-Saharan Africa Centre for Chronic Disease. SAMJ: S Afr Med J. 2010;100(2):94–5.

39 Rossouw L. Poor health reporting: Do poor South Africans underestimate their health needs? Helsinki: No. 2015/027. WIDER Working Paper, 2015.

40 Econex. The Human Resource Supply Constraint: The Case of Nurses. Stellenbosch: Econex; 2010.

41 Development Bank of South Africa. A roadmap for the reform of the South African health system. Midrand: DBSA; 2008.

42 Okorafor O. National Health Insurance Reform in South Africa: Estimating the implications for demand for private health insurance. Applied Health Economics and Health Policy. 2012;10(3):189–200.

43 Rothberg AD, McLeod H. Private-sector caesarean sections in perspective. SAMJ: S Afr Med J. 2005;95(4).

44 Gibbons L, Belizán JM, Lauer JA, Betrán AP, Merialdi M, Althabe F. The global numbers and costs of additionally needed and unnecessary caesarean sections performed per year: overuse as a barrier to universal coverage. World Health Report. 2010;30:1–31.

45 Discovery Health. Submission to the Competiton Commission South Africa Health Market Inquiry. Pretoria: Competition Commission; 2014.

46 Metropolitan Health. Submission to the Competition Commission South Africa Health Market Inquiry. Pretoria: Competition Commission; 2014.

47 Medscheme. Submission to the Competiton Commission South Africa Health Market Inquiry. Pretoria: Competition Commission; 2014.

48 Prentice JC, Pizer SD. Waiting times and hospitalizations for ambulatory care sensitive conditions. Health Services and Outcomes Research Methodology. 2008;8(1):1–18.

49 Guttmann A, Schull MJ, Vermeulen MJ, Stukel TA. Association between waiting times and short term mortality and hospital admission after departure from emergency department: population based cohort study from Ontario, Canada. BMJ. 2011;342:d2983.

50 Statistics South Africa. General Household Surveys [datasets]. Pretoria: Statistics South Africa; 2009.

51 Burger R, Ranchod S, Rossouw L, Smith A. Strengthening the measurement of quality of care. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

52 Agency for Healthcare Research and Quality. Selecting Health Outcome Measures for Clinical Quality Measurement. Rockville, MD: AHRQ; 2016. [Internet]. [cited 27 March 2017].
URL: https://www.qualitymeasures.ahrq.gov/help-and-about/quality-measure-tutorials/selecting-outcome-measures.

53 Clancy CM, Eisenberg JM. Outcomes research: measuring the end results of health care. Science. 1998;282(5387):245–6.

54 Institute for Healthcare Improvement. IHI Global Trigger Tool for Measuring Adverse Events. Cambridge, Massachusetts: IHI. [Internet]. [cited 27 March 2017].
URL: http://www.ihi.org/resources/pages/tools/ihiglobaltriggertoolformeasuringaes.aspx.

55 Chopra M, Daviaud E, Pattinson R, Fonn S, Lawn JE. Saving the lives of South Africa's mothers, babies, and children: can the health system deliver? The Lancet. 2009;374(9692):835–46.

56 Moodley J, Pattinson RC, Fawcus S, Schoon M, Moran N, Shweni P. The confidential enquiry into maternal deaths in South Africa: a case study. BJOG: An International Journal of Obstetrics & Gynaecology. 2014;121(s4):53–60.

57 Pattinson R, Rhoda N. Saving babies 2012–2013: Ninth report on perinatal care in South Africa. Pretoria: Tsephega Press; 2014.

58 Donabedian A. Evaluating the quality of medical care. The Milbank Memorial Fund Quarterly. 1966;44(3):166–206.

59 Republic of South Africa. National Health Amendment Act (12 of 2013). Pretoria: Government Printer; 2013.

60 Kahn T. Government paves the way for move to paperless hospitals. [Internet]. [cited 27 March 2017].
URL: http://www.hst.org.za/news/government-paves-way-move-paperless-hospitals.

61 The Council For Health Services Accreditation of Southern Africa. Accreditation Survey Scores. [datasets] Cape Town: COHSASA; 2015.

62 Weiner BJ, Shortell SM, Alexander J. Promoting clinical involvement in hospital quality improvement efforts: the effects of top management, board, and physician leadership. BMC Health Services Research. 1997;32(4):491.

63 Glickman SW, Baggett KA, Krubert CG, Peterson ED, Schulman KA. Promoting quality: the health-care organization from a management perspective. Int J Qual Health Care. 2007;19(6):341–8.

64 Ferlie EB, Shortell SM. Improving the quality of health care in the United Kingdom and the United States: a framework for change. Milbank Quarterly. 2001;79(2):281–315.

65 Salmon JW, Heavens J, Lombard C, Tavrow P. The impact of accreditation on the quality of hospital care: KwaZulu-Natal province Republic of South Africa. Bethesda, Maryland: University Research Company; 2003.

66 Miller MR, Pronovost P, Donithan M, Zeger S, Zhan C, Morlock L, et al. Relationship between performance measurement and accreditation: implications for quality of care and patient safety. Am J Med Qual. 2005;20(5):239–52.

67 Braithwaite J, Greenfield D, Westbrook J, Pawsey M, Westbrook M, Gibberd R, et al. Health service accreditation as a predictor of clinical and organisational performance: a blinded, random, stratified study. Qual Saf Health Care. 2010;19(1):14–21.

68 Suñol R, Vallejo P, Thompson A, Lombarts M, Shaw C, Klazinga N. Impact of quality strategies on hospital outputs. Qual Saf Health Care. 2009;18(Suppl 1):i62–8.

69 McIntyre D, Goudge J, Harris B, Nxumalo N, Nkos M. Prerequisites for national health insurance in South Africa: results of a national household survey. S Afr Med J. 2009;99(10):725–9.

11

The Ideal Clinic in South Africa: progress and challenges in implementation

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The Ideal Clinic Realisation and Maintenance (ICRM) programme was designed in response to the current deficiencies in the quality of primary health care services and to lay a strong foundation for the implementation of National Health Insurance.

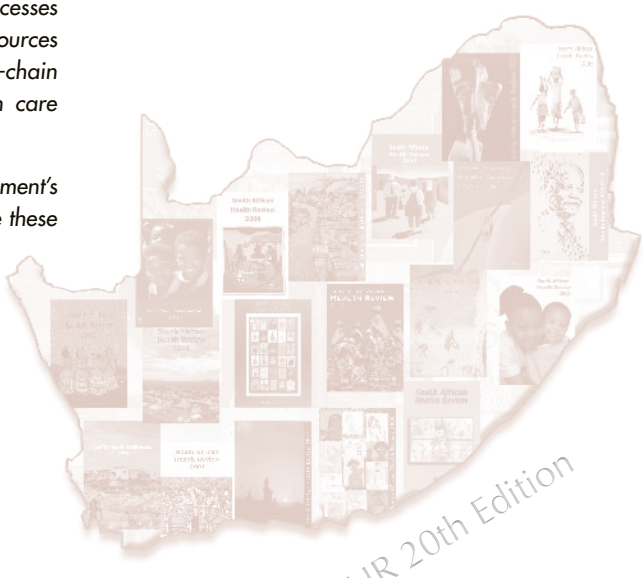
An 'Ideal Clinic' is defined as a clinic with good infrastructure (i.e. physical condition and spaces, essential equipment, and information and communication tools), adequate staff, adequate medicines and supplies, good administrative processes, and adequate bulk supplies; such a clinic uses applicable clinical policies, protocols and guidelines, as well as partner and stakeholder support, to ensure the provision of quality health services to the community.

The 'Ideal Clinic' initiative is structured in three phases: development of the concept (phase one), planning for implementation (phase two), and implementation (phase three). This chapter deals with the implementation phase.

The ICRM scale-up process continued to use an implementation research model and 322 Ideal Clinics were accredited in one year. In addition, the number of clinics that scored over 70% increased from 139 to 445, while the number that scored less than 40% dropped from 213 to 90. This was achieved by focusing on processes to improve integrated clinical-service management, infrastructure, human resources for health, service-user waiting times, financial management, and supply-chain management. However, given that the country has 3 477 primary health care facilities, an achievement of only 322 Ideal Clinics leaves much to be desired.

This chapter reports on implementation progress and challenges for government's 2015/16 financial year, and includes a description of strategies to overcome these challenges, and progress in this regard.

The Ideal Clinic Realisation and Maintenance programme was designed in response to the current deficiencies in the quality of primary health care services and to lay a strong foundation for the implementation of National Health Insurance.



i South African National Department of Health
ii BroadReach Healthcare
iii Clinton Health Access Initiative

Introduction

Central to South Africa's plans to implement National Health Insurance (NHI), is the country's primary health care (PHC) system. This includes 3 477 fixed PHC facilities[1] supplemented with community-based services such as Environmental Health services, School Health teams and community health workers (CHWs). Recent information shows that South Africans are using clinics in increasing numbers.[2] In the 2015/16 financial year alone, over 127 million PHC consultations were provided, over 160 000 deliveries took place, and more than 3.4 million patients on antiretroviral therapy (ART) were supported in clinics and community health centres (CHCs).[2] Additionally, immunisation coverage of over 90% and an 'antenatal first visit before 20 weeks' rate of 62.8% were achieved.[3] Despite these achievements, many PHC facilities in South Africa still face serious challenges such as long waiting times and insufficient space to attend comfortably to service users.[4] This has led to negative experiences of care, thus compromising the important role that PHC services play in health promotion and disease prevention.

The Ideal Clinic initiative (now developed into the Ideal Clinic Realisation and Maintenance (ICRM) programme) is designed to address current deficiencies in the quality of PHC services. The programme includes three phases: development of the concept (phase one), planning for implementation (phase two), and implementation (phase three).[5] Phases one and two, as well as the findings of the Baseline Audit,[6] were described in the 2014/15 edition of the *South African Health Review*. This chapter focuses on developments since that publication and provides an account of the implementation phase of the Ideal Clinic programme.

Overview of phases one and two

Implementation of the Ideal Clinic programme has its roots in the findings of a Baseline Audit commissioned by the National Department of Health (NDoH) in 2011.[6] The audit revealed that only one health facility in South Africa's public-health sector – a hospital in North West Province – fully met the required health-facility standards, as per the audit tools. The audit showed that on average, PHC facilities scored lower than hospitals in all priority areas: essential drug supplies were unreliable; staffing was inadequate; and the poor quality of physical infrastructure was having a major impact on the functioning of services and client satisfaction with services.

The Ideal Clinic programme aims to systematically transform all PHC facilities in order to meet national standards in preparation for the introduction of NHI. To this end, facilities are inspected by the Office of Health Standards Compliance (OHSC). The National Health Amendment Act (12 of 2013) mandates the OHSC to protect and promote the health and safety of health-service users through monitoring and enforcing compliance with prescribed norms and standards.[7] The Ideal Clinic programme is the NDoH's internal mechanism for ensuring PHC facility compliance with these norms and standards in order to satisfy the needs of South African communities.

An Ideal Clinic is defined as a clinic with good infrastructure (i.e. physical conditions and spaces, essential equipment, and information and communication tools), adequate staff, adequate medicines and supplies, good administrative processes and adequate bulk supplies; such a clinic uses applicable clinical policies, protocols and guidelines, as well as partner and stakeholder support, to ensure the provision of quality health services to the community.[8]

Figure 1 shows the relationship between the Ideal Clinic and communities, community-based services, support services, diagnostic services, higher-level health services within the district health system (DHS), and higher-level health services outside the DHS. The Ideal Clinic framework aims to ensure comprehensive[a] person-centric services of an acceptable quality, starting with community PHC service settings, and moving on to include clinics, CHCs, district hospitals, secondary hospitals and tertiary hospitals. Services within health facilities are complemented by non-governmental organisation (NGO), academic and private-sector services. District, provincial and national-level management must ensure systematic collaboration with other government departments that are critical in addressing the social determinants of health.

The DHS remains the vehicle for making a positive impact on the health status of a given community as it plans for and implements services in relation to the specific burden of disease in that community.

The NDoH's District Health System Policy Framework and Strategy 2014–2019 describes the interventions required to improve the current functioning of the DHS.[9] The District Health Management Team (DHMT), supported by provincial management, is responsible for leading the activities of each district. The DHMT is also responsible for managing the facilities (clinics, CHCs and district hospitals) within that district in order to provide communities with access to the agreed service package. The guidelines for standardising DHMT organograms and job descriptions are in the process of being finalised. Services provided at health facilities are complemented by community-based services delivered through environmental health practitioners, School Health teams and CHW teams. Community access to required health services is ensured through a configuration of complementary service sources from different government departments, as well as from sources outside of government. Service quality must be improved continuously through good knowledge management, appropriate training, interventions designed and led by the District Clinical Specialist Teams (DCSTs), and input from clinic committees and hospital boards.

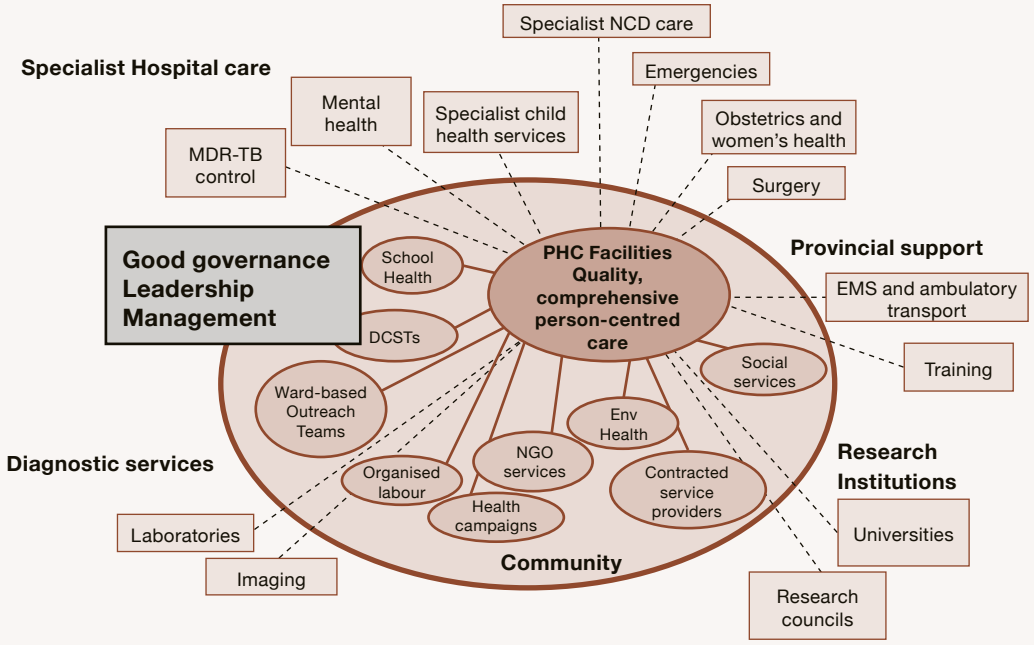
The Ideal Clinic Laboratory

Beginning in July 2013, the NDoH spent eight months testing and developing the Ideal Clinic framework in collaboration with provinces, districts and PHC facility management and staff. A 'dashboard' was developed, using the standard traffic-light colours, and including 10 components and 32 sub-components (Figure 2). Elements are assigned a green colour when they are fully functional; an orange colour if they are partially functional and corrective actions are under way; and a red colour if the element is absent or non-functional.

The framework was then taken into the 'Operation Phakisa' (meaning 'hurry up' in Sesotho) Ideal Clinic Laboratory, which

a In this context 'comprehensive' means a range of integrated community- and facility-based health-promotion, disease-prevention, diagnostic, curative, rehabilitative and palliative services.

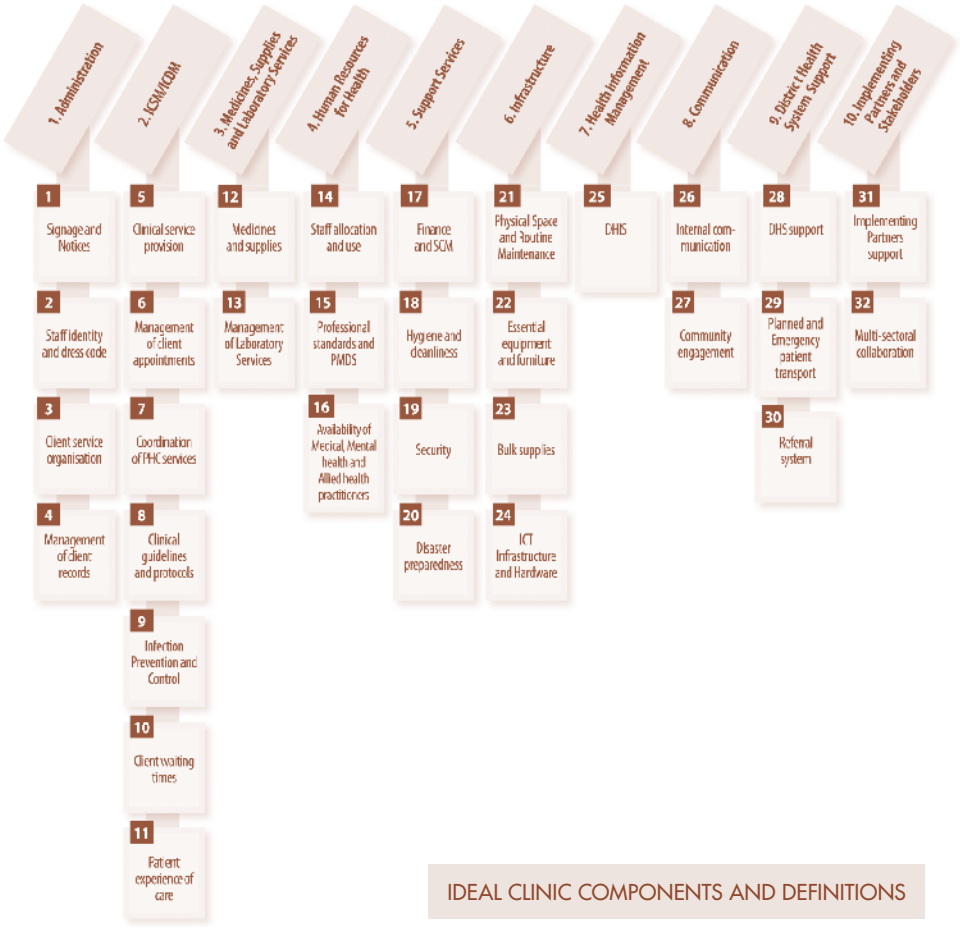
Figure 1: Relationship between the Ideal Clinic and other components of the health system in South Africa



Key: DCST : District-based Clinical Specialist Teams
ENV : Environmental Health
NCD : Non-communicable disease
PHC : Primary health care
EMS : Emergency medical services
MDR-TB : Multidrug-resistant tuberculosis
NGO : Non-govermental organisation

Source: Fryatt and Hunter, 2015.[5]

Figure 2: South African Ideal Clinic Realisation and Maintenance Programme components and sub-components (version 16), 2016



Source: South African National Department of Health, 2016.[8]

Figure 3: Section of the South African Ideal Clinic Realisation and Maintenance Programme, illustrating level of responsibility per ICRM element

NATIONAL CORE STANDARDS	COMPONENT	SUB-COMPONENT		ELEMENTS	WEIGHT	METHOD OF MEASUREMENT	LEVEL OF RESPONSIBILITY	CHECKLIST	PERFORMANCE
DOMAIN 5: LEADERSHIP AND CORPORATE GOVERNANCE	9. District Health Systems Support			**29. Emergency patient transport:** Monitor the availability of planned and emergency transport for patients					
			170	There is a predetermined EMS response time to the facility.	I	?📖	D		
			171	EMS respond according to the predetermined response time.	I	📖	D		
				30. Referral System: Monitor whether patients have access to appropriate levels of health care					
			172	The National Referral Policy is available.	I	📖	NDoH		
			173	The facility's standard operating procedure for referrals is available and sets out clear referral pathways.	I	📖	HF		
			174	There is a referral register that records referred patients.	I	📖	HF		
	10. Implementing Partners and Stakeholders			**31. Implementing Partners' support:** Monitor the support that is provided by implementing partners					
			175	There is an up-to-date list *(with contact details)* of all implementing partners that support the facility.	I	📖	HF		
			176	The list of implementing health partners shows their areas of focus and business activities.	I	?📖	HF		
				32. Multi-sectoral collaboration: Monitor the systems in place to respond to the social determinants of health					
			177	There is an official memorandum of understanding between the PDoH and SAPS.	I	📖	P		
			178	There is an official memorandum of understanding between the PDoH and the Department of Education.	I	📖	P		
			179	There is an official memorandum of understanding between the PDoH and the Department of Social Development.	I	📖	P		
			180	There is an official memorandum of understanding between the NDoH and the Department of Home Affairs.	I	📖	NDoH		
			181	There is an official memorandum of understanding between the PDoH and the Department of Public Works.	I	📖	P		
			182	There is an official memorandum of understanding between the district management and Cooperative Governance and Traditional Affairs (CoGTA).	I	📖	P		
			183	There is an official memorandum of understanding between the PDoH and the Department of Transport.	I	📖	P		

Key: D : District HF : Health Facility P : Province NDoH : National Department of Health.

Source: South African National Department of Health, 2016.[8]

ran from 12 October to 21 November 2014. Lessons learnt during the concept-design phase guided the scope and content of the Laboratory, which was attended by 164 participants from national government departments, provincial health departments, metropolitan municipalities, public health schools, statutory councils, trade unions, development partners, NGOs and the private sector. Eight work-streams were created, which then undertook clinic visits and held meetings with external experts, with detailed analyses being undertaken as necessary. Each work-stream focused on specified activities and outputs, and a final report was prepared after six weeks.[b,10]

The underlying rationale informing the focus on bringing PHC services in facilities to an acceptable standard is that this will also improve community-based services and the functioning of district, provincial and national programmes, as some elements in the ICRM framework have to be addressed at all these levels in order to improve clinic functioning.

b The eight work-streams were service delivery, waiting times, infrastructure, human resources for health, financial management, supply-chain management, institutional arrangements, and scale-up and sustainability.

Figure 3 shows a section of the ICRM framework. The letters in the column labelled 'level of responsibility' indicate who is responsible for turning a specific element from red/orange to green (the health-facility manager, district manager, provincial manager or national manager). It is envisaged that the NDoH will complete similar frameworks for CHCs, in collaboration with the provincial Departments of Health, district management and technical staff.

Implementation of the ICRM framework

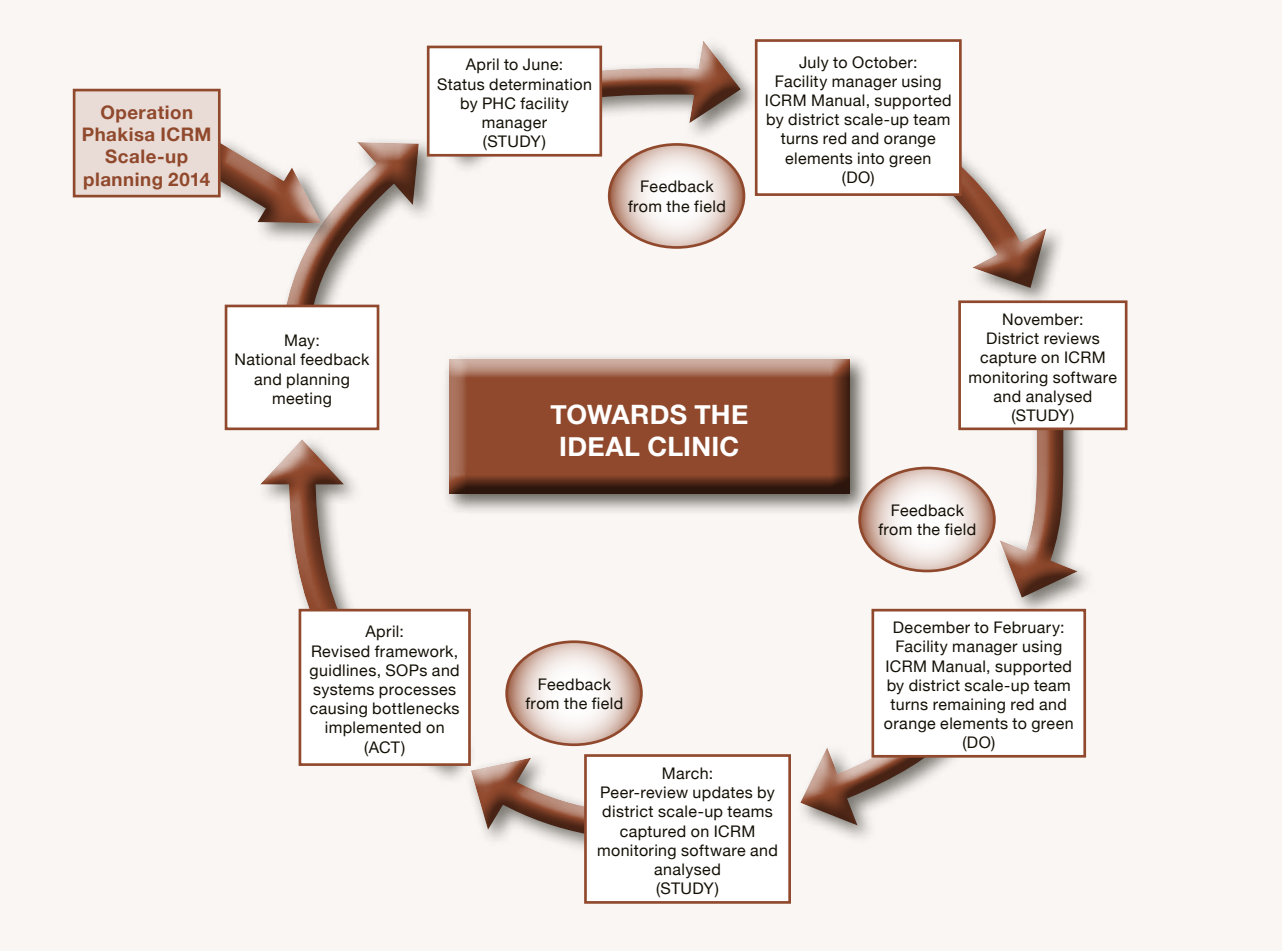
The ICRM framework does not demand anything new in terms of the requirements for a well-functioning clinic. As such, the resources required at clinic level to turn orange and red elements into green should be budgeted for routinely by clinics and districts as part of provincial Health Department budgets. However, there are three innovations in the ICRM framework. Firstly, the requirements for well-functioning clinics are clearly listed and defined in the form of the elements under the sub-components and components. Secondly, standard operating procedures are available in the form of the ICRM Manual,[11] which is a compilation of detailed specific standard operating procedures to turn orange and red ICRM

elements into green; the manual can also be downloaded for use as a mobile application on smartphones. The third innovation is the focus and level of specificity with which the ICRM framework is applied to improve the quality of services at poorly functioning clinics. However, since the annual district budgets are for current cost of employment and operations, additional funding has had to be obtained to address the backlog in infrastructure and for staffing shortfalls. The intervention had to be costed before funding could be obtained from National Treasury for its implementation. This process began at the Operation Phakisa Ideal Clinic Laboratory in October 2014, where participants were assigned to the eight work-streams, each focused on a key area such as supply-chain management or service delivery, for which they were expected to develop an implementation plan and associated budget. Support for the budgeting process was provided by the Clinton Health Access Initiative, which developed a methodology for aggregating the budgets submitted by the work-streams.

Countrywide clinic implementation of version 15 of the ICRM framework began in line with the South African Government's financial year on 1 April 2015. The framework has undergone a number of iterations from the first version, and based on comments from health professionals in the field, it is revised before the beginning of each government financial year. For example, April 2017 saw the implementation of version 17. This constant improvement and refining of the framework is based on the theory of implementation research,[12] which provides guidance on how to bring promising strategies to scale and how to sustain such strategies over the long term. Implementation research is premised on understanding what is not working, understanding how and why implementation is going wrong, and testing new approaches to improve implementation.

The ICRM Programme implementation is also linked to the Plan-Do-Study-Act (PDSA) cycle.[12] Figure 4 depicts the annual ICRM PDSA cycle. Operation Phakisa ICRM planning in 2014 is depicted in a box at the top left (outside of the cycle) because it was a once-off large-scale planning exercise. In general, the cycle starts with status determinations by PHC facility managers (from April to June) and a re-planning session in May. This is followed by the correction of weaknesses (turning red and orange elements into green from July to October). In November, district peer reviews are conducted and then captured on the web-based ICRM monitoring software tool for the purpose of result analyses (study). District scale-up teams then assist clinic managers and staff to turn the remaining orange and red elements into green (from December to February). In March, peer-review updates are done to determine achievement for the financial year. The NDoH receives continuous feedback from managers and staff at provincial, district and facility levels about changes required to guidelines, standard operating procedures, and systems processes that currently cause bottlenecks. The results are used to re-plan the implementation for the next year. Planning for the following year includes amendments to the framework, resulting in a revised version.

Figure 4: Annual ICRM Plan-Do-Study-Act cycle, South Africa



Achievements

Peer reviews of clinic performance were conducted in February 2016.[c] To ensure confidence in the final results, each of the top-scoring 659 clinics was peer reviewed by a district scale-up team from outside that province. Table 1 shows the definitions for the three weight categories and the scores for the weight categories used in the ICRM peer-review process, while Table 2 shows the results of the peer reviews.

As shown in Table 2, the NDoH closed the 2015/16 financial year with 322 Ideal Clinics.[3] In that year, 1 139 clinics were targeted; the number of clinics scoring over 70% increased from 139 to 445 and the number of clinics scoring less than 40% dropped from 213 to 90.

Key lessons learnt from the 2015/16 implementation process

Lesson 1: The main bottleneck areas relate to infrastructure, staffing and supply-chain management.

Clinics that score below 40% have extensive infrastructure, staffing and supply-chain management problems; those scoring between 40% and 69% should have staffing, supply-chain and processes addressed, while those scoring above 70% should simply ensure that through addressing their supply-chain management, the vital elements are present and functional at all times.

Lesson 2: It is imperative for quality improvement that a Professional Nurse is assigned as the clinic manager.

Table 3 shows that there is an inverse correlation between the presence of clinic managers and the performance of clinics. For example, on average, the provinces with the highest vacancy rates for clinic managers also perform the worst in getting clinics to function optimally.

Table 1: Weighting and scoring categories used in the South African ICRM peer-review process

Weights		Silver	Gold	Platinum
Vital (12 elements)	Extremely important (vital) elements that require immediate and full correction. These are elements that affect direct service delivery and clinical care of patients and that may have immediate and long-term adverse effects on the health of the population.	100%	100%	100%
Essential (84 elements)	Very necessary (essential) elements that require resolution within a given time period. These are process and structural elements that indirectly affect the quality of clinical care given to patients.	70%	80%	91%
Important (82 elements)	Significant (important) elements that require resolution within a given time period. These are process and structural elements that affect the quality of the environment in which health care is given to patients.	65%	76%	87%
AVERAGE		**70–79%**	**80–89%**	**90–100%**

Source: South African National Department of Health, 2016.[8]

Table 2: Results of South African ICRM peer-review process for the 2015/2016 financial year[d]

Province	All facilities, Version 15 PR	Platinum	Gold	Silver	Not achieved	Total number of Ideal Clinics
Eastern Cape	90	1	10	3	76	14
Free State	46	5	14	3	24	22
Gauteng	124	17	50	22	35	89
KwaZulu-Natal	185	25	87	29	44	141
Limpopo	77	5	19	3	50	27
Mpumalanga	48	5	12	2	29	19
North West	57	0	3	4	50	7
Northern Cape	32	0	3	0	29	3
Total	659	58	198	66	337	322

Source: Ideal Clinic Monitoring and Evaluation Software.

c This timeframe does not correspond with the timeframe given in Figure 4. This is because 2015/16 was the first year of implementation and it took longer to get implementation logistics in place. The description above Figure 4 describes the future cycle timeframes which had already been implemented in the 2016/17 financial year.

d Note that the Western Cape Department of Health did not join the ICRM Programme in the 2015/16 financial year, but began participating from 1 April 2016.

Table 3: Percentage of Ideal Clinics compared with percentage of clinics without a dedicated manager, per province, 2015/16

Province	Total number of primary health care facilities 2015/16	Number of Ideal Clinics 2015/16	Percentage of Ideal Clinics 2015/16	Percentage of clinics without dedicated managers 2015/16
Eastern Cape	771	14	2%	60%
Free State	221	22	10%	53%
Gauteng	367	89	24%	21%
KwaZulu-Natal	600	141	24%	23%
Limpopo	477	27	6%	49%
Mpumalanga	288	19	7%	29%
North West	314	7	2%	49%
Northern Cape	164	3	2%	47%
Western Cape	275	-	-	-
South Africa	3 477	322	9%	41%

Source: Ideal Clinic Monitoring and Evaluation Software.

Lesson 3: Peer reviews serve as additional training for district scale-up teams.

Feedback received from peer reviewers in April 2016 indicates that the evaluation process was experienced positively as an opportunity for district ICRM scale-up teams to learn from each other and to learn from facilities visited in the districts being reviewed.

Overcoming the challenges

Although 322 clinics achieved Ideal Clinic status and the number of clinics scoring over 70% increased from 139 to 513, progress in the first year of the Ideal Clinic programme has been slow. Three main challenges must be addressed by the national and provincial departments of health in order to improve the rate of scale-up: these are poor infrastructure, inadequate staffing, and poor supply-chain systems. The following section summarises some of the steps that have been taken in these areas. Full descriptions of interventions with regard to these three main bottleneck areas will be the subject of subsequent chapters in future Reviews.

Infrastructure

Figure 5 illustrates the infrastructure-related elements of the ICRM and shows that in March 2015, compliance with the element 'clinic space accommodates all services and staff' was low (13%). Although the rate more than doubled by March 2016, compliance remains low at 28%.

Improvement of clinic infrastructure began with the requirement for PHC facilities to be adequate with regard to both capacity/size and functional layout and flow. This is of particular importance for implementation of the Integrated Clinical Services Management (ICSM) model. The latter is a health-system strengthening model that employs a patient-centric approach encompassing the full value chain of the continuum of care and support. Comprehensive care is delivered via the four streams of care rendered at PHC facilities, namely acute care; chronic care; preventive and promotive services for maternal, child and reproductive health; and health-support services (physical rehabilitation, oral health, etc.). The implementation of ICSM involves two distinct facility-level processes, namely facility re-organisation towards achieving operational efficiencies, and clinical management support to improve the quality of care rendered.

The challenge in implementing facility re-organisation has been inadequate and inappropriate facility infrastructure to support the four streams of care. Recommendations from the Operation Phakisa Ideal Clinic Laboratory were: to develop a standard blueprint for the construction of all new proposed facilities, as well as for existing facilities needing major refurbishment; and to develop maintenance hubs in districts to ensure that proactive planned maintenance is carried out promptly.

During 2015, a team consisting of health-facility planners, public-health specialists and built-environment professionals was tasked with developing the Ideal PHC facility blueprint. This team developed a draft broad standard configuration of facility sizes, using data obtained during the 2011 National Facility Audit. The team then developed the layout guided by the underpinning philosophy of the ICSM, namely to render services in four distinct streams of care in facilities that: provide comfort for users, are well ventilated, have natural light and good acoustics to keep sound levels down, are accessible to physically disabled users, and are both user- and staff-friendly. Room sizes were determined by identifying all the required equipment and furniture per specific room type. In this manner, a complete room list with key features was developed for each of the proposed facility sizes. Table 4 provides a snapshot of a room list.

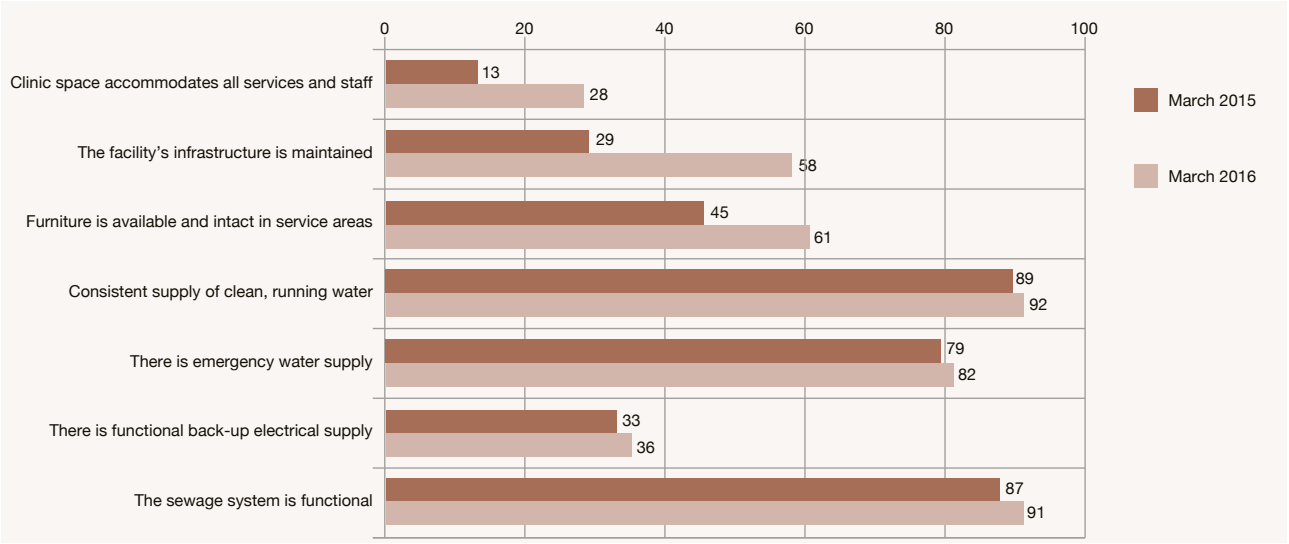
Nonetheless, each facility will have a level of uniqueness determined by geographical location, present and projected future population to be served, referral routes, public-transport routes, specific industries in the area, e.g. mines, and specific health needs in the area, e.g. schools for visually impaired learners. For this reason, a detailed infrastructure and clinical brief template was developed to assist districts in determining the ideal size and configuration of the facility based on services to be delivered, taking into account expected population.

Further to this, while keeping affordability in mind, an attempt has been made to include green technologies in the design of facilities, and finishing schedules have been provided for exteriors and interiors to ensure that products used are durable, easy to maintain and provide a standard appearance in public-health facilities. The NDoH, in collaboration with provinces, is in the process of completing schedules for PHC facilities that need major refurbishment or that need to be re-built.

Staffing

Problems relating to human resources for health in South Africa, and the resultant weaknesses in the health system, have been well documented in South Africa's Human Resources for Health Strategy.[13] In 2012, the National Health Council (NHC) decided that staffing requirements should be determined across the country in a uniform manner. The World Health Organization (WHO) method – Workload Indicators of Staffing Needs (WISN) – was adopted to determine staffing requirements based on workload.[14] The WISN studies were conducted at selected PHC facilities in 10 NHI pilot sites and the results from these pilot facilities were interpreted and used to develop a PHC implementation guideline containing

Figure 5: Percentage of South African clinic facilities compliant with infrastructure-related elements of the ICRM, March 2015 and March 2016



Source: Ideal Clinic Monitoring and Evaluation Software.

Table 4: Room list for different facility sizes in the South African Ideal Clinic blueprint

Room Description		IDEAL CLINIC SMALL			IDEAL CLINIC MEDIUM			IDEAL CLINIC LARGE		
	Total sq.m	No.	Area sq.m	Total sq.m	No.	Area sq.m	Total sq.m	No.	Area sq.m	Total sq.m
Guardhouse	**18**	**1**	**18**	**18**	**1**	**18**	**18**	**1**	**25**	**25**
Adjacent Pedestrian Screening walkway										
Outside covered area	36	1	36	36	1	50	50	1	50	50
Multipurpose meeting rooms	25	1	25	25	1	36	36	1	36	36
External toilet	4	1	4	4	2	4	8	2	4	8
MAIN CENTRAL AREA										
Help Desk	6	1	6	6	1	6	6	1	6	6
Admission counter/Reception	9	1	9	9	1	16	16	1	16	16
Records room	12	1	12	12	1	20	20	1	20	20
Waiting area	50	1	50	50	1	75	75	1	75	75
CCMDD collection kiosk	12	1	12	12	1	20	20	1	20	20
Play area	9	1	9	9	1	16	16	1	16	16
Toilet and WHB-male	4	2	2	4	4	4	16	6	4	24
Toilet and WHB-female	4	2	2	4	4	4	16	6	4	24

normative guides and standards. The implementation guideline includes a PHC staff benchmarking template and application procedures. The process of benchmarking the current clinic staff situation against the PHC normative guides and standards in the implementation guideline was completed for all fixed PHC facilities. The benchmarking process involves determining staffing shortages and surpluses based on clinic workload. The next step is to get clinic staff establishments approved in line with the WISN results and to obtain funding to progress incrementally to the required staffing mix. Provincial Heads of Health Departments are currently prioritising the funding for dedicated clinic manager posts to reduce the high vacancy rates in this regard. There is already an average improvement from 66% in March 2015 to 75% in March 2016.

Figure 6 shows that compliance with the element 'Staffing is in line with WISN' is low (7%). This could imply either an under- or over-supply of the different staff categories.

Supply-chain management

The peer-review results showed that it is possible for clinics to reach average scores as high as 80% or more and still not achieve Ideal status. This is because there is a minimum requirement for 'vital elements'. Figure 7 is an excerpt from the dashboard of a clinic, showing the vital elements that are commonly failed, leading to clinics being unable to achieve Ideal status. These elements, as well as the most failed 'essential' elements, are linked to issues of supply-chain management.

Figure 6: Percentage of South African clinic facilities compliant with human resource-related elements of the ICRM, March 2015 and March 2016

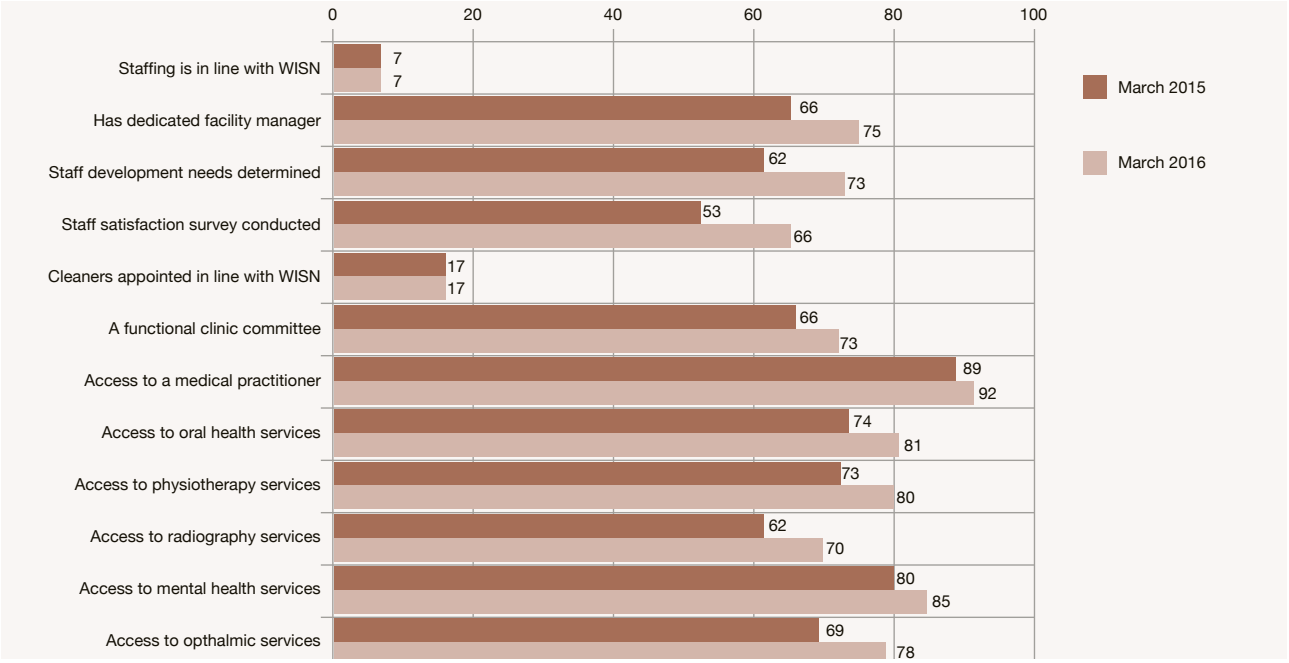


Figure 7: Commonly failed 'vital elements' in the South African ICRM peer-review process

Sub-component				Eastern Cape	Free State	Gauteng
Element		Weighting	Control			
9. Infection prevention and control				**85**	**84**	**94**
54	Sharps containers are deposed of when they reach the limit mark.	V	HF	99	100	100
55	Sharps are disposed of in impenetrable, tamper-proof containers.	V	HF	99	99	100
12. Medicines and supplies				**70**	**77**	**91**
74	There is at least one functional wall-mounted room thermometer in the medicine room/ dispensary.	**V**	HF	**84**	78	98
75	The temperature of the medicine room/dispensary is recorded daily.	**V**	HF	**83**	80	98
76	The temperature of the medicine room/dispensary is maintained within the safety range.	**V**	HF	**85**	80	98
77	There is a thermometer in the medicine refrigerator.	**V**	HF	**96**	98	99
78	The temperature of the medicine refrigerator is recorded twice daily.	**V**	HF	**95**	96	99
79	The temperature of the medicine refrigerator is maintained within the safety range.	**V**	HF	**95**	95	100
80	90% of the tracer medicines are available.	**V**	HF	**72**	70	94
13. Management of Laboratory Services				**53**	48	68
85	Required functional diagnostic equipment and concurrent consumables for point-of-care testing are available.	**V**	HF	**47**	38	82
22. Essential equipment and furniture				**37**	**32**	**63**
141	The resuscitation room is equipped with functional basic equipment for resuscitation.	**V**	HF	**14**	7	52
142	The emergency trolley is restored daily or after every time it was used.	**V**	HF	**11**	5	46
143	There is a sterile emergency delivery pack.	**V**	HF	**35**	40	73
145	An oxygen cylinder with pressure gauges available in resuscitation/emergency room.	**V**	HF	**92**	92	99
23. Bulk supplies				**53**	**46**	**80**
147	There is a constant supply of clean, running water to the facility.	**V**	HF	**78**	82	99

Figure 8: Operation Phakisa Laboratory recommendations for supply-chain management in South African Ideal Clinics

Source: Operation Phakisa Ideal Clinic Lab Report.[10]

Table 5: Matrix of Operation Phakisa work-streams, Ideal Clinic components, and Transversal Lever projects

ICRM component	Operation Phakisa work-stream	Transversal levers
1. Administration		• Automation of patient registration and patient record filing system • Guideline on filling, archiving and disposal of patient records • National Policy for Patient Safety Reporting and Learning • Primary Health Care security specifications • Policy for complaints management
2. Integrated Clinical Services Management	1. Service delivery 2. Waiting times	• Integrated Clinical Services Management roll-out plan • Clinical tools on health promotion • National Patient Referral Policy • Infection Prevention and Control Policy • Clinical Audit Guidelines • Patient Experience of Care Guideline • Patient Waiting Time Policy
3. Medicines Supplies and Laboratory Services		• Medicines stock control system • PHC laboratory guideline
4. Human Resources for Health	4. Human resources for health	• Facility staffing – resource plan based on WISN findings • Basic Life Support Training
5. Support Services	5. Financial management 6. Supply-chain management	• Supply-chain management • Costing of national Ideal Clinic roll-out plan • Cleanliness Guidelines • Linen management policy
6. Infrastructure	3. Infrastructure	• Infrastructure renewal Plan • Essential equipment plan • Branding of the 'Ideal Clinics' • District Infrastructure Maintenance Hubs
7. Health Information Management		• Patient information systems design • Ideal Clinic indicators for National Indicator Dataset

ICRM component	Operation Phakisa work-stream	Transversal levers
8. Communication		• Ideal Clinic Realisation and Maintenance Manual • Ideal Clinic Index and guide • Communications plan – internal and external
9. District Health System Support		• District Health Management Office Framework and Profile • Review configuration of the PHC service delivery platform • District Health Committees Guidelines
10. Implementing Partners and Stakeholders		• Development of Memorandum of Understanding
	7. Scale-up and sustainability	• Change Management Model • Capturing lessons and implementation research
	8. Institutional arrangements	• NDoH 'Ideal Clinic' unit established

The fact that it is difficult for clinics to achieve 'green' status for supply-chain management elements was already evident during the study phase. For this reason, supply-chain management was allocated a work-stream in the Operation Phakisa Ideal Clinic Laboratory. The Laboratory recommendations are summarised in Figure 8.

The following steps have been taken towards implementing some of these recommendations.

- A national supply-chain management forum has been established, chaired by the NDoH Chief Financial Officer (CFO) and composed of provincial CFOs and national and provincial supply-chain management professionals.
- Progress has been made in terms of medicines provisioning and further implementation of the Stock Visibility System (SVS) to all PHC clinics. The SVS enables effective monitoring of stock-outs at facility level. The plan is to link the SVS with Rx Solution (an electronic pharmaceutical stock-management system used at PHC facilities and hospitals) and to feed information for monitoring of minimum and maximum stock. Rx Solution will immediately advise the procurement system to replenish stock. The Rx solution roll-out will be done in phases. To date, more than 3 000 PHC facilities have functional SVS devices, and the rate of medicine stock-outs has been reduced.
- In collaboration with National Treasury, a national catalogue has been drafted, with specifications for all equipment and supplies needed in the Ideal Clinic.
- In collaboration with National Treasury and provinces, the NDoH is in the process of setting up valid transversal tenders for all equipment and supplies needed in the Ideal Clinic.
- The NDoH is in the process of working with provinces where there are particular weaknesses to strengthen their supply-chain structures.

In addition to removing the three key barriers to scale-up as discussed above, plans have also been put in place to address the transversal levers required to improve the rate of scale-up. In the Ideal Clinic context, 'transversal levers' are tools required across all provinces to speed up the attainment of fully functional PHC facilities. In this regard:

- district scale-up teams have been oriented to the programme, and the peer-review exercise in February 2016 served as further training for district scale-up teams;
- dedicated funding has been obtained from Treasury for management of this programme at national level;
- the change-management approach has been piloted and the results are being used to define the approach to be scaled up;
- the development of monitoring and evaluation web-based software has been completed and is fully functional;
- the ICRM manual has been completed and published. It describes how each element can be turned into 'green'; it also includes measurement tools;
- the branding strategy is being piloted, and results will be used to develop the branding guidelines; and
- a proposal for a standardised District Health Management Office structure has been converted into guidelines, which are yet to be approved.

An initiative to pilot improved financial resourcing at district level is in the concept phase.

Table 5 provides an overview of how the transversal levers are linked to the ICRM components and the Operation Phakisa Ideal Clinic Laboratory work-streams.

Conclusion

Implementation of the Ideal Clinic programme will see the Ideal Clinic at the centre of a community-based PHC service, including School Health, Ward-based Outreach Teams and Environmental Health. Of particular importance is the need for an effective service-delivery platform that will facilitate the achievement of population health targets for national health programmes. The ICRM scale-up process continues to use an implementation research model, and 322 Ideal Clinics were accredited in one year. In addition, the number of clinics that scored over 70% increased from 139 to 445, while the number that scored less than 40% dropped from 213 to 90. This achievement is an indication that attention and corrective interventions focused on specific weaknesses in PHC facilities do have the desired effect. This was achieved through focusing on processes to improve Integrated Clinical Service Management, infrastructure, human resources for health, service-user waiting times, financial management, and supply-chain management. However, given that the country has 3 477 PHC facilities, an achievement of only 322 Ideal Clinics leaves much to be desired.

National and provincial Health Departments, with the assistance of national and provincial Treasuries, must speed up infrastructure and staffing improvements and correct the procurement processes that see many clinics functioning without the required medication, consumables, equipment and furniture. With regard to staffing, the

appointment of clinic managers will continue to receive the priority attention assigned to this in 2015/16. We are confident that with concerted effort to strengthen the transversal levers, the programme will continue to yield good results.

References

1 South African National Department of Health. Ideal Clinic Monitoring System. Pretoria: NDoH; 2015. [Internet]. [cited 8 January 2017]. URL: www.health.gov.za

2 South African National Department of Health. National Health Information Repository and Data Warehouse. Pretoria: NDoH; 2017. [Internet]. [cited 8 January 2017]. URL: http://nhird.health.gov.za

3 South African National Department of Health. Annual Report 2015/16. Pretoria: NDoH; 2016.

4 Office of Health Standards Compliance. Annual Inspection Report 2015/2016. Pretoria: OHSC; 2016.

5 Fryatt R, Hunter J. The Ideal Clinic in South Africa: Planning for implementation. In: Padarath A, English R, editors. South African Health Review 2014/15. Durban: Health Systems Trust; October 2015.

6 South African National Department of Health. National Health Care Facilities Baseline Audit, National Summary Report. Pretoria: NDoH; 2013. [Internet]. [cited 8 January 2017]. URL: http://www.hst.org.za/publications/national-health-carefacilities-baseline-audit-national-summary-report

7 Republic of South Africa. National Health Amendment Act (12 of 2013). Cape Town: Government Gazette No. 367, 24 July 2013.

8 South African National Department of Health. Ideal Clinic Definitions, Components and Checklists, Version 16. Pretoria: NDoH; April 2016.

9 South African National Department of Health. District Health System Policy Framework and Strategy 2014 to 2019. Pretoria: NDoH; 2014.

10 South African National Department of Health. Operation Phakisa Ideal Clinic Realisation and Maintenance, Laboratory Report. Pretoria: NDoH; May 2015. [Internet]. [cited 8 January 2017]. URL: https://www.idealclinic.org.za/docs/2016/phakisa/Operation%20Phakisa%20Ideal%20Clinic%20Realisaation%20&%20Maintenance%20Final%20report%20May%202015.pdf.

11 South African National Department of Health. Ideal Clinic Manual. Pretoria: NDoH; April 2016.

12 Peters DH, Tran NT, Adam T. Implementation research in health: a practical guide. Alliance for Health Policy and Systems Research. Geneva: World Health Organization; 2013.

13 South African National Department of Health. National Human Resources for Health, South Africa. HRH Strategy for the Health Sector: 2012/13–2016/17. Pretoria: NDoH; 2011.

14 World Health Organization. Workload indicators of staffing need (WISN): User's Manual. Geneva: WHO; 2010. [Internet]. [cited 19 June 2016]. URL: http://www.who.int/hrh/resources/WISN_Eng_UsersManual.pdf

Pharmacovigilance: a public health priority for South Africa

12

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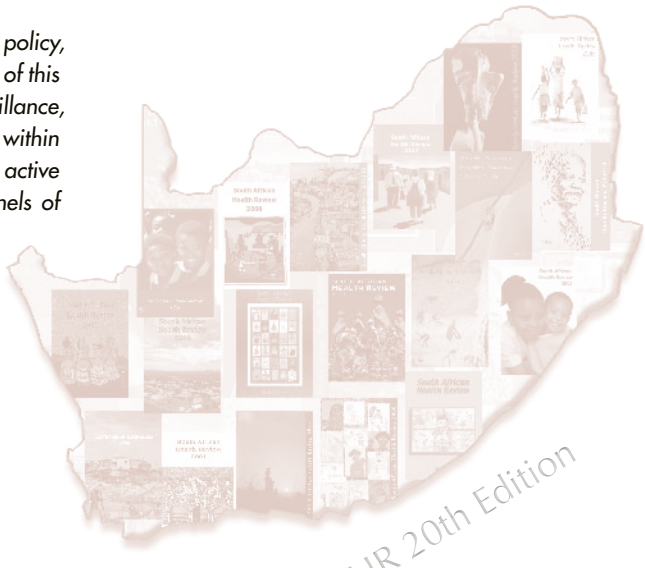
South Africa has been engaged in pharmacovigilance (PV) activities to assess the impact of adverse drug reactions on public safety and health for 40 years. Activities have evolved from passive regulatory reporting to active surveillance systems. The HIV and AIDS and TB epidemics stimulated pharmaco-epidemiological research into the risks associated with medicines used in the standardised regimens of mass treatment programmes. Specific safety concerns, supported by robust local cohort data, have prompted major changes to national and international treatment policies.

This chapter describes the expanding body of local knowledge and the historical and emergent surveillance systems that address the burden of drug-related harms, noting the challenges to health system responsiveness. The South African context presents a unique opportunity to characterise the scale and nature of such harms in mass HIV and AIDS and TB treatment programmes. The use of complex regimens at scale poses new PV challenges. There is an urgent need to develop cohesive, sustainable systems to support evidence-based decisions on appropriate regimen choices, while minimising medicine-associated risks. The increasing use of computerised clinical, laboratory and dispensing records, with unique patient identifiers facilitating data linkage, will increase PV surveillance capacity.

A coherent national PV framework is an essential part of medicines policy, encompassing regulatory, programmatic and individual needs. The key pillars of this framework are: (i) consolidation and expansion of active and passive PV surveillance, optimising existing programmes; (ii) prioritising post-marketing monitoring within the new health products regulatory authority; and (iii) instilling a culture of active risk management in clinical practice through the creation of effective channels of communication and feedback into policy and practice.

There is an urgent need to develop cohesive, sustainable systems to support evidence-based decisions on appropriate regimen choices, while minimising medicine-associated risks.



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Introduction

The use of medicines is unavoidable. We are exposed to medication even before birth, and exposure increases in frequency and variety until death. The system supporting the development, manufacture, regulation, marketing and use of these medicines is vast and influenced by complex social, environmental, financial and political factors at local and global levels.

A medication can be summarised in terms of its benefits, risks and quality. In the modern era, preclinical and clinical trials are conducted under highly regulated conditions to identify the benefits of a candidate product as well as the major and common side-effects. Only once the benefits have been shown to outweigh the harms under clinical trial conditions is the product licensed by a regulatory agency. Once marketed, medicines are rarely used in the specific, controlled conditions of the clinical trial. The frequency and severity of side-effects may be very different in the post-marketing phase when a medicine is used for longer periods of time in a heterogeneous patient population with a range of co-morbidities and concomitant medication, and for off-label indications. Detection of rare side-effects requires large sample sizes, so medicines must be monitored for performance throughout their lifespan.

Pharmacovigilance (PV) refers to the science and activities relating to the *detection, assessment, understanding and prevention* of adverse effects or any other drug-related problem.[1] The goal of PV is to optimise benefits and minimise risks, at the individual and population level. Responsibility should be shared by the pharmaceutical industry, drug regulators, health professionals, patients and the public.

Pharmacovigilance has evolved considerably over the last 20 years. Initially the primary focus was regulatory: identifying (diagnosing, reporting) signals[a] of new or previously poorly described adverse drug reactions (ADRs) for registered medicines. There is increasing recognition of the importance of quantifying event rates and severity for known ADRs, as this may differ from pre-marketing incidence. Post-marketing research is needed that includes robust denominator data and methods that can identify risk factors and quantify incidence. Aligned with global evolution, PV in South Africa has expanded into a comprehensive science that links post-marketing activities with the pre-marketing process of drug development, and quantifies the risks and public health impact of medicines using more robust approaches such as cohort studies and registries. In South Africa, synergies between PV and the related activities of disease surveillance and health system strengthening have resulted in the recognition of PV as a critical public health discipline requiring integration into all aspects of health care. On the global stage, South Africa regularly contributes data, policies and expertise to the World Health Organization (WHO) International Drug Monitoring Programme and various vertical programme-driven initiatives co-ordinated by the WHO.

The focus of this review is on orthodox medicines used by humans, and methods to assess the direct impact of such medicines on human health; the review does not refer to environmental or indirect exposures, medical devices, complementary medicines or illicit drugs. We describe the evolution and scope of PV in South Africa and motivate for strengthening of this discipline as an essential and functional tool to improve patient care, clinical practice and public health.

a A signal is defined as reported information on a possible causal relationship between an adverse event and a drug, the relationship being unknown or incompletely documented previously. Usually more than a single report is required to generate a signal, depending on the seriousness of the event and the quality of the information.

An historical overview of pharmacovigilance in South Africa

A series of catastrophes, including the 1962 thalidomide disaster, were catalysts for the development of PV as a discipline (thalidomide was marketed as a sedative and anti-emetic in pregnancy and caused severe birth defects). It was internationally acknowledged that government intervention was required to regulate the manufacture and sale of medicines in order to ensure standards of safety, efficacy and quality. The Medicines and Related Substances Control Act 101 was promulgated in South Africa in 1965. In 1987, the National Adverse Drug Event Monitoring Centre (NADEMC), a unit of the Medicines Control Council (MCC), was established to facilitate ADR monitoring. The NADEMC managed the collection and review of voluntarily submitted ADR reports from health professionals to detect signals of unknown or poorly understood ADRs, and South Africa became the first African member of the WHO International Drug Monitoring Programme in 1992.

The adverse events following immunisation (AEFI) targeted spontaneous reporting (TSR) system of the expanded programme for immunisation (EPI) was established in 1998 with strong links to the NADEMC. Targeted spontaneous reporting solicits reports of specific, pre-defined serious events for a group or groups of medicines and/or patient groups.

In 2003, ADR reporting guidelines for the pharmaceutical industry were issued by the MCC; the guidelines aimed to improve the quality and quantity of reports submitted and encourage a proactive approach to safety monitoring. During the same year, the PV expert committee of the MCC was constituted to advise the MCC on post-marketing safety issues. In 2003, the national antiretroviral (ARV) treatment programme was launched, with government-funded ARVs becoming accessible to thousands of patients. Integral to the roll-out was strengthening of the national spontaneous reporting system and implementation of "focused surveillance and novel pharmacovigilance methods for addressing key research questions".[2] Targeted spontaneous reporting systems for ADRs in patients on ARVs were established within provincial ARV programmes.[3]

National awareness grew around the importance of reporting ADRs, particularly reactions to ARVs, resulting in increased reporting rates (Figure 1). There was a parallel increase in studies examining the effects of ADRs on adherence and regimen substitutions[4] as well as the impact of HIV on the risk of ADRs to vaccines and TB medicines.[5,6] In 2011, the South African National Department of Health's (NDoH) programmatic PV unit reported on its decentralised system, a TSR system for ARVs and TB medicines aimed at using ADR reports as a clinical tool to improve ARV and TB medicine use.[7]

In 2012, reports of maternal deaths caused by serious nevirapine (NVP)-induced ADRs raised concerns about the safety of ARVs in pregnancy and prompted the NDoH to change first-line ARVs in pregnant women from a NVP- to an efavirenz (EFV)-based regimen.[8]

Pregnancy safety concerns prompted the NDoH to pilot a national pregnancy exposure registry and birth defect surveillance system (PER/BDS) in eThekwini District, KwaZulu-Natal (KZN) in 2013, to monitor the safety of all medicines commonly used by pregnant women.[9]

Current pharmacovigilance systems and research in South Africa

The HIV and AIDS epidemic has generated tremendous advances in the science of PV in South Africa, and an appreciation of the impact of drug-related morbidity and mortality on adherence, treatment policies, health systems and public health.

Pharmacotherapy is a key intervention in public health programmes and the mainstay of clinical practice. In South Africa, PV initiatives are largely driven by three key stakeholders: regulators and the pharmaceutical industry (focused on products); public health programmes (focused on systems); and healthcare providers and clinicians (focused on patients). While each of these groups works to minimise drug-related harm and improve patient outcomes, they have different immediate objectives, capacities and tools at their disposal to investigate and respond to safety issues.

In certain cases or for certain medicines or patient populations, a more targeted and/or active surveillance system is required to augment the MCC's spontaneous reporting system. Targeted spontaneous reporting systems that "solicit more specific information" are used to monitor the safety of vaccines and HIV and TB medicines because of their widespread use and the potential impact of real or perceived drug safety problems on the viability of disease management programmes in which they are employed. In cases where a more focused safety question requires an answer, active surveillance and/or research activities are undertaken. For instance, inpatient morbidity and mortality studies have been conducted at South African hospitals to determine the burden of ADRs on medical ward admissions and deaths. Similarly, case control and cohort studies have been conducted to assess the safety of ARVs used as first-line treatment in the public sector.

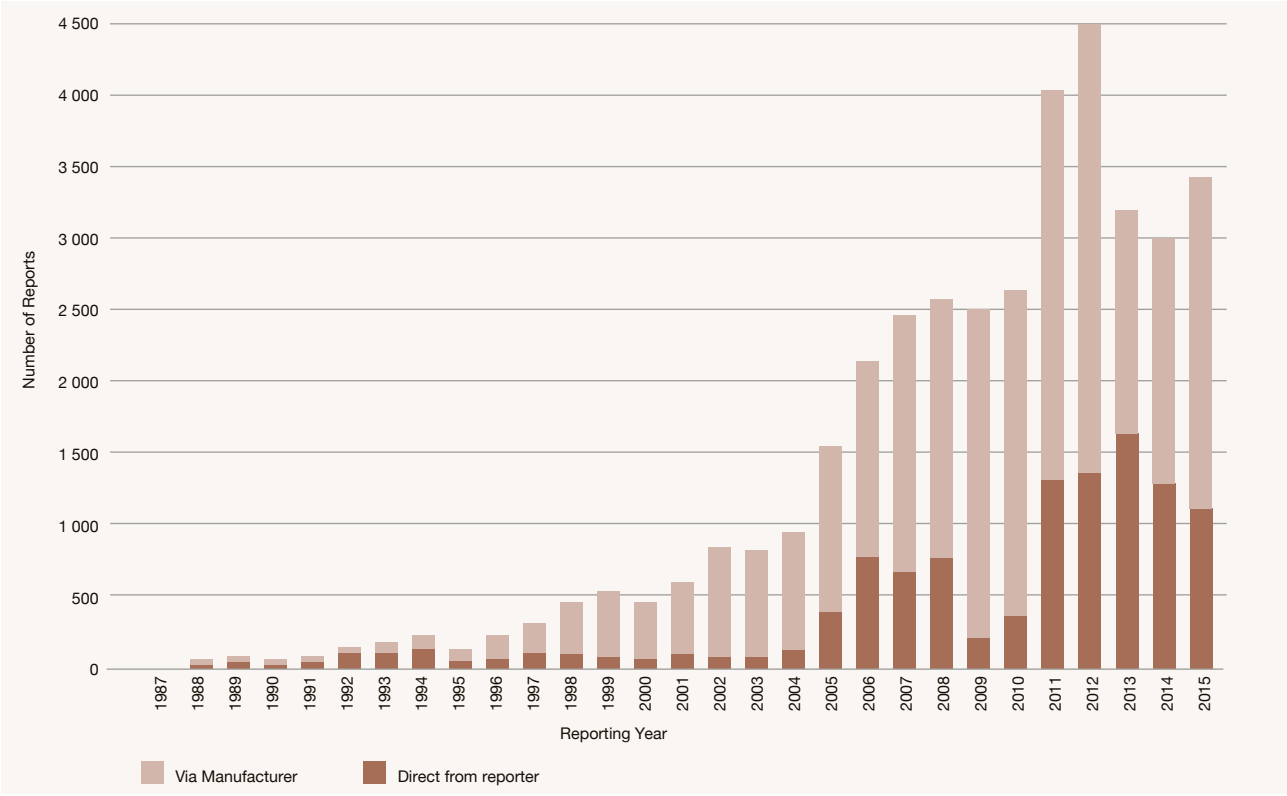
Regulatory pharmacovigilance

Passive surveillance: Spontaneous reporting of ADRs to the NADEMC by health professionals remains the cornerstone of local medicines safety data collection. While reporting rates are still extremely low, they have increased over time (Figure 1) with approximately 62 reports/million capita received in 2015. Despite the surge in reporting rates after the introduction of public sector ARVs after 2003, many of the reports submitted directly to the programmatic PV systems were not incorporated into the NADEMC database.[10] Unlike licensing, post-marketing PV generates no direct income for the regulator, and the discipline has suffered from resource constraints, limiting capacity for analysis, feedback and expansion.

Passive surveillance systems such as spontaneous reporting (including TSR) are useful in identifying new signals or ADR trends, but they are unable to quantify the risk of a particular harm. They cannot quantify ADR incidence or identify risk factors in the absence of a reliable background event rate in the unexposed population or other comparator groups. Therefore passive systems should be augmented with active surveillance approaches.

Active surveillance: In well-resourced settings, pharmaceutical manufacturers are now required to submit risk management plans

Figure 1: Number of ADRs reported per annum to the NADEMC (1987–2015)



(RMPs), including a commitment to conduct post-marketing studies as part of their registration dossiers at the time of licence application. Similar requirements for RMPs are being introduced in South Africa with regard to new medicines and expanded or new indications for already-registered products (e.g. the use of tenofovir for pre-exposure prophylaxis). In addition to local spontaneous reports, the MCC routinely reviews warnings issued by other regulators, post-marketing safety studies published in the literature, media reports, and unpublished data from pharmaceutical manufacturers.

Despite its limitations, spontaneous ADR reporting does provide an opportunity for regulators to interact directly with healthcare providers. This opportunity should be exploited, both to encourage reporting and to improve clinical case management individually and collectively.

It is envisaged that in 2017–2018 a new parastatal agency, the South African Health Products Regulatory Authority (SAHPRA) will replace the MCC. Regulations have been updated and a new infrastructure will be developed. This restructuring represents the opportunity to prioritise PV as a well-resourced, successful regulatory function of the new organisation. There is international recognition of the need to strengthen and prioritise post-marketing PV activities, while streamlining the licensing process through greater reliance on assessment reports written by well-resourced, mature regulatory authorities with greater capacity than South Africa's for dossier review, rather than conducting the entire dossier review afresh locally at time of licensing. This approach could reduce the registration time for novel and essential medicines; improve monitoring and evaluation of already-marketed products; and adapt decisions for local conditions.

In order to adopt a risk-based approach that focuses on patient safety at the individual and population levels, South African regulators should expand their PV resources considerably; they must develop active surveillance capacity by co-opting the local research community, the pharmaceutical industry, medical aid programmes and hospitals to provide critical data for monitoring and risk assessment of registered products. However, careful consideration must be given to which international approaches are relevant and how these could be adapted to the South African context.

Regardless of the approach, local research unequivocally demonstrates the need to strengthen spontaneous reporting by training health professionals on detection and reporting of ADRs; the provision of reliable therapeutic advice in real time such as that provided nationally by the Medicines Information Centre (MIC) at the University of Cape Town (UCT); and individual and collective feedback and communication of ADR reports and other PV data.[11,12] This will enhance public support for drug safety surveillance and optimise the benefits of ADR reports on patient care and public health.

Programmatic and clinical pharmacovigilance systems and research

Passive surveillance: Vaccinations administered to infants and children have shown proven efficacy in reducing the incidence of common childhood infections responsible for much paediatric morbidity and mortality in the past. Other high-risk groups also benefit from immunisation requiring enhanced AEFI surveillance, e.g. influenza vaccines in pregnant women and the elderly. In these examples, events may be incorrectly attributed to the vaccine because of a temporal relationship between the administration of the vaccine and the clinical signs. Serious or potentially vaccine-related AEFIs are submitted routinely to the NADEMC, while programmatic errors are investigated and managed within the EPI programme. Here too, the system needs to be strengthened in terms of data analysis and feedback. In particular, a multidisciplinary, independent AEFI causality assessment committee should be established to review serious reports promptly and assess the relationship (causal, contributory or coincidental) between the event and the vaccine(s), enabling timeous and decisive response.

In 2005, a TSR reporting system for patients on ARVs was implemented in the Western Cape through a partnership between the provincial government and UCT's MIC. The system has expanded to include ADRs to TB treatment, and more recently it has also encouraged reporting on all medicines. Quarterly newsletters summarising the data and including important case studies and 'learning points' are circulated. Potential prescribing errors are addressed through direct feedback to the reporting clinician.

In 2004, KZN's PV committee implemented a mandatory reporting system requiring clinicians to submit an ADR report when toxicity prompted changes in ARV treatment regimens. The system elicited 3 923 reports in its first year (2007), providing useful information on the drugs commonly implicated in ADRs and necessitating treatment substitution.[13] The programme instituted a culture of reporting where none had existed previously. However, the barriers to reporting faced by clinicians in resource-limited settings pose a challenge to the success of a mandatory reporting programme that is linked to treatment access.

In order to develop a responsive, clinically valuable PV system for ARV/TB medicines, the NDoH's programmatic PV unit piloted a decentralised TSR system of multidisciplinary PV clusters at district level. This approach involves the submission of ADR reports to the national unit and routine review for causality and preventability by a multidisciplinary team, with a strong focus on feedback provided by both the local review team and the national unit.[7,14] This system is being rolled out in all provinces. Challenges remain, and the sustainability and value of this model will need to be assessed. During an initial analysis, 48% of reports were found to be of poor quality and unevaluable.[7] A subsequent analysis found that 41% had to be excluded due to poor quality or because the reports related to ARV inefficacy, not toxicity, or to medicines not included in the programme.[14] Moreover, the confusion arising from the need to complete two forms – for both programmatic and regulatory reporting – has tended to undermine efforts to streamline ADR reporting. These findings reflect the need for better co-ordination between the regulatory and programmatic surveillance systems, and highlight again the importance of ongoing training, support and feedback. Efforts are currently under way to harmonise the PV systems, ensuring clear allocation of roles and responsibilities within each programme and appropriate sharing of data. Electronic reporting tools using mobile phones and computers, and integrated into other e-health applications, offer new development and streamlining opportunities.

Active surveillance (studies, cohorts and registries): Weak healthcare systems, poorly resourced regulatory authorities, permeable geographical borders allowing a growing trade in substandard and counterfeit medicines, and complex and varied cultures of

drug use and sharing, all contribute to drug-related morbidity and mortality in Africa. In addition, individual health can be affected by poor nutrition, HIV, TB and malaria, which alter the physiological response to medications and require sophisticated and often erratically accessible drug combinations. Policy-makers should respond to these challenges through the provision of sound local data to quantify the size and severity of ADR-related problems and to identify the extent to which they are preventable – and if so, how. Data from passive surveillance systems are not designed to achieve this.

Some progress has been made locally in quantifying the burden of serious ADRs. These data are derived from (i) morbidity studies in inpatient settings; (ii) PV-related data from disease-specific observational cohorts; (iii) analysis of routine service data using record linkage approaches; and (iv) development of patient registries.

Inpatient morbidity studies

The profile of ADRs and their impact on public health varies across settings,[15] and the nature and frequency of ADRs in South Africa differ significantly from other countries, being influenced by the population structure, burden of disease and the risk profiles of commonly used drugs.[16,17]

A cross-sectional survey conducted in 2013 reviewed adult medical admissions at four geographically diverse South African hospitals. Of 1 951 medical admissions, 164 (8.4%) were the direct result of an ADR: female sex, polypharmacy, comorbidities and ARVs were independent risk factors.[16] An earlier study found that 6.3% of 665 medical ward admissions were ADR-related.[17] Both studies noted a bimodal age distribution of serious ADRs: those due to drugs used in management of non-communicable diseases in older patients (similar to the pattern seen in high-income countries[15]), and those due to medicines used in the management of HIV and TB, driven by the burden of these diseases in South Africa. Forty-five per cent of ADRs were classified as preventable: due to inappropriate and excessive prescribing, inadequate therapeutic monitoring, poor adherence and poor knowledge of drug interactions.[16] In the 2013 survey, ADRs contributed to death in 2.9% of medical admissions, and 16% of deaths were ADR-related – much higher rates of mortality than reported in high-income countries.[18] Tenofovir, rifampicin and co-trimoxazole were most commonly implicated. In contrast, warfarin, non-steroidal anti-inflammatory drugs, heparin, selective serotonin re-uptake inhibitor antidepressants, and corticosteroids were most commonly implicated in high-income countries.[19] Similar data for other patient groups (paediatric, surgical, psychiatric and cancer patients, and pregnant women) are lacking in South Africa.

These data illustrate the burden of serious ADRs due to ARVs and anti-TB treatment, which are frequently prescribed concomitantly. Healthcare workers lack confidence in their ability to diagnose and manage ADRs[11] and 18% of nurses' queries to the National HIV and TB Health Care Worker Hotline were clinical questions about ADRs.[12,20]

Disease-specific cohorts

Observational studies of HIV (case-series,[21] case-control[22] and cohort studies[4,23]) have highlighted safety and effectiveness concerns for commonly used ARVs. Notably, data on the safety of stavudine contributed to local and international changes in treatment policy. Subsequent reports assessed the positive impact of these policy changes on patient safety.[24,25] In paediatrics and dermatology, observational research addressed the use of nevirapine and ritonavir (when used as a single active protease inhibitor).[26,27] These examples demonstrate the value of well-designed and conducted cohort studies in PV research.

Health service data-mining

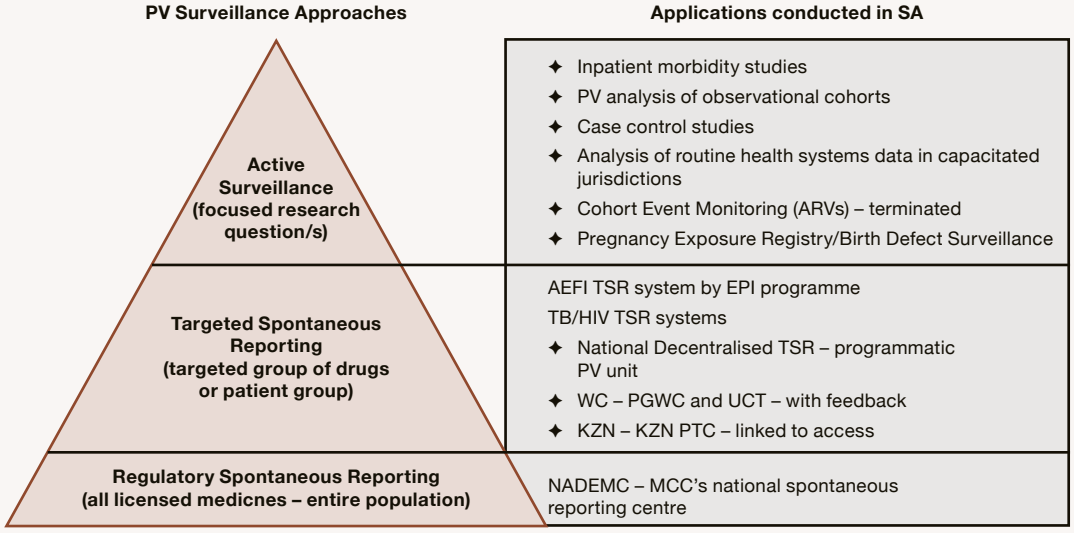
In higher-income countries, data mining of large linked databases has contributed significantly to PV. The UK Clinical Practice Research Database (CPRD), a government-led initiative, houses the clinical data of millions of British citizens and has served as a resource for several pivotal PV studies.[28] In South Africa, a recent analysis of 56 298 patients in a large private sector disease-management programme database identified reverse transcriptase ARVs (efavirenz, zidovudine and stavudine) as risk factors for incident diabetes.[29] Efforts are already under way in South Africa to develop capacity for record linkage using routine health system data.[4] This process requires support from database custodians, appropriate investment in the further development of electronic records and registers, and a governance structure that ensures the research conducted is robust, ethical and in the interests of public health.

Registries

In response to concerns about the safety of efavirenz (EFV) in pregnancy, and notwithstanding reassuring global pooled analyses,[30] the NDoH programmatic PV unit piloted a pregnancy exposure registry/birth defect surveillance (PER/BDS) programme in 2013. The registry was established as a rolling cohort aimed at understanding the effect that ARVs and other medicines commonly used in pregnancy have on maternal and neonatal outcomes. In the first year, 10 417 pregnancies were assessed, with first-trimester exposure to ARVs being the priority. The pilot programme demonstrated the value of the PER/BDS surveillance system as an approach to assess potential associations between exposures to certain medicines over the course of pregnancy and adverse birth outcomes such as stillbirth, pre-term delivery, low birth weight, neonatal death and congenital anomalies identified at birth, while providing further reassuring evidence of the safety of the first-line ARV regimen in pregnancy. The Western Cape is currently developing a pregnancy registry that is integrated into and strengthening existing routine clinical data-collection systems.

Robust active surveillance systems in representative populations are often able to supply many of the answers that programmatic PV is designed to deliver but often poorly able to achieve. A sentinel approach to the use of active PV could be an efficient way of limiting programmatic PV interventions to those that have direct value to clinical practice with minimal additional burden on practitioners. (Figure 2).

Figure 2: Pharmacovigilance approaches conducted in South Africa



Key: AEFI : adverse events following immunisation
EPI : Expanded Programme for Immunisation
MCC : Medicines Control Council
PGWC : Provincial Government of Western Cape
PV : pharmacovigilance
WC : Western Cape
ARVs : antiretrovirals
KZN : KwaZulu-Natal
NADEMC : National Adverse Drug Event Monitoring Centre
PTC : Pharmacy and Therapeutics Committee
TSR : targeted spontaneous reporting

Gaps, challenges and oportunities

Over the last 20 years, owing largely to local and international funding of expanded HIV and TB treatment programmes, South Africa has developed a better understanding of the burden of ADRs on both the healthcare system and healthcare consumers. Approximately one in 12 medical ward admissions are due to ADRs, and ADRs account for 16% of deaths among adult medical admissions. Almost half of these deaths are preventable, which indicates the need for research and monitoring to inform and transform clinical practice.

Optimising the safety of medicines to minimise patient harm is a shared responsibility requiring the co-ordinated and complementary efforts of key stakeholders. In August 2012, a multi-stakeholder meeting made recommendations aimed at strengthening national PV; however, no national policy exists.[31] The current transition from the MCC to SAHPRA is an opportunity to strengthen and prioritise PV activities nationally and to expand this essential safety net for better monitoring of the risk of harm, including harms associated with complementary medicines and medical devices. Importantly, this requires a dedicated budget.

In keeping with global trends, PV activities in South Africa are transitioning from reliance on passive surveillance reporting to a more dynamic science involving active surveillance with cohort studies, record-linkage projects and the establishment of patient registries. In South Africa, these active surveillance systems have been largely confined to investigating the effects of HIV and TB medicines, with resultant positive public health interventions. Attention should be paid to medicines for non-communicable diseases such as diabetes, hypertension, inflammatory conditions and stroke, as these are the other major contributors of drug-related hospitalisations, particularly among the elderly.[32] Technological advances and progress towards an electronic health information system will do much to support the expansion of PV research in both the public and private sectors, largely through data mining of large linked databases and the interrogation of existing patient cohorts. Where present, unique patient identifiers should be exploited to link medicine use and ADRs, including in pregnant women and children. These activities should be governed by sound ethical and scientific principles, building on what has been learnt in South Africa and elsewhere.

Perhaps the most critical shortcoming of the national PV programme is lack of communication. Healthcare providers who responsibly submit ADR reports to the national reporting centres are rarely given any useful feedback that would give relevance and meaning to the reporting process. Concurrently, strategies for public education and feedback are required, both to enhance individual patient self-reporting of ADRs, and community and media understanding of what is meant by the risk-benefit of medicines. Much can be gained by working with international regulatory agencies, including in Africa, where new centres of excellence in PV are being established.[33]

Thus far, the regulatory and programmatic PV programmes have largely operated in parallel, missing the opportunity to share and benefit from each other's data and expertise. This has had a detrimental effect on the PV programme and caused confusion around reporting requirements.[16] The benefits of provincial pilot programmes have either not been sustained, or have not been expanded to the national programme. While ADR reporting from clinical trials is largely well managed, reports from observational research studies such as demographic platforms or cohort studies should also be strengthened through advocacy and closer collaboration between researchers and the PV programmes, and the proactive development of a more consultative regulatory framework.

Ideally, existing South African PV systems should be assessed critically in terms of their ability to inform treatment policies and patient care and improve outcomes. In January 2016, the European Medicines Agency released its strategy on measuring the impact of PV activities. This document recognises the importance of developing standardised methods for modelling the health impact of PV decisions and activities based on epidemiological parameters such as "population-attributable risk, prevalence of exposure, behavioural change data, regimen or drug-switching of therapies, etc.). Key data sources for impact studies will include electronic health records, drug prescription, dispensing and utilisation data, and patient registries."[34] South Africa is in the process of building these data systems to facilitate such impact assessments on a large scale.

Conclusion and recommendations

This review highlights the importance of a robust national PV system in order to reduce the significant burden of drug-induced disease, to inform treatment policies with real-world evidence, to improve outcomes of common diseases such as HIV, TB, hypertension and diabetes through optimal therapeutic management, and to ensure the safety of large-scale pharmacotherapeutic interventions such as vaccines, especially when newly introduced.

South Africa must develop a cohesive system that builds on the considerable progress already achieved. A considered PV policy framework is recommended that:

- promotes consolidation and expansion of active and passive PV surveillance, optimising existing research and surveillance programmes;
- prioritises post-marketing monitoring within the regulatory authority; and
- instils a culture of active risk management in clinical practice through the creation of effective channels of communication and feedback into policy and practice.

This requires strong political commitment and leadership by senior policymakers, supported by real investment in infrastructure and training. Initiatives must be underpinned by a culture of drug safety awareness in which healthcare providers, patients, manufacturers, and policy-makers feel confident in their knowledge of the risks and benefits of the products they promote, prescribe or use. All medicines have side-effects, which vary according to who uses them and how they are used. Understanding this not only alerts patients to potential risks, but importantly reassures patients about the relative safety and therapeutic benefits of medicines and vaccines. Having an effective national PV programme will reinforce patient and community confidence in the health system, while building the science base that supports rational and safe prescription of medicines.

References

1 World Health Organization. The importance of pharmacovigilance: Safety monitoring of medicinal products, Geneva: WHO; 2002. [Internet]. [cited 1 February 2017]. URL: http://apps.who.int/medicinedocs/pdf/s4893e/s4893e.pdf

2 South African National Department of Health. Operational plan for comprehensive HIV and AIDS care, management and treatment for South Africa. Pretoria: South African National Department of Health; 2003. [Internet]. [cited 1 February 2017]. URL: https://www.hsph.harvard.edu/population/aids/southafrica.aids.03.pdf

3 World Health Organization. HIV/AIDS programme. WHO technical brief: Surveillance of antiretroviral drug toxicity within antiretroviral treatment programmes, Geneva: WHO; 2013. [Internet]. [cited 1 February 2017]. URL: apps.who.int/iris/bitstream/10665/91578/WHO_HIV_2013.124_eng.pdf?ua=1

4 Boulle A, Orrell C, Kaplan R, et al. Substitutions due to antiretroviral toxicity or contraindication in the first three years of antiretroviral therapy in a large South African Cohort. Clin Infect Dis. 2007;45(2):254–60.

5 Hesseling AC, Schaaf HS, Hanekom WA, et al. Danish Bacille Calmette-Guerin vaccine-induced disease in human immunodeficiency virus-infected children. Clin Infec Dis. 2003;37:1226–33.

6 Schutz C, Ismail Z, Proxenos CJ, et al. Burden of antituberculosis and antiretroviral drug-induced liver injury at a secondary hospital in South Africa. S Afr Med J. 2012;102(6):506–11.

7 Dheda M, Distefano K, Sunduzway K, et al. Decentralized HIV/AIDS pharmacovigilance in South Africa: Mpumalanga success and moving forward. J AIDS and HIV Research. 2013;5(9):370–9.

8 Moran NF. Maternal deaths due to adverse drug reactions to nevirapine-containing HAART: New recommendations for ARV therapy in pregnancy in South Africa. O&G Forum. 2012;22:29–32.

9 South African National Department of Health. The UBOMI Report: Understanding birth outcomes from mothers and infants: Report on the pilot phase of the national pregnancy exposure registry and birth defect surveillance (PER/BDS) system: A review of the initial 12 months of data and experiences. Pretoria: South African National Department of Health; 2015.

10 Maigetter K, Pollock AM, Kadam A, et al. Pharmacovigilance in India, Uganda and South Africa with reference to WHO's minimum requirements. Int J Health Policy Manag. 2015;4(5):295–305.

11 Ruud KW, Srinivas SC, Toverud E. Healthcare providers experiences with adverse drug reactions and adherence challenges in antiretroviral therapy of HIV patients in the Eastern Cape Province, South Africa. Eur J Clin Pharmacol. 2012;68:1321–8.

12 Swart AM, Chisholm BS, Cohen K, et al. Analysis of queries from nurses to the South African National HIV and TB health care worker hotline. S Afr J HIV Med. 2013;14(4):179–82.

13 Manickum VK, Suleman F. Evaluating adverse drug reactions among HAART patients in a resource-constrained province of South Africa. Afr J AIDS Research. 2012;11(2):75–81.

14 Birbal S, Dheda M, Ojewole E, et al. Adverse drug reactions associated with antiretroviral therapy in South Africa. Afr J AIDS Research. 2016;15(3):243–8.

15 Wiffen P, Gill M, Edwards J, Moore A. Adverse drug reactions in hospital patients. A systematic review of the prospective and retrospective studies. Bandolier Extra. 2002:June:1–6.

16 Mouton JP, Njuguna C, Kramer N, et al. Adverse drug reactions causing admission to medical wards: A cross-sectional survey at 4 hospitals in South Africa. Medicine. 2016;95(19):1–9.

17 Mehta U, Durrheim DN, Blockman M, Kredo T, Gounden R, Barnes KI. Adverse drug reactions in adult medical inpatients in a South African hospital serving a community with a high HIV/AIDS prevalence: prospective observational study. Br J Clin Pharmacol. 2008;65(3):396–406.

18 Mouton JP, Mehta U, Parrish AG, et al. Mortality from adverse drug reactions in adult medical inpatients at four hospitals in South Africa: a cross-sectional survey. Br J Clin Pharmacol. 2014;80(4):818–26.

19 Pirmohammed M, Meakin JS, Green C, et al. Adverse drug reactions as a cause of admission to hospital: prospective analysis of 18 820 patients. BMJ. 2004;329(7456):15–9.

20 Njuguna C, Stewart A, Mouton JP, et al. Adverse drug reactions reported to a national HIV & tuberculosis health care worker hotline in South Africa: Description and prospective follow-up of reports. Drug Saf. 2016;39(2):159–69.

21 Stead D, Osler M, Boulle A, et al. Severe hyperlactataemia complicating stavudine first-line antiretroviral therapy in South Africa. Antivir Ther. 2008;13(7):937–43.

22 Osler M, Stead D, Rebe K, et al. Risk factors for and clinical characteristics of severe hyperlactataemia in patients receiving antiretroviral therapy: a case-control study. HIV Med. 2010;11(2):121–9.

23 Geddes R, Knight S, Moosa MY, et al. A high incidence of nucleoside reverse transcriptase inhibitor (NRTI)-induced lactic acidosis in HIV-infected patients in a South African context. S Afr Med J. 2006;96(8):722–4.

24 Njuguna C, Orrell C, Kaplan R, et al. Rates of switching antiretroviral drugs in a primary care service in South Africa before and after introduction of tenofovir. PloS One. 2013;8(5):e63596.

25 Brennan AT, Davies MA, Bor J, et al. Has the phasing out of stavudine in accordance with changes in WHO guidelines led to a decrease in single-drug substitutions in first-line antiretroviral therapy for HIV in sub-Saharan Africa? AIDS. 2017;31(1):147–57.

26 Davies MA, Moutrie H, Eley B, et al. Virologic failure and second-line therapy in children in South Africa – the IeDEA Southern Africa collaboration. J Acquir Immune Defic Syndr. 2011;56(3):270–8.

27 Stewart A, Lehloenya R, Boulle A, et al. Severe antiretroviral-associated reactions in South African patients: a case series and case control analysis. Pharmacoepidemiol Drug Saf. 2016;25(11):1313–9.

28 Herret E, Gallagher AM, Bhaskaran K, et al. Data resource profile: Clinical practice research datalink (CPRD). Int J Epidemiol. 2015;44(3):827–36.

29 Karamchand S, Leisegang R, Schomaker M, et al. Risk Factors for Incident Diabetes in a Cohort Taking First-Line Nonnucleoside Reverse Transcriptase Inhibitor-Based Antiretroviral Therapy. Medicine. 2016;95(9):e2844.

30 Ford N, Mofenson L, Shubber Z, et al. Safety of efavirenz in the first trimester of pregnancy: an updated systematic review and analysis. AIDS. 2014;28(S2):S123–31.

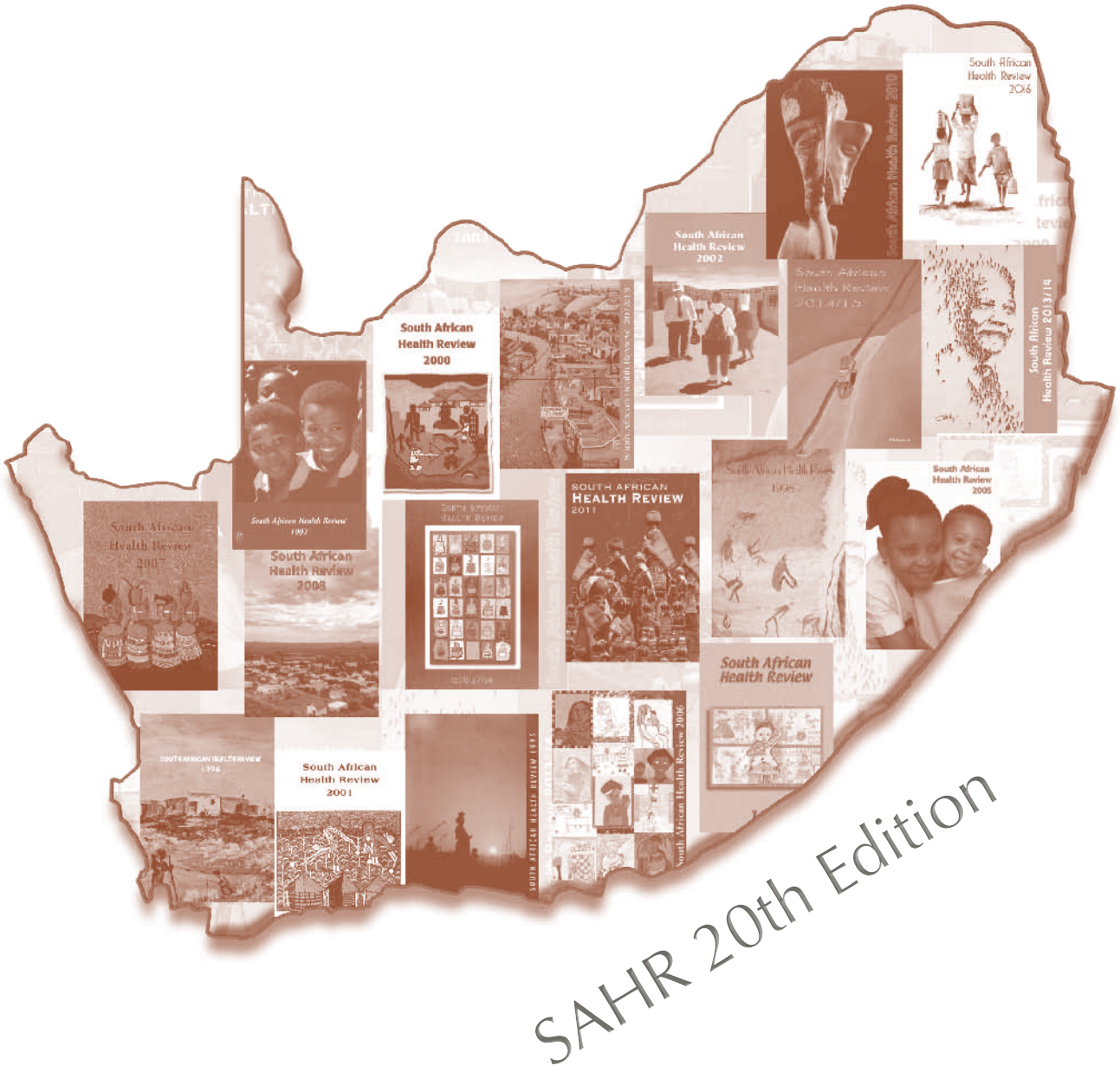
31 Mehta U, Dheda M, Steel G, et al. Strengthening pharmacovigilance in South Africa. S Afr Med J. 2014;104(2):104–6.

32 Tipping B, Kalula S, Badri M. The burden and risk factors for adverse drug events in older patients – a prospective cross-sectional study. S Afr Med J. 2006;96(12):1255–9.

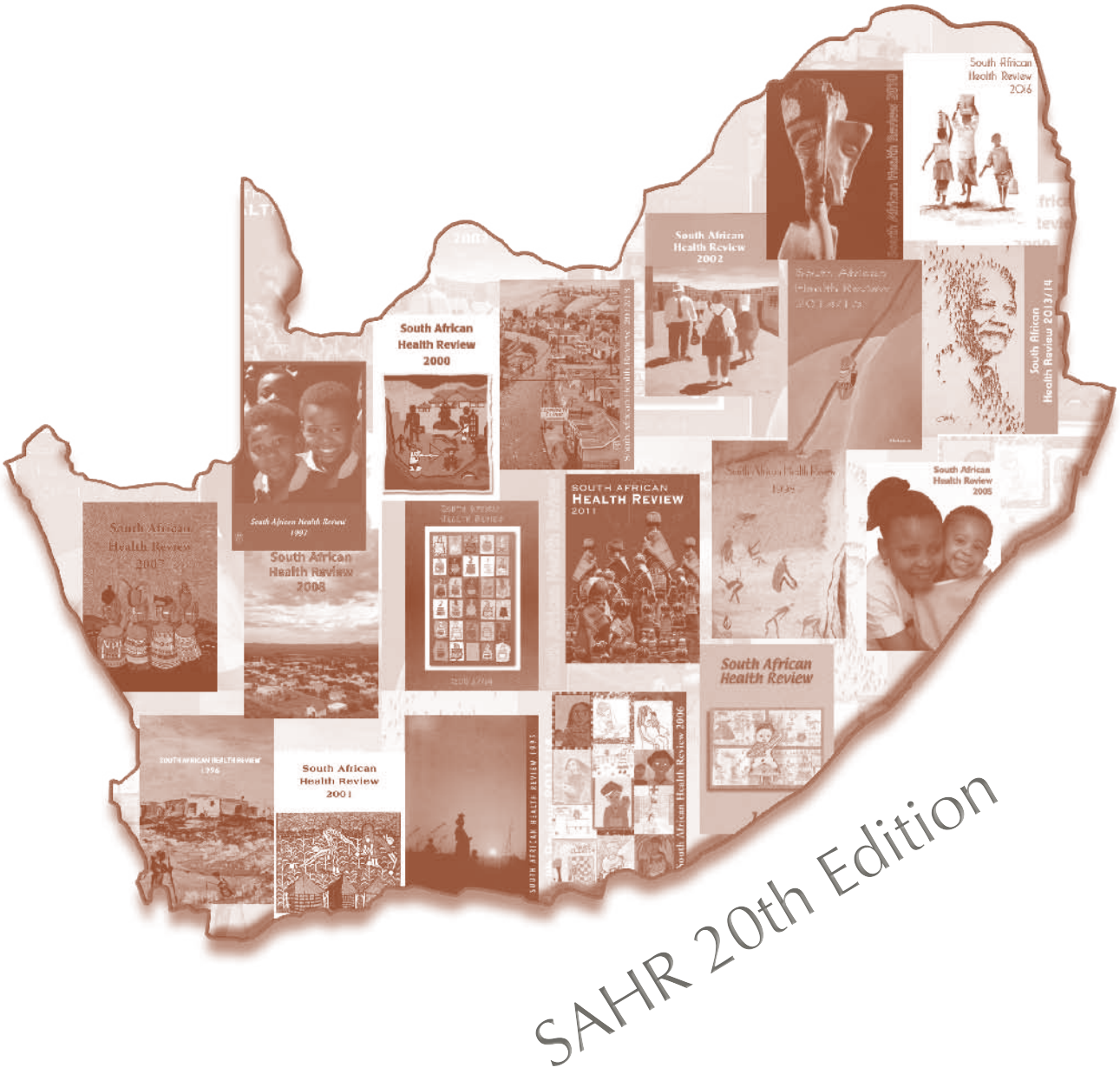
33 Uppsala Monitoring Centre. Global Pharmacovigilance. Uppsala; 2017. [Internet]. [cited 1 February 2017]. URL: https://www.who-umc.org/global-pharmacovigilance/specialist centres/

34 European Medicines Agency Pharmacovigilance Risk Assessment Committee (EMA PRAC). PRAC strategy on measuring the impact of Pharmacovigilance activities; 2016. [Internet]. [cited 3 March 2017]. URL: http://www.ema.europa.eu/docs/en_GB/document_library/Other/2016/01/WC500199756.pdf.

Infectious diseases



Infectious diseases



13 Eliminating mother-to-child transmission of HIV in South Africa, 2002–2016: progress, challenges and the Last Mile Plan

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The South African programme for the prevention of mother-to-child transmission of HIV (PMTCT) began 15 years ago. Underpinned by strong political will and civil involvement, evidence-based national policy updates culminated in January 2015 with the introduction of lifelong triple antiretroviral therapy (ART) for all HIV-positive pregnant and lactating women (PMTCT Option B+), and three-monthly HIV testing of HIV-negative pregnant and lactating women. This chapter tracks the development and impact of the South African PMTCT programme from 2002 to 2016.

District and facility-based quality improvement, mentorship, strong national leadership and civil action has led to rising antenatal HIV testing uptake (≥95% by 2015/16) and triple ART coverage (≥93% by 2015/16). Consequently the national risk of early (six weeks postpartum) mother-to-child transmission of HIV (MTCT), plummeted from approximately 25-30% prior to 2001 to an estimated 1.4% in 2016. There are no routine data sources monitoring long-term PMTCT effectiveness. However, data from the South African Medical Research Council measured the risk of MTCT at 18 months as 4.3% (3.7–5.0%). Possible game-changers to increase PMTCT effectiveness include strengthening safe-sex and family-planning services, pre-pregnancy through breastfeeding and beyond; repeat maternal and infant HIV testing at every contact with the health system; viral-load monitoring with immediate action for high-risk mothers; strengthening postnatal care; implementing a unique identifier to facilitate routine monitoring; real-time tracking of HIV-exposed infants and their mothers; early ART initiation for HIV-positive pregnant women and their HIV-positive family members in accordance with revised guidelines; mentorship and supervision of healthcare providers; and increasing accountability of communities and health care personnel at all levels.

South Africa is well poised to achieve further MTCT reductions; however, reducing maternal HIV prevalence, strengthening postnatal care and increasing accountability need significantly more attention.

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Introduction

This chapter tracks the development and impact of the South African programme to prevent mother-to-child transmission of HIV (PMTCT), from 2002 to 2016. The information presented is drawn from published literature, and from national reports and consultations.

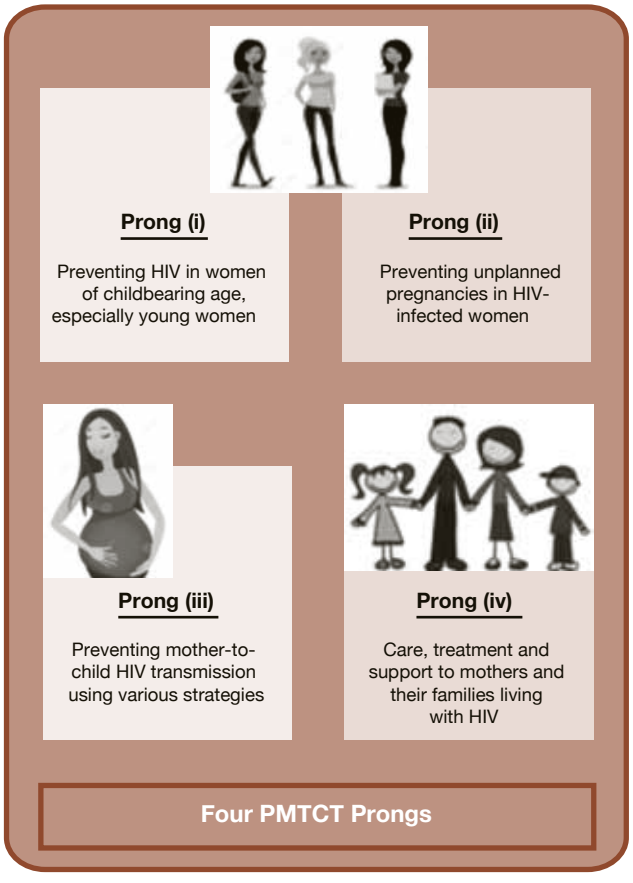
Global context

Globally, PMTCT is located within a broad framework that emphasises four broad interventions:

- preventing new HIV infections among mothers;
- preventing unplanned pregnancies in HIV-positive women;
- reducing vertical HIV transmission; and
- care and treatment and support for HIV-positive women and their families.

As early as 2002, the World Health Organization (WHO) reflected this perspective in a three-pronged PMTCT strategy, which expanded to a four-pronged approach to PMTCT in 2004 (Figure 1).[1,2]

Figure 1: World Health Organization four-pronged approach to PMTCT, 2004



Source: World Health Organization, 2004.[1]

These PMTCT prongs guided the development of PMTCT interventions globally. As evidence emerged that the early initiation of antiretroviral (ARV) drugs significantly reduced mother-to-child transmission of HIV (MTCT), and that lifelong triple antiretroviral therapy (ART) for HIV-positive pregnant and lactating women may be the key game-changer in a public-health approach to eliminating MTCT (EMTCT), global PMTCT recommendations were improved and simplified. Recommendations transitioned from single-dose nevirapine (NVP) in 1999, to lifelong ART for all HIV-positive pregnant and lactating women (PMTCT Option B+), regardless of immune status (CD4 cell count) in 2015.[3–6] Consequently, given the progress in reducing MTCT globally, the global agenda transitioned from PMTCT between 2001 and 2011, to EMTCT by 2014. In 2014 the WHO recommended two impact and three process criteria to validate EMTCT (Box 1).[7–9]

Box 1: World Health Organization criteria to assess elimination of mother-to-child transmission of HIV

Impact criteria:

- Case rate of new paediatric HIV infections due to MTCT of ≤ 50 per 100 000 live births (case rate)
- A MTCT rate of <5% in breastfeeding populations, and <2% in non-breastfeeding populations

Both of these criteria should be achieved for one year at the lowest sub-national level.

Process criteria:

- ≥95% antenatal care coverage (among all pregnant women)
- ≥95% HIV testing coverage (among all pregnant women)
- ≥90% of antiretroviral treatment coverage among HIV-positive pregnant women.

Each of these criteria should be achieved for two years at the lowest sub-national level.

Source: UNAIDS, 2011; World Health Organization, 2014; UNAIDS, 2011.[7–9]

Additionally, global targets for MTCT were included in the Millennium Development Goals (MDGs) 2000–2015, and in the Sustainable Development Goals (SDGs) 2015–2030.[10]

EMTCT interventions to end paediatric AIDS are programmatically complex, as care spans across various levels of the healthcare system (from community level to quaternary) and several delivery points (from pre-conception, through antenatal to postnatal), and involves at least two users (mothers and their children). Furthermore, there has been recent recognition of the critical role that families and partners play in improving maternal and child health uptake and outcomes.[11] Consequently, for optimal outcomes, evidence-based updated EMTCT interventions should be implemented within strong health systems, at community and facility levels. Access, coverage, quality and safety of health interventions must be optimised to improve the efficiency and responsiveness of the health system, to reduce financial risk, and to improve health outcomes.[12]

South Africa's journey towards EMTCT

South Africa's PMTCT programme began in 2001 at 18 pilot sites, with the implementation of a comprehensive package of care including single-dose NVP regimen for HIV-positive mothers at the onset of labour and for their HIV-exposed infants within 72 hours of delivery; modified obstetric practices; and avoidance or early cessation of breastfeeding.[13] In 2002, a court order mandated the scale-up of the 2001 comprehensive package of care to prevent MTCT.[13] In 2004, policies recommended ART for pregnant women

with a CD4 cell count <200 cells/mm^3;[14] in 2008, dual prophylaxis with azidothymidine (AZT) from 28 weeks gestation and NVP at the onset of labour;[15] in 2010, WHO PMTCT Option A was instituted, with lifelong ART for HIV-positive women with a CD4 cell count of 350 cells/mm^3 or less and six weeks of infant NVP prophylaxis, or alternatively, AZT from 14 weeks' pregnancy for all other HIV-positive women with maternal single-dose NVP during labour, and infant NVP prophylaxis throughout breastfeeding.[5,16] In 2013, a standardised ART regimen was introduced to treat HIV-infected pregnant women (regardless of CD4 cell count) during pregnancy and breastfeeding, with continuation of ART after breastfeeding cessation for women with CD4 counts of 350 cells/mm^3 or less (Option B).[6,17] In 2015, the guidelines were extended to Option B+, which provides lifelong ART to all HIV-positive pregnant and breastfeeding women, regardless of CD4 cell count or WHO clinical stage of disease.[18] At the start of the PMTCT programme in 2001, infant HIV testing was recommended at six weeks of age, at six weeks' post-breastfeeding cessation, and at 18 months of age.[16] In 2015, the six-weeks test was replaced with HIV testing at birth and after 10 weeks, or 18 weeks for infants who received extended post exposure prophylaxis, to identify HIV-infected infants early and fast-track them into care.[18]

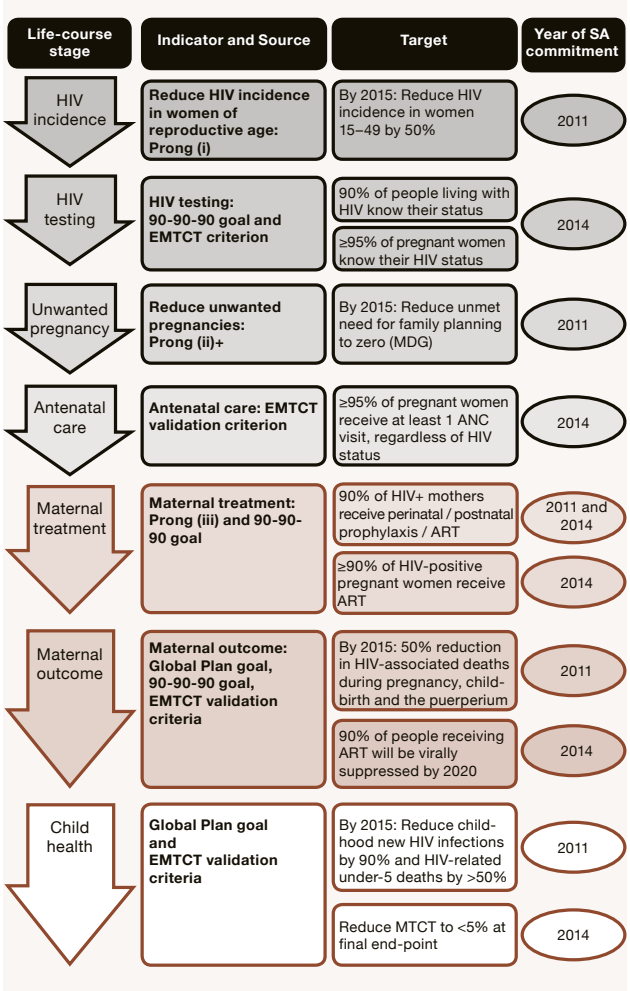
Between 2008 and 2016, quality improvement (QI) at facility and district levels played a role in the rapid and effective scale-up of the PMTCT programme following the success of QI demonstration projects pre-2008.[19] In 2008, the national PMTCT accelerated plan (A-plan) was launched. The aim was to reduce MTCT from 12% in 2008 to less than 5% by 2011, in accordance with the National Strategic Plan 2007–2011.[20,21] The QI approach was bottom-up: facility staff were engaged to focus on data-driven decision-making, system integration and change management, which culminated in building of capacity and leadership at facility, district, provincial and national levels.[22] The use of QI methods resulted in rapid progress in achieving effective national-scale implementation of PMTCT interventions across a large range of different geographic and socio-economic contexts, with varying HIV prevalence rates.[22]

The systematic use of data to monitor and evaluate the PMTCT programme was part of the QI approach,[23] and has been achieved using laboratory data from the National Health Laboratory Services (NHLS),[24] routine data captured by the South African public health sector using the District Health Information Software (DHIS),[25] and population-based data derived from surveys conducted by the South African Medical Research Council (SAMRC).[26,27]

Since 2011, using bottleneck analysis, colour-coded dashboards, QI tools/methodology, and building up from facility and district level, a National Prevention of PMTCT Action Framework (2011–2015) has been implemented, striving for continuous improvement based on data monitoring.[23] Selected PMTCT indicators are used to monitor integration and to track quarterly progress through the 'Data for Action' reports at national, provincial and district levels.

Key activities of the framework include improving the rates of HIV counselling and testing for all pregnant and lactating women (including ongoing repeat testing for HIV-negative women during pregnancy and breastfeeding); improving linkages to ART treatment, care and support services; scale-up of laboratory diagnostics; and improving the use of data for action at decentralised levels.

Figure 2: Global PMTCT targets adopted by South Africa, 2011–2014



In 2014, South Africa committed to the 90-90-90 Strategy, which aims to ensure that 90% of people living with HIV know their status, 90% of HIV-positive people receive ART, and 90% of people receiving ART are virally suppressed by 2020.[28] Figure 2 summarises South Africa's PMTCT-related commitments over the past five years.

Monitoring PMTCT impact in South Africa

Four main methods have been used to monitor PMTCT impact in South Africa, namely reviewing routine laboratory data, reviewing the District Health Information Software (DHIS), and conducting surveys and modelling.

Using routine laboratory data to monitor PMTCT effectiveness

The NHLS Corporate Data Warehouse (CDW) stores laboratory data for all pathology tests performed in the public sector, representing data for approximately 80% of the South African population.[29] The CDW has been used for real-time monitoring of infant HIV testing coverage, early (<6 weeks postpartum) MTCT, progress with birth HIV testing, and to fast-track children into care (see Table 1 and Figure 3).

Table 1: Laboratory-based monitoring of MTCT in South Africa, 2012–2016

Use of NHLS CDW	Findings
To track national coverage of early infant HIV diagnosis	2012 coverage rate 72.6% 2014 coverage rate 87.0%
To track early MTCT	2012 early MTCT rate 2.4% 2015 early MTCT rate <1.8%
To track progress with birth PCR testing	2016 CDW data demonstrate that the national coverage of birth testing was 87.3% and the in-utero transmission rate was 1.0%, with an average of 196 neonates infected per month.
To fast-track HIV-positive children into care	Weekly HIV PCR 'Results for Action' reports collate HIV PCR results in real-time for a facility or district, and are distributed weekly to the responsible healthcare worker to fast track HIV PCR-positive children into care.

Source: Sherman et al., 2014,[24] Sherman et al., 2017.[29]

The CDW data lack unique identifiers; thus some individuals are possibly counted more than once, making it difficult to determine the number of patients tested and the true MTCT risk, and to conduct cohort monitoring using laboratory data.

Laboratory assays have been used to measure HIV incidence; however, these measurements are largely retrospective using historical samples, and are not real-time. Limitations include the need for large sample sizes, the influence of ART in interpretation of results, variable mean durations of recent infection, and false recent rates.[30]

Using routine DHIS data to monitor PMTCT effectiveness

The *District Health Barometer* (DHB), an annual publication of the Health Systems Trust since 2005, synthesises key indicators across a variety of health areas at provincial and district levels.[25] The PMTCT-related indicators reflect two PMTCT prongs, namely:

- Couple year protection rate[a] (prong (i));
- Antenatal client initiated on ART rate[a] (prong (iii) and the 90-90-90 targets);
- Infant first test around 6–10 weeks uptake and positivity rates (prong (iii) and EMTCT validation criteria).

In addition, three other PMTCT-related indicators (see Figure 2) are also measured:

- Mother's 1st postnatal visit before 6 days rate;[a]
- Antenatal first visit before 20 weeks rate;[a]
- Maternal mortality in facility ratio (relates to the overall aim of the Global Plan);

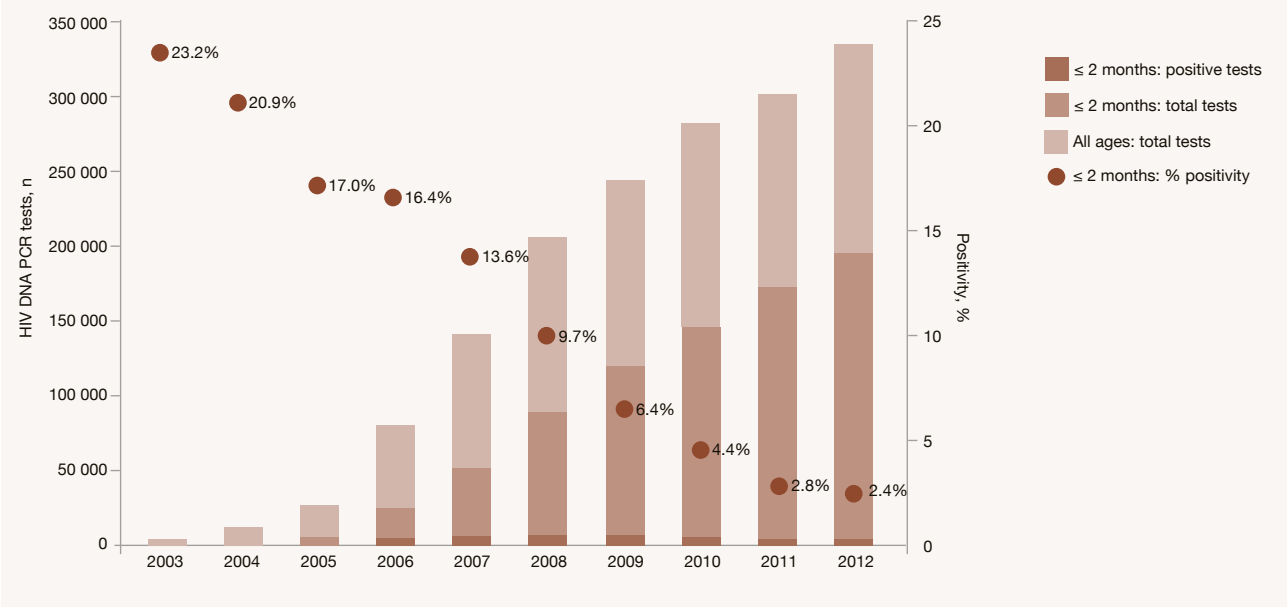
No routine indicators are available to monitor:

- HIV incidence among women of reproductive age (prong (i));
- Unplanned pregnancy and unmet need for family planning (prong (ii));
- HIV testing uptake among pregnant women or women of reproductive age (prong (iii))
- HIV-related under-5 deaths (Global Plan goal);
- Retention in care at 6 and 12 months postpartum;
- Postnatal transmission rates in infants.

The 2016/17 data, drawn from the DHIS, demonstrate an increase in antenatal 1st visit before 20 weeks rate, an increase in ART uptake, an increase in the couple year protection rate, a persistently low MTCT at 6–10 weeks, and increasing uptake of first postnatal visit within 6 days rate (Table 2).[25]

a Note: the term 'rate' is used as this is the name of the indicator in the DHIS. It does not imply statistical analyses relating to time.

Figure 3: Uptake of infant HIV DNA PCR tests and percentage HIV-positivity using routine laboratory data in South Africa, 2003–2012



Note: Data from KwaZulu-Natal are not included for 2003–2005.

Source: Sherman et al., 2014.[24]

Table 2: Key indicators drawn from the DHIS, South African National Department of Health, 2014–March 2017

Indicator	FY 2014/15	FY 2015/16	FY 2016/17*	FY 2016/17 Target	Scoring **
Antenatal 1st visit before 20 weeks: Numerator: Antenatal 1st visit before 20 weeks Denominator: Antenatal 1st visits, total	53.8%	61.2%	65.5%	60%	
Antenatal client initiated on ART rate: Numerator: Antenatal client initiated on ART Denominator: Antenatal client eligible for ART	91.2%	93.0%	94.3%	95.5%	
Couple year protection rate (annualised): Numerator: Contraceptive years dispensed Denominator: Population 15–49 years female	63.4%	66.7%	69.4%	63%	
Infant 1st PCR test positive around 10 weeks rate (prior to 2016/17 use 6 weeks): Numerator: Infant 1st PCR test positive around 6 weeks Denominator: Infant 1st PCR test around 6 weeks	1.5%	1.5%	1.5%	1.4%	
Mother postnatal visit within 6 days rate: Numerator: Mother postnatal visit within 6 days of delivery Denominator: Delivery in facility total	72.8%	68.5%	69.4%	75%	

Note: *Data from April–October 2016, i.e. not for a full financial year (FY).
** Based on revised definition in line with international guidelines.
Blue shading denotes attainment of the national target in the 2016/17 Annual Performance Plan (APP); grey shading indicates measurements just below the national target.

Source: DHIS, National Department of Health (NDoH).

In 2015/16, 13 districts (25%) had ART initiation rates less than 90%, which is one of the global EMTCT process indicator targets.[31]

The DHB presents indicators by socio-economic quintile (SEQ). Nationally, in 2015/16 there was little gradient in the uptake of antenatal client ART initiation by socio-economic quintile, with uptake ranging from 91.5% in the least-deprived quintile to 94.6% in the most-deprived quintile.[32] Although no confidence intervals (CIs) are provided, the uptake among quintiles is quite close, illustrating that equity is being achieved for this indicator.

Routine data obtained through the DHIS facilitate monitoring of national, provincial and district-level progress; however, limitations include the aggregate nature of the data, reliance on correct capturing and relay of information between different levels of the healthcare system, and denominator estimations resulting in more than 100% uptake on some indicators. Additionally, the routine DHIS data cannot currently be used to monitor cohorts of mothers and their children, as there is no unique identifier linking mothers and their children across different levels of care and facilities.

Using national surveys to monitor PMTCT effectiveness

Three nationally and provincially representative South African PMTCT Evaluations (SAPMTCTEs) have been undertaken. Conducted in 2010, 2011–2012 and 2012–13, these surveys measured six-week MTCT as 3.5% (95% CI: 2.9–4.1%), 2.7% (95% CI: 2.1–3.2%) and 2.6% (95% CI: 2.0–3.2%), respectively.[26,27]

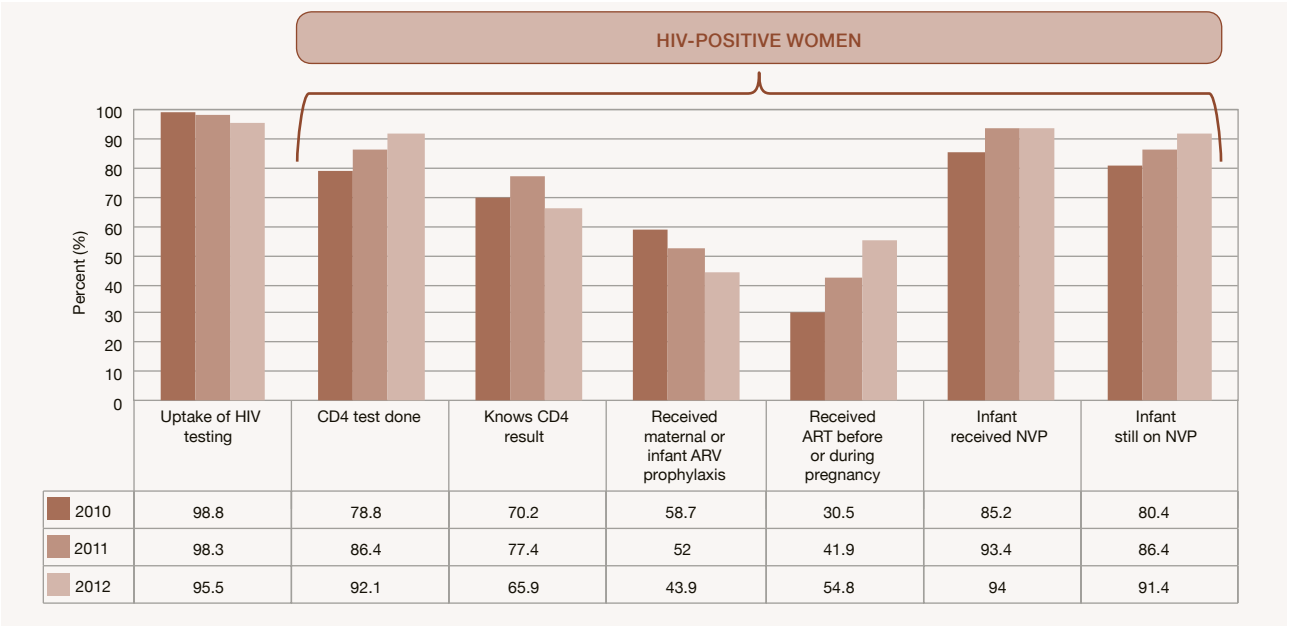
The surveys gathered PMTCT coverage data and demonstrated >95% antenatal HIV testing uptake; >92% uptake of CD4 cell count testing; increased ART uptake with concomitant decrease in ARV prophylaxis; and increased uptake of infant NVP (Figure 4).[26,33]

Additional analyses of survey data yielded nationally representative information on several PMTCT prongs and main outcomes:

- HIV incidence (prong (i)) was measured as 3.3% (2.8–3.8%) among HIV-negative mothers.[34]
- Unplanned pregnancy (prong (ii)) was reported in 56–64% of mothers at six weeks post-delivery.[27]
- Early MTCT was reported as 1.2% in mothers who initiated ART during or before the first trimester of pregnancy.[26]
- Providing two or fewer staff per facility for HIV testing was associated with an increase in early MTCT.[35]
- Uptake of infant HIV testing (prong (iii)): 35% of HIV-positive mothers intended to request EID at the six-week immunisation visit.[36]
- Adolescents had three times lower uptake of PMTCT interventions and three times higher incidence of early MTCT than adults 20 years or older.
- Cumulative 18-month MTCT was 4.3% (3.7–5.0%).[37]
- Cumulative 'MTCT-or-death' (as a combined outcome) was 6.3% (5.5–7.3%).[37]
- 81% of the cumulative 18-month MTCT and 67% of 'MTCT-or-death' occurred by six months postpartum.[37] Thus the first six months is a critical period for infant HIV prevention, early HIV detection, and paediatric treatment initiation.

Synthesis of these results shows that the main characteristics associated with poor access to care or MTCT include being a teenage mother; discrimination reported by the mother; poor or late ARV uptake; not knowing a partner's HIV status; late antenatal care booking; and limited maternal education/knowledge. These surveys did not measure maternal viral load.

Figure 4: Weighted uptake of HIV testing amongst all women, and along the PMTCT cascade among self-reported HIV-positive women in South Africa, 2010-2013



	Uptake of HIV testing	CD4 test done	Knows CD4 result	Received maternal or infant ARV prophylaxis	Received ART before or during pregnancy	Infant received NVP	Infant still on NVP
2010	98.8	78.8	70.2	58.7	30.5	85.2	80.4
2011	98.3	86.4	77.4	52	41.9	93.4	86.4
2012	95.5	92.1	65.9	43.9	54.8	94	91.4

Source: South African Medical Research Council, 2016;[26] 2015.[27]

Although surveys have been used successfully, limitations include:

- The need for a large sample size to obtain information that is nationally and provincially representative;
- The high cost and complexity of implementation, requiring national systems for successful fieldwork implementation;
- Surveys do not necessarily build routine monitoring and evaluation systems.

Using modelling to monitor PMTCT Effectiveness

In the absence of survey data or accurate routine laboratory or DHIS data, modelling has been used to track PMTCT progress. According to the 2015 African HIV Spectrum Estimates, South Africa has reached almost all targets outlined in the Global Plan for EMTCT, with the final MTCT rate estimated to be 2.0% at 18 months and 1.4% at six weeks.[38] Although helpful, modelling has several limitations: the outputs are only as valid as the data and assumptions that go into models, and inputs often rely on suboptimal quality or incomplete routine data, which compromise the quality of the final result.

Impact of PMTCT in South Africa: Summary of data obtained using laboratory systems, DHIS, surveys and modelling

Data demonstrate marked progress in achieving prong (iii) and (iv) targets, but slow progress in achieving prong (i) and (ii) targets. Data on reducing HIV incidence is difficult to obtain in South Africa, and we tend to use population-level estimates obtained from the Thembisa and Spectrum models. In 2014, modelled estimates gave the number of new infections nationally among women of reproductive age in 2014 as 160 000 (150 000–180 000).[38]

Data are scarce on unmet need for family planning (prong (ii)). However, all three SAMRC surveys reported more than 50% of women as saying that their pregnancy was unplanned.[33] Regarding prong (iii), early MTCT (six weeks postpartum) decreased from 5.8% in 2009 to 1.5% in 2014/15 (Figure 5). Despite the decreasing early MTCT, high maternal HIV prevalence led to significant numbers of children still being infected; consequently, the number of paediatric HIV infections per 100 000 live births is above the elimination target (<50 new paediatric HIV infections through MTCT per 100 000 live births), exceeding this by five- to ten-fold.

As indicated in the sections above, data from the SAMRC surveys[26,27] and from the DHIS[25] demonstrate increased ART access, with attainment of the national target and the 90-90-90 target on ART access. However, data on virological suppression among pregnant and lactating women following increased ART access are not readily available.

Key EMTCT challenges in South Africa

Although significant MTCT reductions have occurred in South Africa (Figure 5), challenges exist around PMTCT implementation, drug availability and impact monitoring.[39] Implementation challenges have been discussed at provincial and national EMTCT stock-taking meetings, and 13 main bottlenecks identified. These have been categorised according to the WHO's health system building blocks:[12]

Health workforce:

1 Suboptimal implementation of family planning

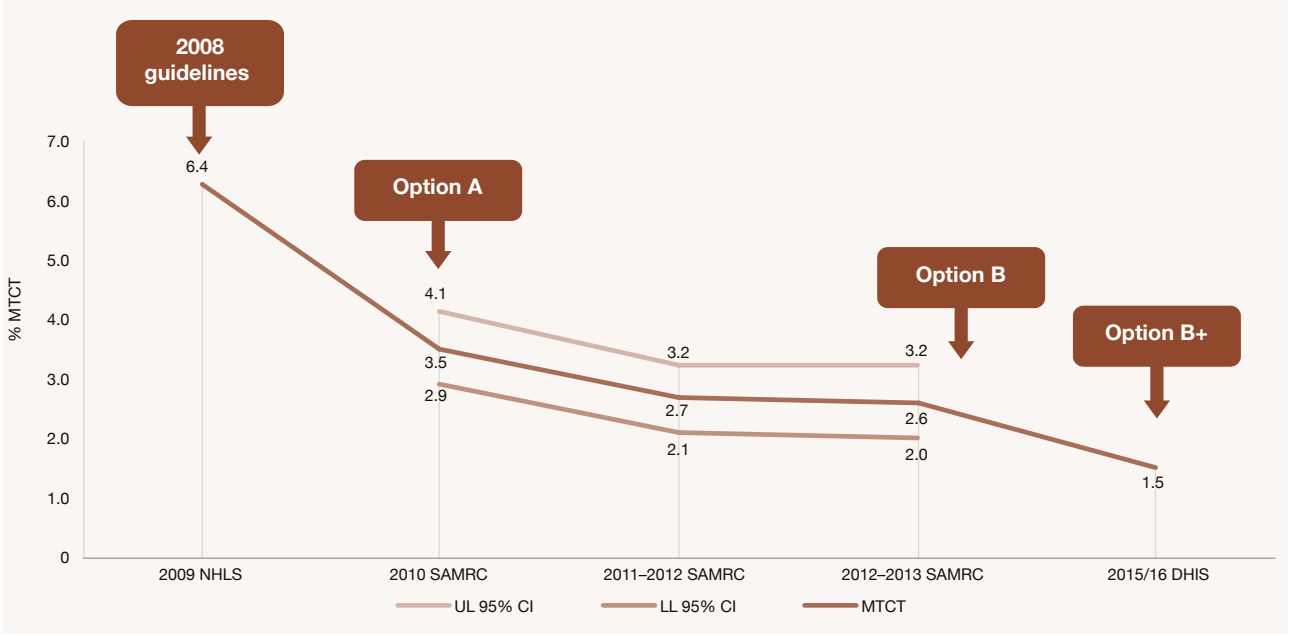
2 Suboptimal quality of infant dried-blood-spot specimens

3 Poor use of data and QI approaches at facility level.

Medical products/technologies:

4 Stock-outs of ARV drugs in 2013/14.

Figure 5: Trends in early MTCT in South Africa, 2009–2014/15[a]



Information and research:

5 Lack of routine data to monitor postnatal PMTCT effectiveness, until the end of breastfeeding

6 Tools (registers and tally sheets) not aligned with the new guidelines.

Service delivery:

7 Late antenatal care booking after 20 weeks

8 Low coverage for ART initiation of HIV-positive pregnant women in some districts

9 Suboptimal repeat testing for HIV-negative pregnant and breastfeeding women in some districts

10 Poor integration of family planning and HIV activities into antenatal care and postnatal services

11 Lack of focused programmes to reach adolescents and young people

12 Suboptimal postnatal mother-infant follow-up and infant-feeding counselling

13 Suboptimal community outreach mechanisms, including tracking of mothers and infants, and suboptimal community engagement.

The Last Mile Plan for EMTCT

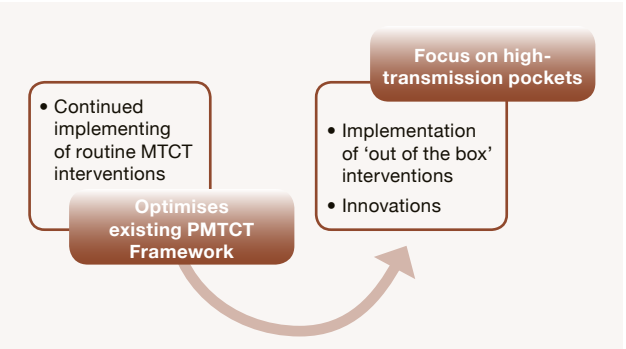
In light of these key bottlenecks, the NDoH has developed a 'Last Mile Plan for EMTCT' in South Africa.[40]

The plan highlights the critical need to reach the 'unreached'; to ensure that all women and their partners receive quality sexual and reproductive health education and services, and that all children receive comprehensive child-health services so as to improve overall health and development. Consequently, a dual approach has been adopted (Figure 6) to:

1 optimise the implementation of high-impact interventions to prevent MTCT, and optimise maternal and child health (MCH) outcomes along the continuum of care from the antenatal to the postnatal period, with scale and quality, across all provinces, districts and facilities (regardless of MTCT rates, HIV counselling and testing and ART rates);

2 intensify postnatal tracking of, and support for, mothers and babies in 'targeted' and 'hot spot' districts at facility level in order to understand leaks in the PMTCT continuum of care/cascade in real time and to implement tailored actions and responses.

Figure 6: The dual approach adopted in the Last Mile Plan for EMTCT in South Africa, 2014



a We are grateful to the South African Medical Research Council for providing and compiling this information for the purposes of this chapter using a multitude of data sources as indicated in Figure 5.

Several game-changers have been identified in the Last Mile Plan for EMTCT.[40] Each author of this chapter prioritised these and other potential game-changers individually, using a Likert scale. The top eight game-changers identified during this process are listed in Table 3.

Table 3: Eight potential key game-changers to increase PMTCT effectiveness

Game-changers	
1	Strengthening services for safe-sex and family planning (pre-conception, and throughout pregnancy and breastfeeding (BF))
2	Strengthening repeat HIV testing amongst HIV-negative persons of reproductive age at high risk of HIV (pre-conception and through pregnancy, delivery and BF)
3	Early ART initiation for HIV-positive women and their infected family members, in accordance with revised guidelines
4	Viral-load testing (pre-conception, and through pregnancy, delivery and BF), with immediate action for high-risk mothers
5	Strengthening postnatal retention in care, with involvement of community linkages and ward-based outreach teams
6	Implementing a unique identifier to facilitate real-time routine monitoring
7	Real-time tracking of HIV-positive women and their infants
8	Mentoring and supportive supervision of key healthcare providers

The way forward

Various data sources exist in South Africa to assess progress in attaining the Global Plan, EMTCT and 90-90-90 targets, and to measure PMTCT effectiveness. Additionally, close collaboration exists between programmatic and research institutions to monitor PMTCT progress and EMTCT.

EMTCT is a complex health intervention involving mothers and infants at all levels of the healthcare system and affected by the actions of their partners (through their HIV status) and other members of the community (through stigmatisation and discrimination). As such, structural and health-system factors that facilitate or hinder implementation must be examined.

Given South Africa's response to PMTCT in the context of maternal and child health over the past 15 years (Table 4), we hypothesise a high likelihood of further success with EMTCT if gaps are addressed and key game-changers are implemented.

Table 4: South Africa's response to eliminating MTCT

WHO building block 1: Leadership/governance	
1	The highest level of government, including the Minister of Health, has committed to the Last Mile Plan for EMTCT.
2	Leadership is encouraged at all levels of the healthcare system.
WHO building block 2: Healthcare financing	
3	All the essentials of the PMTCT and EMTCT programmes have been self-funded from the public sector without reliance on donor funding for essential commodities and supplies, e.g. drugs.
4	Collaborating partners have made clinic-based mentoring and national surveillance possible.
WHO building block 3: Health workforce	
5	South Africa is investing in Ward-based Outreach Teams, District Clinical Specialist Teams, support staff (mother mentors) and community workers to bolster the health workforce.
WHO building block 4: Medical, products, technologies	
6	Although drug stock-outs have occurred, the 'Stop Stock-out' coalition monitors trends closely and informs the National Department of Health to facilitate quick resolution.
WHO building block 5: Information and research	
7	Close collaborations with districts, partners, laboratories and research organisations have enabled monitoring of key PMTCT indicators and sharing with key groups.
WHO building block 6: Service delivery	
8	Key priorities have been identified, such as family planning, adolescent services and integration between HIV-related care and antenatal and postnatal care.

Conclusions

Since the scale-up of PMTCT interventions in 2002, South Africa has walked a straight and focused path, guided by evidence in an attempt to optimise EMTCT interventions for all people. This is exemplified in the recent 'Last Mile Plan'. These steps have resulted in remarkable gains in reducing early MTCT and keeping mothers healthy; however, several gaps exist specifically relating to postnatal follow-up and measuring long-term PMTCT effectiveness.

The eight game-changers listed should be discussed at national, provincial and district levels, with prioritisation exercises to guide future investments at each level, and in specific 'hot spots' where HIV transmission is particularly high. This will facilitate intensified implementation of targeted interventions, as and where they are most needed. Additionally, and most importantly, eliminating MTCT must be aligned with strategies that aim to improve the overall health of women, children and adolescents, allowing them to 'survive, thrive and transform'.

References

1 Medley A, Garcia-Moreno C, McGill S, Maman S. Rates, barriers and outcomes of HIV serostatus disclosure among women in developing countries: implications for prevention of mother-to-child transmission programmes. Bull World Health Organ. 2004;82:299–307.

2 World Health Organization. Strategic approaches to the prevention of HIV infection in children: Report of a WHO meeting, Morges, Switzerland, 20–22 March 2002. [Internet]. [cited 25 March 2017]. URL: http://www.who.int/hiv/pub/mtct/en/StrategicApproachesE.pdf

3 World Health Organization. Prevention of HIV in Infants and Young Children: Review of Evidence and WHO's Activities. 2002. [Internet]. [cited 26 March 2017]. URL: http://www.who.int/hiv/mtct/ReviewofEvidence.pdf

4 World Health Organization. Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants: towards universal access. Recommendations for a public health approach. 2006 revision. [Internet]. [cited 12 December 2016]. URL: http://www.who.int/hiv/pub/mtct/arv_guidelines_mtct.pdf

5 World Health Organization. Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants: towards universal access. Recommendations for a public health approach. 2010 revision. [Internet]. [cited 1 December 2016]. URL: http://www.who.int/hiv/pub/mtct/arv_guidelines_mtct.pdf

6 World Health Organization. Use of Antiretroviral Drugs for Treating Pregnant Women and Preventing HIV Infection in Infants. 2012. [Internet]. [cited 18 April 2012]. URL: http://www.who.int/hiv/pub/mtct/programmatic_update2012/en/

7 UNAIDS. Political Declaration on HIV and AIDS. 2011. [Internet]. [cited 12 December 2016]. URL: http://www.unaids.org/sites/default/files/sub_landing/files/20110610_UN_A-RES-65-277_en.pdf

8 World Health Organization. Elimination of mother-to-child transmission (EMTCT) of HIV and syphilis: Global guidance on criteria and processes for validation. 2014. [Internet]. [cited 12 December 2016]. URL: http://www.who.int/hiv/pub/emtct-validation-guidance/en/

9 UNAIDS. Global plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: UNAIDS; 2011. [Internet]. [cited 12 December 2016]. URL: http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2011/20110609JC2137_Global-Plan-Elimination-HIV-Children_en.pdf

10 Buse K, Hawkes S. Health in the sustainable development goals: ready for a paradigm shift? Global Health. 2015;11:13.

11 Kashitala J, Nyambe N, Mwalo S, et al. Is Male Involvement in ANC and PMTCT Associated with Increased Facility-Based Obstetric Delivery in Pregnant Women? Afr J Reprod Health. 2015;19(2):17–24.

12 World Health Organization. Everybody's business: Strengthening Health Systems to improve Health Outcomes: WHO's Framework for Action. 2007. [Internet]. [cited 28 January 2017]. URL: http://www.who.int/healthsystems/strategy/everybodys_business.pdf

13 Barron P, Pillay Y, Doherty T, et al. Eliminating mother-to-child HIV transmission in South Africa. Bull World Health Organ. 2013;91:70–4.

14 South African National Department of Health. Protocol for providing a comprehensive package of care for the prevention of mother-to-child transmission of HIV (PMTCT) in South Africa. 2001. [Internet]. [cited 12 June 2015]. URL: http://www.law-lib.utoronto.ca/Diana/TAC_case_study/Protocol.html

15 South African National Department of Health and SANAC. Clinical Guidelines: PMTCT. 2008. [Internet]. [cited 31 March 2017]. URL: http://i-base.info/htb/1815

16 South African National Department of Health and SANAC. Clinical Guidelines: PMTCT (Prevention of Mother-to-Child Transmission). 2010. [Internet]. [cited 12 December 2016]. URL: http://www.fidssa.co.za/images/PMTCT_Guidelines.pdf

17 South African National Department of Health. The South African Antiretroviral Treatment Guidelines 2013: PMTCT Guidelines, revised March 2013. [Internet]. [cited 12 December 2016]. URL: http://www.doh.gov.za/docs/policy/2013/ART_Treatment_Guidelines_Final_25March2013.pdf.

18 South African National Department of Health. National consolidated guidelines for the prevention of mother-to-child transmission of HIV (PMTCT) and the management of HIV in children, adolescents and adults. 2015. [Internet]. [cited 12 December 2016]. URL: http://www.sahivsoc.org/upload/documents/HIV%20guidelines%20_Jan%202015.pdf

19 Doherty T, Chopra M, Nsibande D, Mngoma D. Improving the coverage of the PMTCT programme through a participatory quality improvement intervention in South Africa. BMC Public Health. 2009;9:406.

20 South African National Department of Health. The National Strategic Plan on HIV, STIs and TB, 2012–2016. [Internet]. [cited12 December 2016]. URL: www.info.gov.za/view/DownloadFileAction?id=155622.

21 Mate K, Barker P. A quality improvement model for the rapid scale-up of a program to prevent mother-to-child HIV transmission in South Africa. Int J Qual Health Care. 2013;25(4):373–80.

22 Barker P, Barron P, Bhardwaj S, Pillay Y. The role of quality improvement in achieving effective large-scale prevention of mother-to-child transmission of HIV in South Africa. AIDS. 2015; July(29):S137–43.

23 Bhardwaj S, Barron P, Pillay Y, et al. Elimination of mother-to-child transmission of HIV in South Africa: Rapid scale-up using quality improvement. S Afr Med J. 2014;104(3):Suppl1:239–43.

24 Sherman G, Lilian R, Bhardwaj S, Candy S, Barron P. Laboratory information system data is useful for monitoring the prevention of mother-to-child transmission programme (PMTCT) in South Africa. S Afr Med J. 2014;104(3)(Suppl 1)):235–8.

25 Massyn N, Peer N, Padarath A, Barron P, Day C, editors. District Health Barometer 2014/15. Durban: Health Systems Trust; 2015. [Internet]. [cited 27 January 2017]. URL: http://www.hst.org.za/publications/district-health-barometer-201415-1

26 Goga A, Dinh T, Jackson D, et al. Population-level effectiveness of maternal antiretroviral treatment initiation before or during the first trimester and infant antiretroviral prophylaxis on early mother-to-child transmission of HIV, South Africa: Implications for eliminating MTCT. J Glob Health. 2016. [Internet]. [cited 23 January 2017]. URL: http://www.jogh.org/documents/issue201602/jogh-06-020405.pdf

27 Goga A, Dinh T, Jackson D, et al. First population-level effectiveness evaluation of a national programme to prevent HIV transmission from mother to child, South Africa. J Epidemiol Community Health. 2015;69:240–8.

28 UNAIDS. 90-90-90: An ambitious target to help end the AIDS epidemic. 2014. [Internet]. [cited 27 January 2017]. URL: http://www.unaids.org/en/resources/documents/2014/90-90-90

29 Sherman G, Haeri Mazanderani A, Barron P, et al. Towards Elimination of Mother to Child Transmission in South Africa: How Best to Monitor the PMTCT Program. J Glob Health. 2017 (in press).

30 Puren A, Simbarashe T. HIV estimates for South Africa: update on laboratory methods and post test algorithms. In: National Institute for Communicable Diseases SA. Communicable Diseases Surveillance Bulletin. 2012. [Internet]. [cited 23 March 2017]. URL: http://www.nicd.ac.za/assets/files/HIV%20incidence%20estimates%20for%20SA.pdf

31 Massyn N, Peer N, English R, Padarath A, Barron P, Day C, editors. District Health Barometer 2015/16. Durban: Health Systems Trust; 2017. [Internet]. [cited 31 March 2017]. URL: http://www.hst.org.za/sites/default/files/Complete_DHB_2015_16_linked.pdf

32 Chirinda W, Singh Y. Antenatal client initiated on ART rate. In: Massyn N, Peer N, English R, editors. District Health Barometer 2015/16. Durban: Health Systems Trust; 2016. [Internet]. [cited 31 March 2017]. URL: http://www.hst.org.za/sites/default/files/Complete_DHB_2015_16_linked.pdf

33 Goga A, Jackson D, Lombard C, Singh M, for the SAPMTCTE study group. Early (4–8 weeks post-delivery) Population-level Effectiveness of WHO PMTCT Option A, South Africa, 2012–13. [Internet]. [cited 12 December 2016]. URL: http://www.mrc.ac.za/healthsystems/SAPMTCTEReport2012.pdf

34 Dinh T, Delaney K, Goga A, et al. Impact of maternal HIV seroconversion during pregnancy on early mother to child transmission of HIV (MTCT) measured at 4–8 weeks postpartum in South Africa 2011–2012: A national population-based evaluation. PLoS One 2015; e-pub/doi:10.1371/journal.pone.0125525

35 Woldesenbet S, Jackson D, Lombard C, et al. Structural Level Differences in the Mother-to-Child HIV Transmission Rate in South Africa: A Multilevel Assessment of Individual-, Health facility-, and Provincial- Level Predictors of Infant HIV Transmission. J Acquir Immune Defic Syndr. 2017. doi:10.1097/QAI.0000000000001289, e-publication ahead of print.

36 Woldesenbet S, Jackson D, Goga A, et al. Missed opportunities for early infant HIV diagnosis: Results of a national study in South Africa. J Acquir Immune Defic Syndr. 2015;68(3):26–32.

37 Goga A, Jackson D, Lombard C, et al. Highest risk of mother-to-child transmission of HIV or death in the first 6 months postpartum: results from 18 month follow-up of an HIV-exposed national cohort, South Africa. Abstract number: A–792–0314–06477. AIDS. 2016. [Internet]. [cited 24 March 2017]. URL: http://programme.aids2016.org/Abstract/Abstract/6477

38 UNAIDS. Global Plan progress report. 2015. [Internet]. [cited 24 March 2017]. URL: http://www.emtct-iatt.org/wp-content/uploads/2015/12/UNAIDS-2015-ProgressReport-on-the-Global-Plan.pdf

39 Médecins Sans Frontières, South African HIV Clinicians Society, Section27, RuDASA, TAC, Rural Health Advocacy Project. Stockouts in South Africa: Second Annual Report. 2014. [Internet]. [cited 27 March 2017]. URL: http://stockouts.org/uploads/3/3/1/1/3311088/stockouts_2014_final_online.pdf

40 South African National Department of Health. The Last Mile Plan for EMTCT. 2016. [Internet]. [cited 27 January 2017]. URL: http://www.emtct-thelastmile.co.za/

Twenty years of the female condom programme in South Africa: past, present, and future

14

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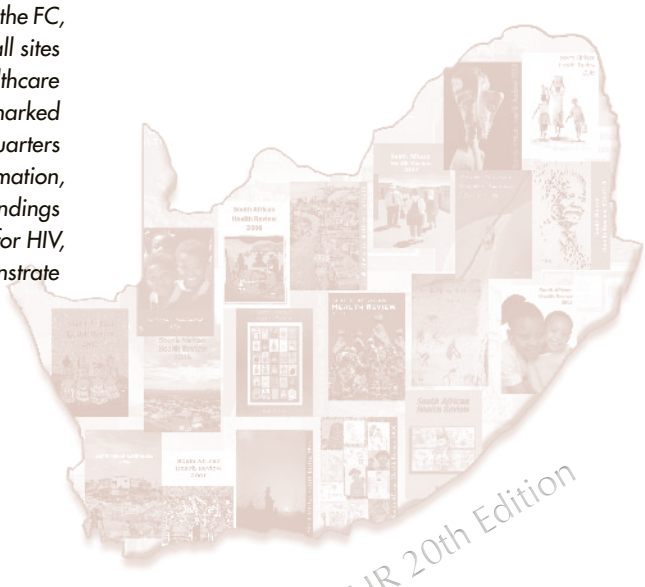
The female condom (FC) was introduced in South Africa in 1998, marking a parallel anniversary to this 20th edition of the South African Health Review. The FC programme has grown rapidly from a pilot phase to a national programme that is one of the largest government-funded FC programmes worldwide. Twenty-seven million FCs were distributed in South Africa in 2015/2016, exceeding the country's National Strategic Plan (NSP) target of 25 million annually by 2016.

The primary objective of this evaluation, conducted in 2014–2016, was to evaluate the national FC programme and identify determinants of FC uptake and continued use among couples. The study aimed to provide an evidence base for the future direction of South Africa's FC programme, and to identify health system, provider and client barriers and facilitators to FC uptake and continued use.

The evaluation included four components: a national survey in the public and private sectors consisting of interviews with providers and clients and an anonymous client survey; a cohort of new FC acceptors and their male partners; key informant interviews with policy and programme managers; and a unit-cost analysis of total programme costs.

Results indicated that nearly 90% of men and women interviewed had heard of the FC, and approximately 20% had used it. Although FCs were available at almost all sites surveyed, only two-thirds of clients knew that FCs were available at their healthcare facility. Female condom distribution has doubled since 2008, but there are marked differences across provinces. Provider interviews indicated that three-quarters of providers had been trained in FC provision, but most sites lacked information, education and communication (IEC) materials and demonstration models. Findings underscore the need to promote awareness of FC availability in South Africa for HIV, sexually transmitted infection (STI) and pregnancy prevention and also to demonstrate the pivotal role of the provider in delivering FCs to potential users.

The female condom programme has grown rapidly from a pilot phase to a national programme that is one of the largest government-funded female condom programmes worldwide.



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Introduction

The female condom (FC) is one of several under-used reproductive health technologies.[1] It has the potential to expand choice in reproductive health and family-planning programmes, add value to the method mix, and meet the diverse needs of clients.[2,3] It is key to increasing HIV protection options for women and men, and is the only woman-initiated HIV prevention barrier method. However, despite increased FC distribution globally, distribution remains significantly low compared with male condoms (MCs), accounting for only 0.19% of global condom procurement.[1]

South Africa has one of the largest, best-established, government-funded, public-sector male and female condom programmes worldwide. Launched in 1998, the pilot FC programme targeted a small number of sites in each province.[4,5] In the context of high HIV and unintended pregnancy rates, the programme was scaled up in phases; by 2014 the National Department of Health (NDoH) had made FCs available to all public-sector sites, expanded distribution to non-public sites, and added two new FC products. According to South Africa's National Strategic Plan (NSP),[6] 25 million FCs were to be distributed yearly by 2016, a goal that was exceeded by 2 million in 2016.

South Africa is one of many countries globally that are scaling up FC distribution; however, key knowledge gaps in programming remain, including limited data on public-sector programmes; lack of consensus regarding how FC success is operationalised; paucity of research on substitution of FCs for MCs; and limited, inconsistent and sporadic information about programmatic costs. A review of the progress and challenges to the MC and FC programme and condom research conducted in South Africa was published in 2012.[7]

The primary objective of this study was to evaluate the national FC programme and determinants of uptake, and continued use of FCs among couples. The study aimed to provide an evidence base for the future direction of South Africa's programme, and identify health system, provider and client barriers and facilitators to FC uptake and continued use. Knowledge gaps explored included variation of FC uptake across sites, gender dynamics of FC use, perspectives of long-term users, consistency of use, service-delivery challenges, a unit-cost analysis of total programme costs, and socio-cultural barriers to FC use. In addition, the availability of new FC products in South Africa provided the potential to assess the impact of parallel programming of more than one FC product. This was the first FC programme globally to undergo a comprehensive national evaluation and as such could help to maximise the effectiveness, efficiency and impact of scaling up FC delivery nationally, regionally and globally.

Evaluation design

The South African National FC Evaluation comprised four complementary, interrelated components, and used a mixed-methods approach.

Component 1 consisted of a telephone survey and review of distribution statistics from the District Health Information Software (DHIS). A sub-sample of sites participated in on-site assessments, client interviews (up to eight per site), provider interviews (two–three per site), and an anonymous client survey. Programmatic costing was conducted at selected sites in one province. Although the focus of the evaluation was on FCs, less detailed data on MCs were also collected in all components of the evaluation.

The national site evaluation sample included public- and non-public-sector sites. The public-sector health facilities sample comprised the existing national sexually transmitted infection (STI) sentinel surveillance sites, namely 30 sites per province (n = 270).[8] All sites were contacted to participate in the telephonic survey using a structured questionnaire, which was completed by the operational manager or his/her designee. We anticipated that approximately 75–80% of the 270 public-sector sites would be distributing FCs, and that approximately 50% of these sites would be sampled for the on-site assessment. The on-site assessment sample comprised of 12–13 sites per province. These were selected randomly according to the following categories:

- Location (rural, urban, peri-urban)
- Level of care (community health centre, primary health care (PHC) clinic)
- Well-established long-term distribution (>5 years) and newer sites (<2 years)
- Sites distributing different types of FC products; between 12 and 13 sites were selected per province.

The aim for the non-public-sector site target sample (n = 36) was to include one non-governmental organisation (NGO), one tertiary education institution, one social-marketing outlet, and one private-sector site in each province, randomly selected from a list of FC-distributing sites identified in every province. All sites were additionally asked to participate in the on-site assessment.

Providers were selected for interview on the day of on-site assessment in the public and non-public sector. In addition to the operational manager, one to two providers were randomly selected depending on the total staff complement. Clients were purposively selected on the basis of current or previous FC use.

Component 2, represented by a cohort study of 598 females who were new FC acceptors and a sub-sample of their male partners (n = 60) permitted longitudinal assessment of key outcomes related to FC and MC use, HIV-related behaviours, and relationship characteristics. New acceptors of the FC (including those who had 'ever used' FCs, but not used them in the last six months) in four facilities in KwaZulu-Natal (KZN) were identified by facility providers and asked if they would be interested in participating in the cohort study. Semi-structured in-person interviews were conducted at baseline, and follow-up interviews were conducted at one, six and 12 months for women and at one and 12 months for men.

Component 3 consisted of key informant (KI) interviews with policy-makers and programme managers who identified critical issues, such as overall programme leadership and co-ordination, training, supply and commodity security, advocacy, monitoring, and integration with other programmes. We purposively selected policy and programme managers at provincial and national level to ensure representation of a range of views on the FC.

In Component 4, a unit-cost analysis was conducted at eight sites in order to establish FC programme costs.[a]

a Data not presented in this chapter due to space limitations.

Figure 1 shows the number of sites and participants in each component of the South African National FC Evaluation Study.

Figure 1: National FC evaluation study components, 2014–2016

COMPONENT 1	COMPONENT 2
National Telephone Survey and Review of Distribution Statistics in FC Distribution Sites (n=256 public sector, 28 non-public sector)	**Cohort of New FC Acceptors** (n=598 at four sites in KwaZulu-Natal) Semi-structured interviews conducted at: Baseline (n=500) 1 month (=543) 6 months (n=509) 12 months (n=549)
In-depth Assessment of Sub-Sample of Survey Sites (n=114 public sector, 19 non-public sector sites from National Survey)	
Client Interviews (n=427 across sites) **Provider Interviews** (n=278 across sites)	**Male Partners of New FC Acceptors** (n=60 partners of female participants) Semi-structured interviews conducted at: Baselne (n=60) 12 months (n=58)
Anonymous Clent Survey (n=4 442)	
COMPONENT 3	**COMPONENT 4**
Key Informant Interviews with Policy-makers and Programme Managers (n=26)	**Programmatic Costing** (n=8 sites from In-depth assessment)

Study approvals

The study protocol, recruitment materials and instruments were approved by the Human Research Ethics Committee (HREC) at the University of the Witwatersrand. Permission was received from national, provincial and district Departments of Health and from individual sites participating in the evaluation. Written informed consent was obtained from all participants (aside from the anonymous survey). Consents and client interviews were conducted in participants' language of choice.

Key findings

Data were collected between 2014 and 2016. After verification of the sentinel surveillance sample within each province, we learnt that five sites were no longer functioning; an additional nine elected not to participate. Twenty-eight non-public-sector sites were included. Although an NGO distributing FCs was identified in each province, not all provinces had one of the other three categories that distributed FCs (tertiary education institution, social-marketing outlet, and private-sector site).

Government and donor commitment

The national condom programme has various sources of funding. Key informants reported that at national level the programme is funded primarily by national government, with additional support from international funders such as the US President's Emergency Plan for AIDS Relief (PEPFAR) and the United States Agency for International Development (USAID). At provincial level, participants reported that the programme is funded through a conditional grant.[b] Non-governmental organisations also received international funding.

Distribution and commodity management

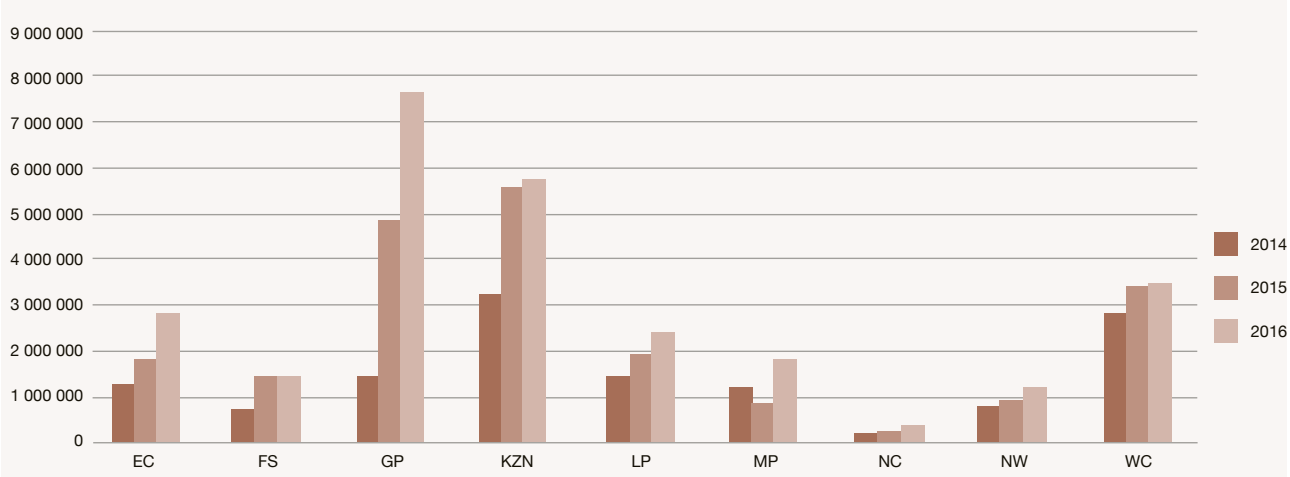
Key informants indicated that condom distribution targets are set at national level, and that these are divided into provincial and district targets. Population-distribution statistics and logistics-management systems are used to determine quantities of condoms required for distribution and storage per district, sub-district and facility.

Review of DHIS FC distribution data (which have only been collected since 2013) showed large increases in distribution over the three-year period (2013/14–2015/16), with many provinces doubling distribution over this time (Figure 2). This increase was also reported in the KI interviews, with targets exceeded in many areas. Overall, between 2015 and 2016, there was a 28% increase in distribution nationally, which was the largest increase of any contraceptive method available in South Africa in this time period.[9]

By comparison, MC distribution data from the DHIS showed increases in eight of the nine provinces between 2013/14 and 2014/15 (Figure 3). The Western Cape (WC) noted a small decline, also seen in the third year (2015/16), whereas four other provinces (KZN, Mpumalanga (MP), Northern Cape (NC), and North West (NW)) showed no change or small decreases in distribution between 2014/15 and 2015/16.

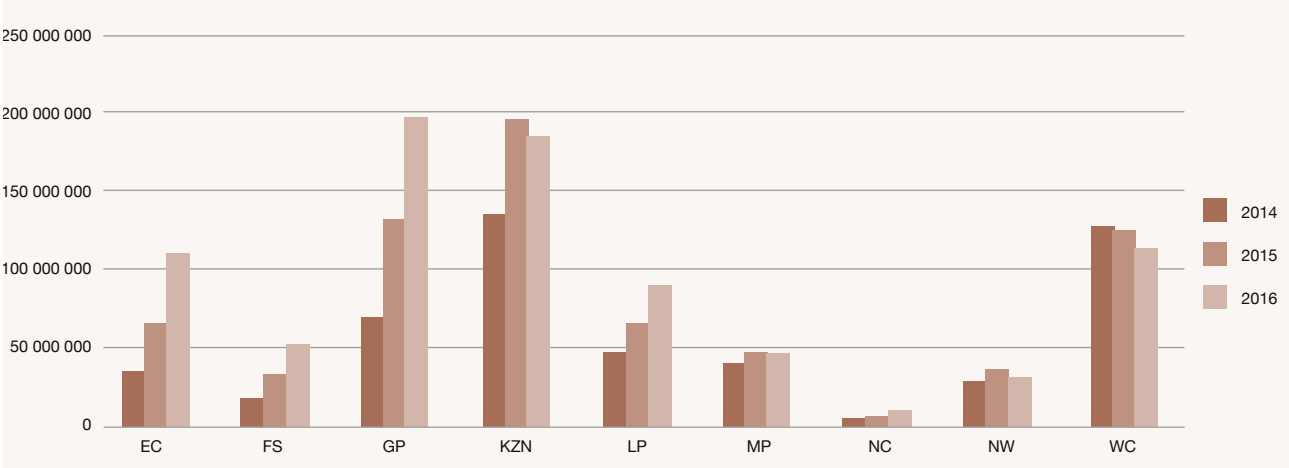
b A conditional grant is a system of allocation of funds from national level to a decentralised level (in this case provinces), set aside for support and encouragement of projects or specific and clearly defined expenditure.

Figure 2: Female condom distribution by province between 2013/2014 and 2015/2016



Source: DHIS.

Figure 3: Male condom distribution by province between 2013/2014 and 2015/2016



Source: DHIS

The telephonic site survey indicated that all public-sector sites had distributed FCs – 53.8% had distributed for more than five years, while 18.8% had commenced distribution within the last two years. Only a small proportion of sites (2.8%) had stock expire in the last year. Fourteen (4.9%) of the 284 sites reported stock-outs due to the following:

- depleted FC supply (n = 7);
- late ordering of FCs (n = 2);
- no demand for FCs and so staff did not re-order (n = 2);
- rumours that FCs were not being used for what they were intended, so staff did not re-order (n = 2); and
- one site identified itself as a non-designated FC distribution site.

Five of the 14 sites discontinued ordering and supplying FCs to clients, despite NDoH guidelines that FCs should be available at all sites.

Each site was asked to report its distribution figures for the same three-month period (February–April 2014). These data were then confirmed at the site visit and also checked on the DHIS. With 68 (57%) of the 114 public-sector sites participating in the on-site assessment, there was no agreement among the three data sources (telephone survey, site visit and DHIS) in at least one of the three months. Reasons for the discrepancy were mainly unknown or were assumed to be due to missing records. During data collection, some sites reported distribution box units rather than actual FC numbers, and they often did not report distribution if a box had not been emptied. Condom boxes are bulky and some sites did not have storerooms to accommodate condoms. Storage was noted as a challenge by almost half (49%) of the sites.

The most commonly distributed FC was FC2 (99%), followed by Cupid (34%) and Pleasure More (2%). Of the 23 sites experienced in distributing newly introduced FCs, only one site had all three FCs in stock on the day of the site assessment; 17 had two FC products, and five had one product in stock. Sites reporting only one FC product indicated that they had received a new product that replaced the one previously distributed.

Role of the provider in the female condom programme

Condom counselling and demonstration

Two-thirds (65.5%) of the 278 providers who completed the provider interview had been trained in FC counselling and demonstration compared with four-fifths (79.1%) who received MC training (Figure 4).

Figure 4: Provider training in FC/MC counselling and demonstration, and values clarification, National FC Evaluation Study, 2014–2016

In the last year, 66.7% of providers reported that they had never or rarely counselled/given FCs to men. In the last month, 39% of providers discussed FC use in one-on-one interactions with female clients compared with 61% who discussed MC use.

Thirty-seven percent of providers had ever used a FC. Provider technical knowledge on FCs was good; however, attitudes varied; 38% of providers thought FCs were 'weird', 28% thought they were inconvenient, and 42% thought they were messy.

Male condom availability was much higher than FC availability at all site distribution points, particularly in areas outside of consultation rooms, such as waiting areas (MC availability 80%, FC availability 62%). This means that FC uptake requires provider promotion and willingness to counsel and offer FCs to clients.

In the early years of the programme, FCs were primarily distributed from consulting rooms to ensure that new users were given counselling on use, and because of concerns about limited stock and that wider distribution would lead to stock-outs.[7] This mode of distribution is now shifting, with FCs being distributed at more accessible points at sites; however, some improvements are still required to mirror MC availability at sites.

Female condom promotion strategies: Availability and use of information, education and communication material

Ninety per cent of providers reported that clients were informed verbally about the availability of FCs and MCs. This may be due to lack of availability of IEC material, which was limited for both MCs and FCs (Figure 5). Although providers talked about FC leaflets and pamphlets, these were the manufacturers' instructions in the condom boxes.

Experience with new female condoms

Nearly all providers (96.3%) with experience in providing more than one FC thought it was important to increase FC choice. However, two-thirds of providers (66.0%) were concerned that if one type was more popular, they might run out of stock. Twenty-seven per cent worried that having different FCs available may confuse clients.

> *It's better to have two types of FCs for people to have choice and take the one they like most.*

Providers requested more product-specific training and IEC material for both themselves and the community. Key informants reported a shortage of MC and FC training manuals, and although most facilities (78%) had access to MC demonstration models (dildos), few had pelvic models for FC demonstration (22%).

Figure 5: How clients are informed about condom availability in the facility, National FC Evaluation Study, 2014–2016

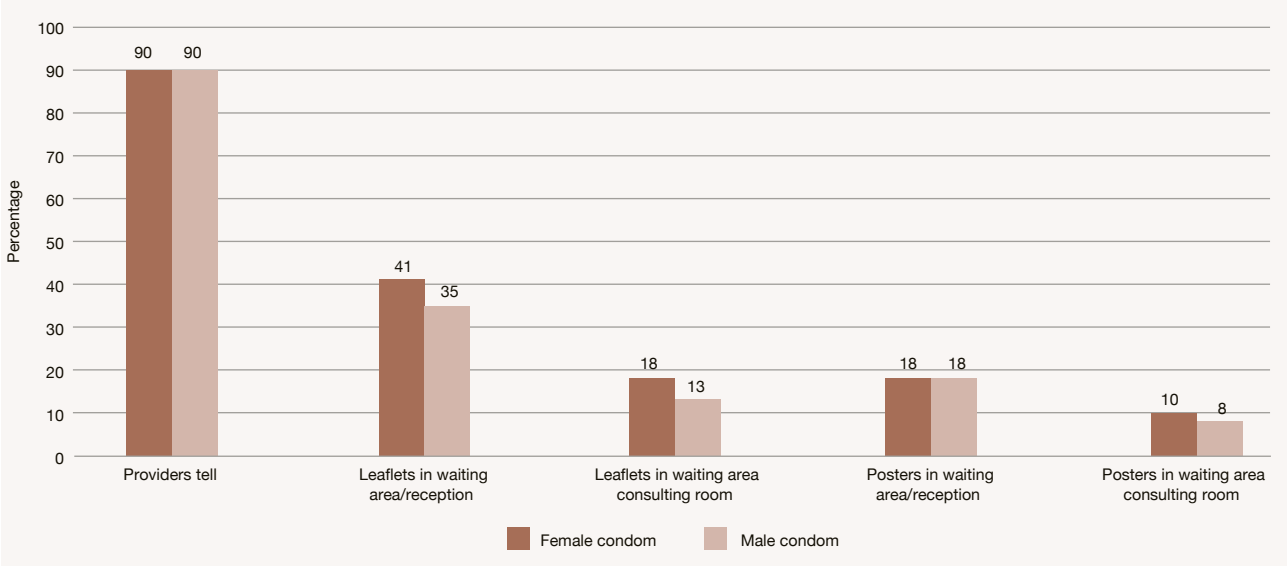
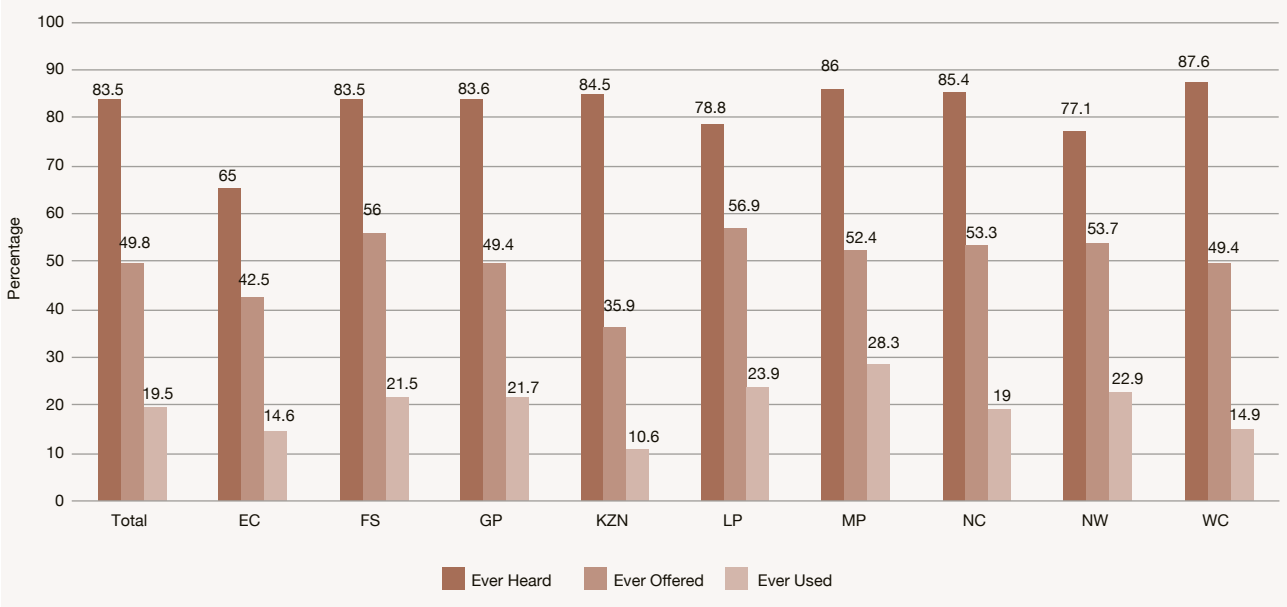


Figure 6: 'Ever heard of' FC, 'ever offered' FC and 'ever used' FC, by province, National FC Evaluation Study, 2014–2016



Client perspectives

Client anonymous survey

Of the 4 442 anonymous surveys completed, similar proportions of women (84%) and men (79%) had ever heard of FCs (Figure 6), and overall, 19.3% had ever used a FC; of these, two-thirds (65.5%) had used them for dual protection (pregnancy and STI/HIV prevention). Awareness of FCs has been increasing gradually and is now higher than reported in past national population-based surveys. In 2003, just over half of the women and men interviewed (53% and 56%, respectively) had heard of the FC.[10] Five years later, the National Human Sciences Research Council (HSRC) Communication Survey reported that 78% of women and 72% of men had heard of the FC.[11]

The level of FC 'ever used' was found to be considerably lower than the level of awareness, with wide variation in 'ever used' across the provinces, ranging from 10.6% in KZN to 28.3% in MP (Figure 6). These data can be compared with data collected in the 2008 National Communication Survey[11] which also found that 'ever used' FCs was the lowest in KZN at 3.3%. Two of the three best-performing provinces in 2008, Limpopo (LP) (11.4%) and MP (9.8%),[12] continued to lead FC 'ever used', while the third best-performing province in 2008, namely the NC (12.8%), had not gained as much ground over the same period.

Figure 6 also shows the proportion of clients who reported ever being offered a FC by a provider. The provinces with the lowest 'ever offered' score, namely KZN and the Eastern Cape (EC), also showed the lowest levels of 'ever used'. The data on overall distribution of FCs and MCs (Figures 2 and 3) show that KZN was the second-highest distributor of both condoms. These data may seem at odds with client data indicating that KZN appears to have the lowest reported 'ever used' and 'ever offered' rates by provider. This may be related to variations in district distribution. Data on MC coverage at district level indicate wide differences in coverage in KZN – uMgungundlovu distributed 153.4 condoms to every male 15 years and older in 2013/14, whereas eThekwini reported distributing 14.6 condoms per male.[13] Female condom coverage per adult male or female is not currently reported in the *District Health Barometer*.

Figure 7 shows FC 'ever users' by age and clearly indicates the disparity among the age groups, with the youngest group, which should be a key target for condom use, showing the lowest levels of 'ever used' for both men and women.

Figure 7: Ever used female condoms by age and sex, National FC Evaluation Study, 2014–2016

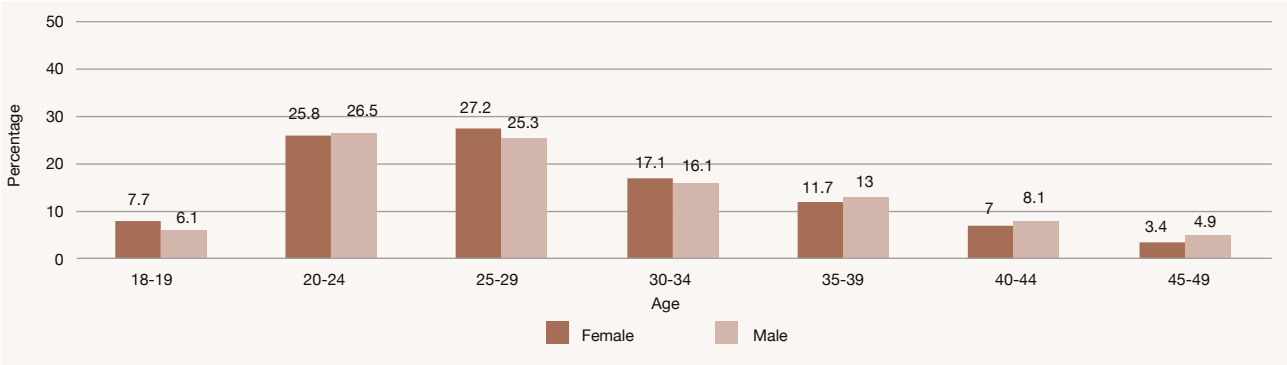
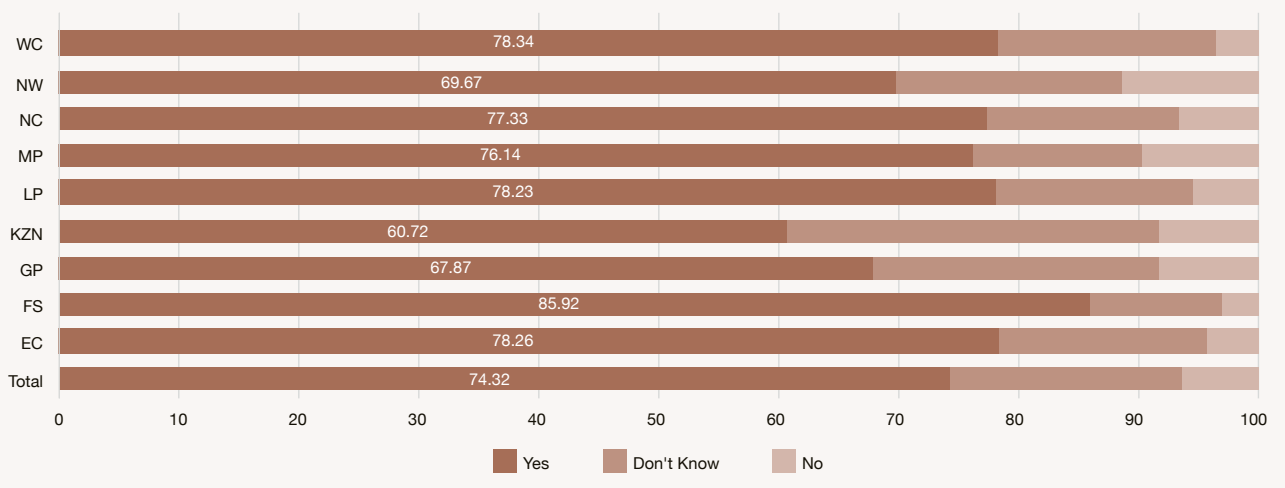


Figure 8: Client perceptions of FC availability on-site, National FC Evaluation Study, 2014–2016



Although awareness of FCs may be high and FCs are available at sites, as confirmed in the national site assessment, clients need to know that they are available in order to access them. In seven provinces, at least three-quarters of anonymous survey clients were aware that FCs were available at the site where they were interviewed, compared with 60.7% in KZN and 67.9% in Gauteng (GP) (Figure 8). One of the main reasons given for not ever using FCs was that clients did not know where to obtain them. This highlights the importance of developing IEC materials to promote FC awareness, and of healthcare providers routinely discussing and offering FCs to their clients at clinics and other sites where FCs are available. The other main reasons for not using the FC were partner reluctance and fear of trying it.

Client exit interviews

A total of 427 women, all of whom were current or ex-users of FCs, completed an exit interview during the in-depth assessment. Their mean age was 31 years (18–49 years), with only 2.8% under 20 years; 42% were HIV-positive and 20.8% reported having an STI in the last year. The three main reasons cited for initially trying a FC were, "to protect against HIV/STIs" (39.4%), "to protect against pregnancy" (40.9%), and "just wanted to try one" (28%). Almost all clients (96%) felt it was important to increase the choice of FCs.

Most women reported acquiring their first FCs directly from providers (76%) and fewer women first obtained them from dispensers (18%). Two-thirds (65.9%) reported that they were offered FCs by providers, while 31.1% had requested FCs. Providers explained how to use FCs to 92% of women, 84.2% were shown a FC, 69.9% were given a hand demonstration, and 67.2% received advice on how to introduce the FC into their relationship. Two-thirds of FC users (67.9%) said they would prefer to use the FC, compared with 21.7% who preferred MCs, and 10.4% who liked both equally. Of the current FC users, 73.4% reported using condoms more often than before they started using FCs, while 24.5% used condoms at about the same frequency as previously.

Cohort of new female condom users

Women enrolled in the cohort (n = 598) had a mean age of 28 years, with 3.7% under 20 years; 50% were unemployed; the majority (80%) had regular visiting partners, and 11% had at least two regular and/or casual partners. Thirty per cent of the women reported that they were HIV-positive and 36% believed that they would 'probably or definitely become infected'. Almost all the women (91%) had used FCs by the one-month interview; those who had not used them stated that 'partner refused to use the FC' and 'FC was difficult to use' as their main reasons for non-use.

At their one-month interview, most women (87%) reported that their partners were supportive of using the FC, and at six months this rose to 97%. Eighty per cent of women at one month felt that FC use placed the woman in charge. The level of unprotected sex (no MC or FC use) declined from 43.3% at baseline to 8.4% at 12 months.

At the 12-month interview, over half (53%) of the male partners reported that they were interested in and willing to try FCs when initially introduced to them by their partners and just over half (57%) said that FCs did not change their sexual experience. At their one-month interview, 58% of men said that the FC was 'better or much better' than the MC, and at 12 months this rose to 74%.

New developments in male and female condom programmes

The Max male condom

Re-branding has been shown to be an effective demand-creation strategy for the MC. For more than 10 years, the South African government promoted, freely distributed, and branded MCs as 'Choice'. However, the quality of the condom was questioned, along with its appeal to young people.[14] The re-branding of 'Choice' as 'Max', available in four different scents, was based on market research confirming that potential condom users wanted something new and more desirable. Deputy-President Cyril Ramaphosa and Health Minister Dr Aaron Motsoaledi highlighted the importance of condom use at the 2016 launch of the Max condom as part of the wider launch of the national HIV campaign.[15]

New female condom products in the condom programme

Between 1999 and 2013, only one FC product design was procured by the South African NDoH. The polyurethane FC1 was available until 2009 when it was replaced by the FC2 which was the same design but made of synthetic latex. At the end of 2013, two other FC products were added to the programme, namely Cupid and Pleasure More. In 2014, following training of some healthcare providers, the new products were gradually introduced into the public and non-public sector (NGOs, private sector and tertiary education) as sites ordered new FC stock.

Conclusions

The FC programme introduced 20 years ago is now well established and embedded in the healthcare system; in particular, systems for MC and FC distribution are complementary, with similar ordering and reporting processes. The proportion of FC distribution relative to MC remains low. The low level of uptake despite availability is reflective of FC uptake worldwide, including in the African region.[2,3] This low level of use has been attributed to limited availability (often due to higher cost compared with MC), lack of male acceptance, and difficulties in use.[16] The literature stresses that although female-initiated, male involvement is key for successful programming.[17]

FC users less than 20 years of age were poorly represented across all three data-collection methods for female clients in this evaluation, a pattern that has been noted previously in national surveys.[10,11] Client reasons for not using FCs were similar across all data-collection methodologies. One of the main reasons cited in the anonymous survey was that clients did not know where to get FCs, confirming data that many clients were unaware that the FC was available at the site where they completed the survey. For those who had tried to use a FC, a common reason for non-use across all data-collection methods was that the male partner had refused use, or that the woman had practical difficulties in using the FC.

Data highlight the role of providers as gatekeepers to FC access; thus they hold the key to the improved uptake of the FC in public and non-public sectors. Promotion by providers is variable, with different attitudes about FCs influencing what providers offer and how they counsel.

Evaluation findings provide solid support for further programme expansion in South Africa and more widely, generating crucial information to ensure that programme responses consider the realities of system, provider and client concerns. Years of limited distribution may have conveyed to both providers and clients that FCs are not available at all sites, and that providers do not need to stock and promote the product. With new HIV prevention options on the horizon, there are opportunities to learn and apply lessons learnt from evaluated national FC programmes.

Recommendations and study utilisation

A national dissemination meeting was held in Johannesburg on 27 January 2017 to present key findings of the evaluation to the NDoH and other key stakeholders. Following an overview of study findings, the following specific recommendations were made.

Policy and programmatic considerations

- The FC should be re-branded to make it more appealing, as was done for the Max male condom, including different colours and scents, and it should be branded to appeal to both men and women.
- Generic non-brand-specific posters and leaflets are needed as more brands with distinct differences become available.
- Availability of more than one product will ensure that female and male clients are offered a choice; sites should be offered all FC types when they order.
- Storage of large bulky FC/MC boxes is a reported challenge. Mpumalanga has a good model of warehouse storage with dedicated staff, which reduces stock-outs.
- There is a need to standardise acceptable FC distribution points (e.g. waiting areas) and to inform sites of recommendations.
- Containers specific to FCs are needed to accommodate the packaging of FCs. Condom containers that health facilities use for MCs are an inappropriate fit for FCs.
- All sites should have a FC demonstration model.
- Some providers still hold negative views about the FC; this should be addressed in future condom training.
- With the introduction of new HIV-prevention technologies such as pre-exposure prophylaxis (PrEP), condom messaging must be consistently linked with sexual and reproductive health and HIV, that is, the three-in-one package must be reinforced (HIV/STI/pregnancy prevention). Condoms should be integrated into new prevention services in a similar way to medical male circumcision.
- Free FCs should continue to be provided to private companies and this could be expanded to increase awareness among employed populations who may purchase FCs in the commercial sector in the future.

Health provider issues

- Since FCs are available in healthcare facilities, clients and communities should be advised that they can obtain FCs there.
- Provider training should focus on ongoing myths and problems related to FC use and include values-clarification exercises that address provider attitudes.
- If more than one FC product is available at the site, clients should be given a choice.
- The decision about whether or not to stock FCs should not be made by the site.
- Female condoms should be available in at least one private area at each site so that clients do not have to obtain them from a provider.

- As young people are the least likely group to be using FCs, sites should focus on counselling young people to try FCs.

Demand creation

- There should be expanded promotion of FCs among men. Sites that serve male populations should be targeted, and providers should be encouraged to promote FCs to men.
- As female condoms are acceptable to HIV-positive women, FC provision should be ensured in HIV clinics and to people living with HIV.
- In some provinces, higher-education institutions have not started FC distribution; support is needed to help these institutions to launch FC programming.

Further research

- Research priorities should include acceptability studies involving men, youth and under-represented user groups such as men who have sex with men, and sex workers.

Acknowledgements

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References

1 Reproductive Health Supplies Coalition. Caucus on new and underused reproductive health technologies. Product brief: female condom. Reproductive Health Supplies Coalition; 2013. [Internet]. [19 Dec 2016]. URL: https://www.rhsupplies.org/fileadmin/uploads/rhsc/Working_Groups/New_Underused_RH_Technologies_Caucus/Documents/Technical_Briefs/rhsc-brief-female-condom_A4.pdf

2 Center for Health and Gender Equity. Female condoms and U.S. foreign assistance: an unfinished imperative for women's health. Washington, DC: Center for Health and Gender Equity; 2011.

3 Peters A, Jansen W, van Driel F. The female condom: the international denial of a strong potential. Reprod Health Matters. 2010;18(35):119–28.

4 Mqhayi M, Beksinska M, Smit J, et al. Introduction of the female condom in South Africa: Programme activities and performance 1998–2000. Durban: Reproductive Health and HIV Research Unit, FHI, NDoH; 2003.

5 Mantell JE, Scheepers E, Abdool Karim QA. Introducing the female condom through the public health sector: experiences from South Africa. AIDS Care. 2000;2(5):589–601.

6 South African National Department of Health. HIV and AIDS and STI National Strategic Plan for South Africa, 2012–2016. Pretoria: NDoH; 2012.

7 Beksinska M, Smit J, Mantell J. Progress and challenges in male and female condom use in South Africa. Sex Health. 2012; 9(1):51–58.

8 Bamford C, Brink A, Govender N, et al. Part V. GARP: Surveillance activities. S Afr Med J. 2011 Jul;101(8):579–82.

9 Massyn N, Peer N, English R, Padarath A, Barron P, Day C. District Health Barometer 2015/16. Durban: Health Systems Trust; 2016.

10 South African National Department of Health, Medical Research Council, OrcMacro. South Africa Demographic and Health Survey 2003. Pretoria: NDoH; 2007.

11 Shisana O, Rehle T, Simbayi LC, et al. South African national HIV prevalence, incidence, behaviour and communication survey 2008: a turning tide among teenagers? Cape Town: Human Science Research Council Press; 2009.

12 Guerra FM, Simbayi LC. Prevalence of knowledge and use of the female condom in South Africa. AIDS Behav. 2014 Jan;18(1):146–58.

13 Massyn N, Day C, Peer N, Padarath A, Barron P, English R, editors. District Health Barometer 2013/14. Durban: Health Systems Trust; October 2014.

14 Ashmore J, Henwood R. Choice or no choice? The need for better branded public sector condoms in South Africa. S Afr J HIV Med. 2015;16(1).

15 United Nations Fund for Population Activities (UNFPA) South Africa. Max Condom launched in South Africa with UNFPA support. Jun 2016. [Internet]. [19 Dec 2016]. URL: http://southafrica.unfpa.org/news/max-condom-launched-south-africa-unfpa-support

16 Moore L, Beksinska M, Festin M, Gollub E. Knowledge, attitudes, practices and behaviors associated with female condoms in developing countries: A scoping review. Open Access J Contracept. 2015;6:125–42. URL: http://dx.doi.org/10.2147/OAJC.S55041

17 Mantell JE, Dworkin S, Exner TM, Hoffman S, Smit JA, Susser I. The promises and limitations of female-initiated methods of HIV/STI protection. Soc Sci Med. 2006;63 (8):1998–2009.

15 Drug-resistant tuberculosis in South Africa: history, progress and opportunities for achieving universal access to diagnosis and effective treatment

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Drug-resistant tuberculosis (DR-TB) is a significant threat to efforts to end TB in South Africa. Responding to this epidemic requires access to drug-sensitivity testing among all TB patients and effective second-line anti-tuberculosis treatment for all diagnosed patients. South Africa currently treats the third-highest number of DR-TB patients globally, after India and Russia. The 12 527 cases (10% of the global cohort) reported to be enrolled on treatment in 2015 is close to four times the figure reported for 2007, yet represents only 64% of the diagnosed cases in 2015. Treatment outcomes are poor, with a success rate of approximately 50% nationally and globally.

In this chapter we review the emergence of DR-TB in South Africa and progress towards universal access to diagnosis and effective treatment; we also discuss key policy initiatives that have contributed to treatment access and patient outcomes, and highlight opportunities and challenges moving forward.

While DR-TB was first identified in the 1980s, systematic, standardised treatment was only rolled out across South Africa in 2001. Prior to this time, DR-TB treatment was only available in a small number of specialised TB hospitals. Following the publication of the 2008 updated World Health Organization guidelines, the standardised treatment used in South Africa was strengthened with the inclusion of more drugs. Implementation of new diagnostic tests, including the Xpert test from 2011 have significantly increased the number of diagnosed DR-TB cases. A policy supporting decentralised and deinstitutionalised DR-TB treatment provision at lower levels of the health system was introduced in 2011 but to date, implementation has varied. More recently, South Africa has expanded access to the newly available TB drugs.

Defining and piloting models of DR-TB care across different settings and supporting patients throughout treatment are important challenges moving forward. Incorporating new drugs into shorter, more effective treatments that can be delivered through primary care provides an opportunity to improve treatment outcomes and reduce mortality.

Implementation of new diagnostic tests, including the Xpert test from 2011 have significantly increased the number of diagnosed drug-resistant TB cases. A policy supporting decentralised and deinstitutionalised DR-TB treatment provision at lower levels of the health system was introduced in 2011 but to date, implementation has varied. More recently, South Africa has expanded access to the newly available TB drugs.

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Introduction

In 1996, the South African government declared tuberculosis (TB) a national emergency and the DOTS (Directly Observed Therapy Short-course) strategy was rolled out across the country.[1] At that time, TB incidence was estimated to be high, with emerging epidemics of both HIV-related and multidrug-resistant (MDR) TB.[2,3] Over the past two decades, the TB epidemic in South Africa has remained among the worst globally, although the annual number of TB patients has declined in recent years.[4]

Currently, South Africa has a large burden of rifampicin-resistant TB (RR-TB), including MDR-TB (Box 1). In 2015, close to 20 000 individuals were reported to have been diagnosed with RR-TB.[4] While South Africa provides second-line TB treatment for the third-largest number of RR-TB patients globally, a significant gap remains between the number of cases reported as diagnosed and those started on second-line treatment; delays to start treatment are also common.[4,5] Overall, treatment is successful for approximately half the patients starting treatment, similar to the global treatment success rate.[4]

South Africa was one of the first high-burden MDR-TB countries to roll out second-line treatment for MDR-TB nationally in 2001, and the country has since implemented innovative strategies to improve case detection and patient outcomes. Traditionally, TB programmes have relied on outdated and poorly efficacious tools for diagnosis and treatment; however, there are now improved diagnostics for TB (and TB drug-resistance), and with several new drugs becoming available, improved prospects for better treatment outcomes. In this chapter we describe the emergence of drug-resistant tuberculosis (DR-TB) in South Africa, historical policy approaches, and new developments with the potential to improve patient outcomes and reduce the burden of DR-TB.

Emergence of TB drug resistance in South Africa

Prior to the first democratic election in 1994, the provision of TB treatment in South Africa relied on erratic and unstandardised treatment regimens.[2,6] At that time, there were 14 different health services providing TB treatment, with no national co-ordination, and reliance on expensive hospitalisation to ensure compliance.[3] Drug supplies were reported to be poor and treatment interruptions were common.[2] Treatment success rates were largely unknown and unreported, but were found to be as low as 18% in one study.[7] Under such conditions, the emergence of TB drug resistance was unsurprising.

While resistance to key TB drugs is commonly reported to have emerged in the 1980s,[8,9] there are reports of widespread resistance prior to that time.[10] Before 1994 the majority of TB resistance data came from surveillance conducted by the South African Medical Research Council (SAMRC). A retrospective analysis of surveillance data from hospitals in four provinces suggests that between 1965 and 1970, 29% of patients tested had TB with resistance to isoniazid, 34% had resistance to streptomycin, and 6% had resistance to rifampicin.[10] Resistance to rifampicin is surprising at that point in time, given reported use of the drug from only 1973 in some provinces,[11,12] and more widespread use from 1980,[13,a] which may indicate laboratory problems. Nonetheless, MDR-TB incidence was reported to be less than 2% among *Mycobacterium tuberculosis* isolates in the period 1980–1988.[10] The same study reported dramatic declines in resistance over the three time periods tested; isoniazid resistance fell from 29% in 1965–1970 to 14% in 1980–1988. These data were interpreted to suggest that continuing efforts to provide adequate first-line treatment would result in declining TB drug resistance.

Box 1: Useful definitions for drug-resistant TB

Disease	Definitions	Treatment
TB	Tuberculosis	***First-line treatment (6 months)*** ✦ Most effective drugs: isoniazid and rifampicin ✦ Additional drugs: ethambutol and pyrazinamide
DR-TB	Drug-resistant TB (resistance to any TB drug)	
RMR-TB	Rifampicin mono-resistant TB (resistance to rifampicin and susceptibility to isoniazid)	Second-line treatment plus isoniazid
MDR-TB	Multi-drug resistant TB (TB resistant to isoniazid and rifampicin)	***Second-line treatment (18–24 months)*** ✦ Fluoroquinolones: ofloxacin, moxifloxacin, levofloxacin ✦ Second-line injectable drugs: amikacin, kanamycin, capreomycin ✦ Other available drugs: ethionamide, terizidone ✦ Repurposed drugs: linezolid, clofazimine ✦ New drugs recently available: bedaquiline, delamanid
RR-TB	Rifampicin-resistant TB (TB resistant to rifampicin, regardless of resistance to other drugs)	
PreXDR-TB	MDR-TB with resistance to either a fluoroquinolone OR a second-line injectable drug	
XDR-TB	Extensively drug-resistant TB (MDR-TB with resistance to both a fluoroquinolone AND a second-line injectable drug)	

a Personal Communication: Mary Edington, 8 December 2016.

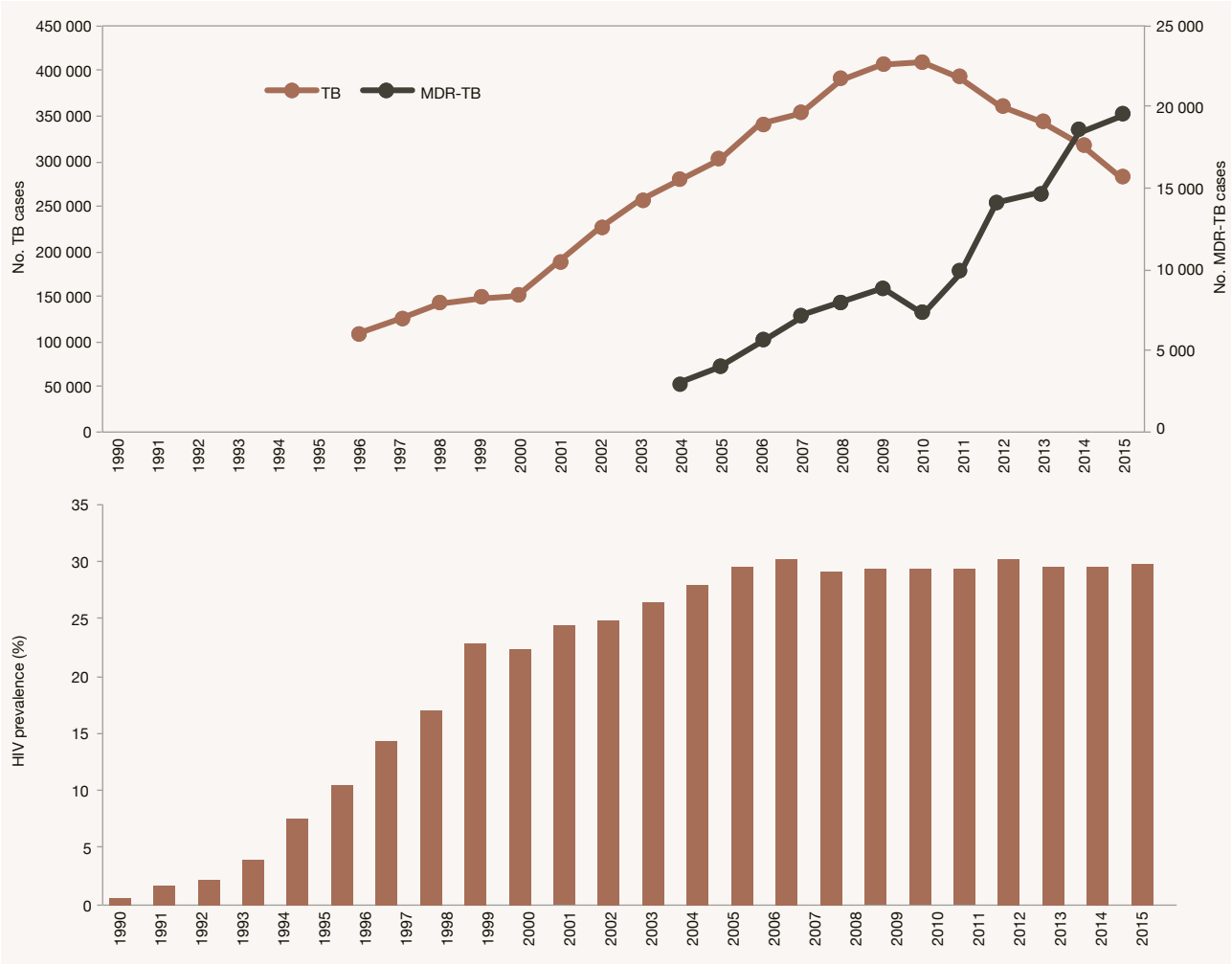
Separate studies suggest that MDR-TB was present across all South African provinces by the early- to mid-1990s.[13,18] With increasing HIV prevalence there was a dramatic increase in the number of TB patients reported and widespread MDR-TB emergence.[2,19] Unfortunately, the SAMRC's TB drug-resistance surveillance programme was closed in 1995 due to budgetary constraints, just at the point when the World Health Organization (WHO) warned of the potential spread of MDR-TB in settings like South Africa.[20] While the percentage of TB patients with MDR-TB may have appeared relatively low at approximately 2%, since TB rates were high and increasing, this translated into large numbers of patients. Overall, South Africa was recording close to 2 000 MDR-TB cases each year in the mid-1990s.[21]

The first national, representative TB resistance survey was conducted by the SAMRC in 2001–2002.[9] Multidrug-resistant TB was detected among 2.9% of the 5 866 TB patients tested across all provinces; a further 0.4% were found to have rifampicin mono-resistant TB (RMR-TB). These figures were then used as the basis for estimation of the MDR-TB burden; close to 3 300 cases were estimated to have emerged in 2000.[22] However, from 2000 to 2010, the number of MDR-TB patients diagnosed nationally increased dramatically, to approximately 8 000 per year in the latter part of the decade (Figure 1).

While the prevailing view in South Africa, and indeed internationally, was that resistance was primarily due to acquired resistance emerging during poor first-line TB treatment, through poor patient adherence, inadequate treatment regimens or lower drug quality,[14,27,28] several studies suggest that there was significant community transmission of DR-TB strains in South African settings from the mid-1990s.[17,29,30]

While MDR-TB has been prevalent in South Africa since the 1980s, it was only identified as a major threat to TB control in 2006, with publication of data describing an outbreak of extensively drug-resistant TB (XDR-TB) at a rural hospital at Tugela Ferry, KwaZulu-Natal, where 39% of TB patients had MDR-TB and 6% had XDR-TB.[31] Fifty-five per cent of XDR-TB patients had never received prior TB treatment, illustrating direct transmission. Many of these patients had recently been admitted to hospital, suggesting nosocomial transmission. Between 2004 and 2007, 210 XDR-TB cases were found among 10 000 MDR-TB cases across South Africa.[32] Retrospective analyses have now determined that XDR-TB was present as early as 1992 in the Western Cape,[15] and the XDR-TB strain causing the Tugela Ferry outbreak was present in 2001 in KwaZulu-Natal.[29]

Figure 1: Reported cases of TB and laboratory-diagnosed cases of MDR-TB (top panel, note different axes), and national antenatal care HIV prevalence rate (lower panel) between 1990 and 2015



Source: WHO 2016;[4] NDoH 2011;[23] WHO 2015;[24] NDoH 2007;[25] Ndjeka 2014.[26]

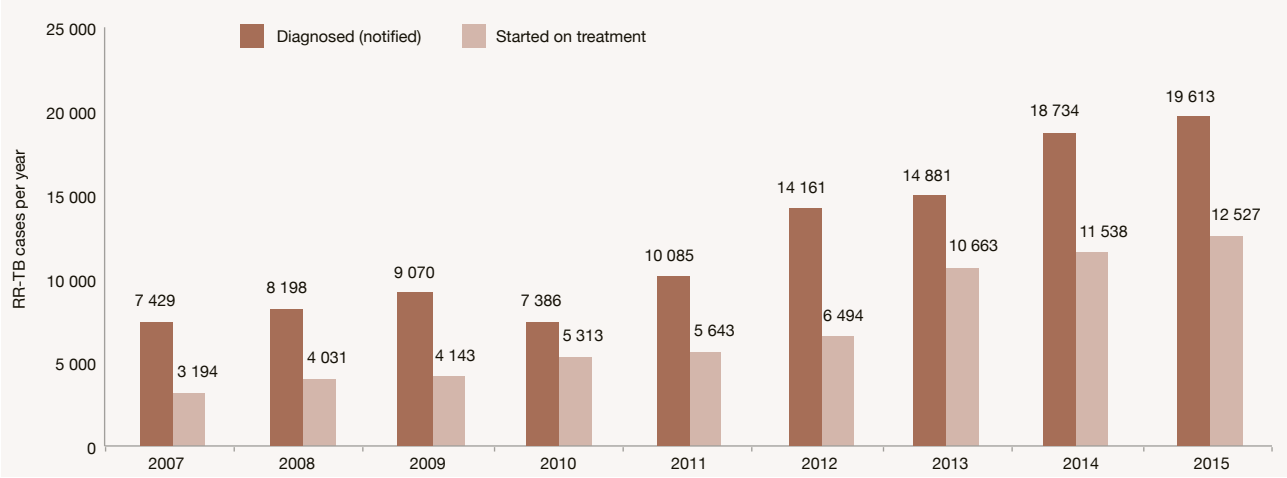
Current epidemiology of drug-resistant TB

In 2015, 19 613 patients were reported to have been diagnosed with RR-TB in South Africa.[4] This figure represents a dramatic increase from 2011 (Figures 1, 2), most likely the result of improved case detection. In 2011, the Xpert MTB/RIF diagnostic test was progressively rolled out nationally, providing access to drug-susceptibility testing (DST) for all individuals being investigated for TB. Xpert simultaneously detects *M. tuberculosis* and rifampicin resistance, theoretically providing results within hours.[33] Prior to this, only patients who reported previous treatment or those considered at high risk of DR-TB (such as individuals with close contact to known MDR-TB patients, healthcare workers and individuals with prison exposure) and those failing first-line therapy, were tested for resistance.

The second and most recent national survey of TB drug resistance was conducted in 2012–2014, with results released in 2016.[34] Overall, 4.6% of more than 10 000 pulmonary TB patients were found to have RR-TB, resulting in an estimated RR-TB burden of 20 000/year.[4] However, national estimates of the incidence and prevalence of RR-TB may mask settings of high prevalence and significant differences across provinces (Figure 3).

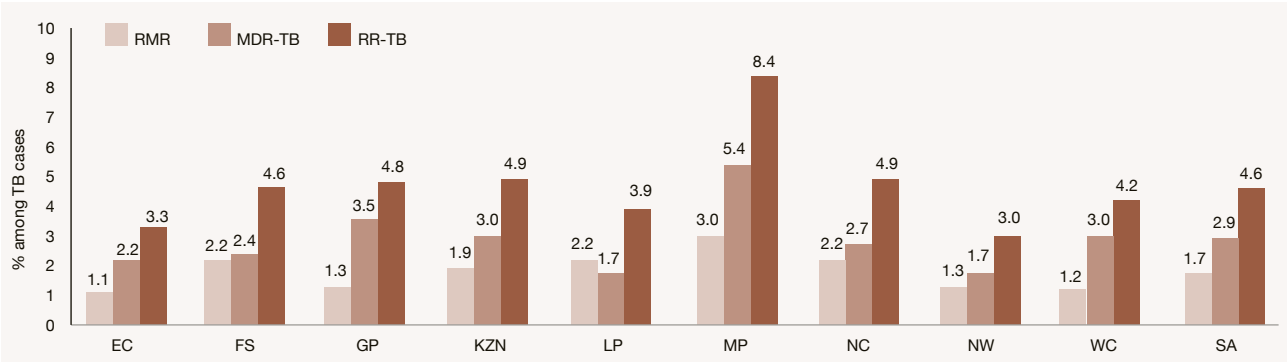
The survey determined that a substantial proportion of RR-TB was due to RMR-TB, but again this varied across provinces, with the prevalence of RMR-TB ranging from 1.1% to 2.2% (Figure 3). While the proportion of MDR-TB was reported to be similar between the 2001–2002 and 2012–2014 national surveys, the level of RMR-TB increased substantially over the decade (Figure 4).

Figure 2: Numbers of RR/MDR-TB patients diagnosed and reported to have started on second-line treatment, by year, in South Africa



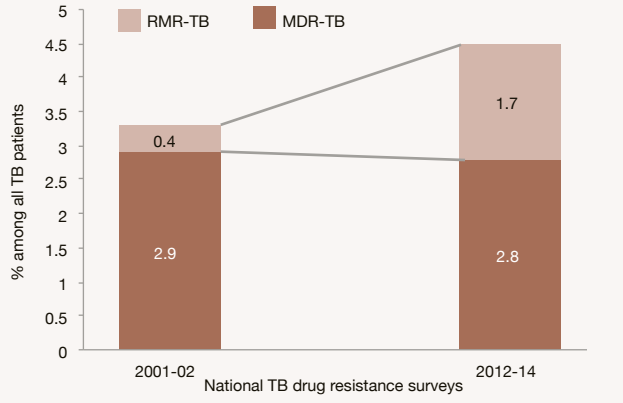
Source: WHO 2016;[4] NDoH 2011;[23] Ndjeka, 2014.[26]

Figure 3: Percentage of TB cases found to have RMR-TB, RR-TB, and MDR-TB across provinces in South Africa through the 2012–2014 national survey



Source: National Institute for Communicable Diseases, 2016.[34]

Figure 4: Change in percentage of RMR-TB and MDR-TB among TB patients between two national surveys



Source: Weyer et al. 2007;[9] National Institute for Communicable Diseases 2016.[34]

The 2012–2014 national survey found that 4.9% of MDR-TB patients had XDR-TB.[34] However, a further 16.0% were infected with MDR-TB strains with resistance to either a fluoroquinolone or a second-line injectable (pre-XDR-TB), resulting in 21% of MDR-TB patients with significant second-line drug resistance. Similarly, the proportion of XDR-TB among MDR-TB patients varies across provinces. In 2012, the proportion of notified XDR-TB cases ranged from <1% to >20% of MDR-TB cases across provinces.[35,36] Two recently released South African studies highlight the role of transmission of XDR-TB in communities and health facilities in driving the DR-TB epidemic in South Africa.[37,38]

While data on the global prevalence of DR-TB among children are scarce, data from routine surveillance across South Africa in 2008 suggest that there is a higher risk of MDR-TB among children aged <15 years than among adults (16.4% of children with TB had MDR-TB).[39] In contrast, reports of children being diagnosed routinely with MDR-TB suggest much lower numbers than would be expected given the overall TB burden.[40,41] Across a 5.5-year period, only 626 children and adolescents with MDR-TB were located through TB hospitals in four South African provinces.[41] These data suggest that although there is likely to be a substantial burden of DR-TB among children in South Africa, much of this burden remains undiagnosed and therefore untreated.

The drug-resistant TB diagnosis and treatment cascade

In 2015, 12 527 patients were reported to have initiated second-line treatment for RR-TB;[4] this was only 64% of the number reported to have been diagnosed (Figure 2). The magnitude of this treatment gap was confirmed in a recently published cohort study, where only 63% of RR-TB patients diagnosed in 2013 and followed up retrospectively received second-line treatment within six months.[5] Factors such as high early mortality, particularly among HIV-positive patients, difficulties in accessing laboratory results, lack of access to second-line treatment provision in primary care, lack of unique patient identifiers, under-reporting, and late updating of records, are likely to have contributed to the treatment gap.

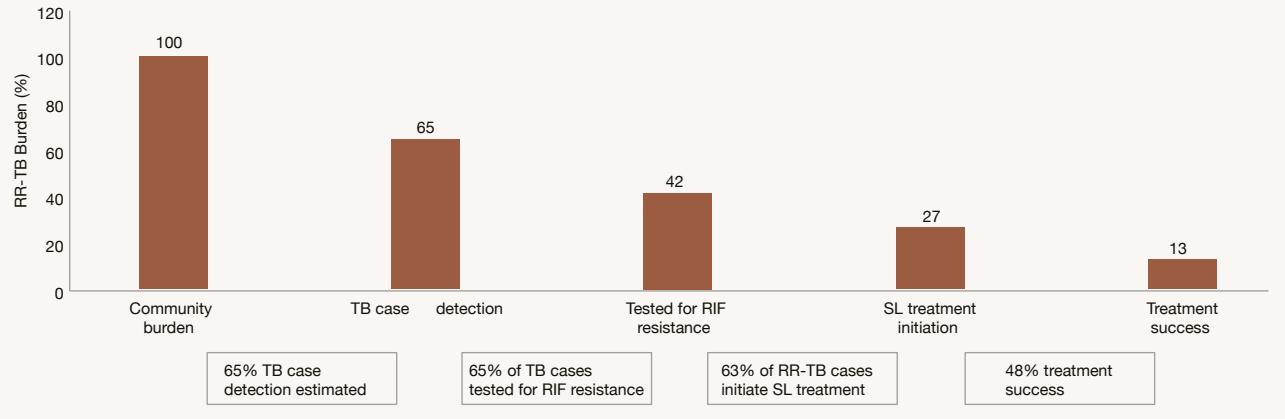
Treatment outcomes are poor among the RR-TB cases reported to have started second-line treatment in South Africa; only 48% of MDR-TB patients and 24% of XDR-TB patients who started treatment in 2013 were reported as being successfully treated, with high rates of mortality, loss from treatment and treatment failure.[4] Overall, given the likely gap in case detection (based on the estimated case-detection rate for all TB of 63% and bacteriological confirmation <100%[4]) and the significant treatment gap, only 13% of incident RR-TB cases are successfully treated at present (Figure 5).

Policy responses to the epidemic

National guidance for drug-resistant TB treatment

Prior to 2000, only a limited number of specialised hospitals were treating MDR-TB. These included Brooklyn Chest Hospital in the Western Cape, Rietfontein (Sizwe) Hospital in Johannesburg, West End Hospital in Kimberley and King George V (King Dinuzulu) Hospital in Durban.[42] Treatment outcomes were generally poor; of 343 MDR-TB patients diagnosed from 1987 to 1988 in the then Cape Province, only 33% were reported as cured and alive after five

Figure 5: Simplified RR-TB diagnosis and treatment cascade in South Africa



Source: WHO 2016;[4] Cox et al. 2017.[5]

years.[18] Similarly poor outcomes were reported from Port Elizabeth, where only 25% of MDR-TB patients treated between 1999 and 2000 were cured.[43]

Following the introduction of the DOTS strategy in 1996, the first national guideline for the treatment of MDR-TB (DOTS-Plus) was produced in 1997 and revised in 1999.[27] However, there are reports that MDR-TB treatment was not actively promoted initially because it was considered more important to cure new TB cases at first diagnosis, through the effective implementation of the DOTS programme.[44] This thinking may have been based on the notion that effective first-line treatment would reduce DR-TB prevalence.[45] However, in 2000 the MDR-TB guidelines were formally endorsed, and from 2001, DOTS-Plus implementation was actively supported.[46]

The 1999 guideline described the provision of either individualised or standardised treatment regimens. The former is the provision of a multidrug treatment regimen based on DST results for each patient, while the latter describes a standard treatment regimen given to all MDR-TB patients in the absence of individual DST. In reality, standardised regimens were chosen across South Africa as second-line DST was not widely available. To receive treatment, all patients were referred to a provincial 'specialist' MDR-TB unit. Most patients were admitted either until conversion of sputum cultures to 'negative' or for the duration of the intensive phase, although the guidance allowed for ambulatory treatment after initial evaluation and treatment initiation.[27]

From 2000, the standardised regimen consisted of a four-month intensive phase using five drugs: kanamycin, ethionamide, pyrazinamide, ofloxacin and either cycloserine or ethambutol. This was followed by a 12–18-month continuation phase using three drugs (ethionamide, ofloxacin and cycloserine or ethambutol).[27] Slight modifications to this regimen were made in different provinces.[47] Treatment outcomes were consistently poor on this regimen; an analysis of treatment outcomes for patients from eight provinces treated between 2000 and 2004 suggested successful treatment in 46% of patients.[47]

In the absence of routine second-line DST, the use of standardised regimens containing relatively few active second-line drugs is thought to contribute to the emergence of further resistance,[48] even with good adherence.[49,50] In response, the standardised treatment regimen for MDR-TB was strengthened with the routine inclusion of terizidone in 2010, and a switch from the use of ofloxacin to moxifloxacin across different provinces in 2011/12.

In 2006, release of the revised WHO DR-TB treatment guidelines[51] coincided with publication of the XDR-TB outbreak in KwaZulu-Natal,[31] together prompting revision of the national DR-TB guidelines. A revision of the guidelines emphasising standardised treatment as national policy was drafted in 2008. In 2011, after further revision, guidelines were released including strategies for decentralisation and deinstitutionalisation of MDR-TB treatment.[23] This was prompted by insufficient numbers of hospital beds to provide hospitalisation for all MDR-TB patients, the cost of lengthy hospitalisation,[52] and the consequent long waiting lists at most major provincial specialist TB hospitals.[53–55] In addition, the guidelines described the provision of community-based treatment for MDR-TB patients who were sputum smear-negative, through a system of satellite MDR-TB units at various health system levels, with oversight at provincial level.

Decentralisation and deinstitutionalisation of drug-resistant TB care

Input for the national decentralisation policy was provided from the implementation of pilot programmes in KwaZulu-Natal and the Western Cape (Box 2). In KwaZulu-Natal, a programme to provide ambulatory second-line treatment was first introduced in uMzinyathi District, the setting of the well-publicised XDR-TB outbreak. Early treatment outcomes and patient adherence were reported to be much improved.[56,57] In the Western Cape, a decentralised treatment programme was implemented in the densely populated township of Khayelitsha, Cape Town, and was associated with increased proportions of diagnosed patients receiving treatment and reduced delays to treatment initiation, resulting in a greater proportion of the number of diagnosed patients being treated successfully.[58,59]

Box 2: Pilot DR-TB decentralised programmes in KwaZulu-Natal[56,57] and the Western Cape[58,59]

	KwaZulu-Natal pilot	Western Cape pilot
Setting	uMzinyathi district (predominantly rural)	Khayelitsha Sub-district (peri-urban township in Cape Town)
Treatment initiation	Treatment initiated by doctors at a district-level hospital	Treatment initiated by doctors at primary health care clinics
Provision of daily injections	Mobile, nurse-led teams visiting patient homes	Patient attendance at primary care clinics
Role of centralised hospital	Management of children, patients with XDR-TB and medically complex patients	Admission of clinically unwell patients and referral of medically complex patients

Since 2011, progress towards achieving greater treatment decentralisation has been relatively slow. In 2013, 56% of all RR-TB patients were still admitted to a tertiary-level or specialist TB hospital to start treatment, and only 19% were started on treatment in primary care.[5] By November 2015, all provinces were reported to have decentralised sites, reaching the target of one DR-TB treatment initiation site per district.[53] Many districts and several provinces still require mandatory hospital admission to initiate second-line treatment.

Drug-resistant TB diagnostics

Xpert testing was commenced at the same time as the release of the national decentralisation policy. By 2013, the majority of South Africans investigated for TB had access to Xpert. In addition to improved TB diagnosis compared with sputum smear microscopy, the Xpert rollout aimed to improve RR-TB case detection and reduce the often lengthy delays to receive DST results using conventional culture techniques. Xpert implementation partly explains a dramatic increase in the reported number of diagnosed RR-TB patients since 2011 (Figure 1), and has likely contributed to a substantial reduction in the delay to second-line treatment for those found to have RR-TB, despite a number of issues with implementation.[60] According to a large nationwide retrospective cohort study, the median time between patient submission of a specimen for diagnosis and the initiation of second-line treatment fell from 44 days in 2011 to 22 days in 2013.[5] While substantial, this reduction in delay is still some way from the national five-day target.[61]

Novel drugs for treatment

More recent policy initiatives have included expanded access to the new anti-tuberculosis drug, bedaquiline. Bedaquiline was the first new TB drug to become available since rifampicin in the 1960s and has been shown to improve patient outcomes when added to the standard MDR-TB second-line regimen.[62] Early outcomes from a clinical access programme have been promising, with 76% of XDR-TB or pre-XDR-TB patients who completed six months of bedaquiline showing sputum culture conversion.[63] Based on these data, guidance on the use of bedaquiline was released by the National Department of Health (NDoH) in 2015.[64]

Bedaquiline is currently recommended for the treatment of patients with pre-XDR-TB, XDR-TB and MDR-TB under circumstances where an effective treatment regimen cannot be formulated with other second-line drugs. As of December 2016, a total of 3 846 patients have received bedaquiline in South Africa.[65] The emergence of TB drug resistance and key policy responses are described in Box 3.

The promise of improved diagnostics, shorter treatment regimens and new drugs

While Xpert implementation has improved RR-TB case detection, the diagnosis of second-line drug resistance and therefore XDR-TB and pre-XDR-TB still relies largely on conventional culture-based methods. Culture-based methods delay the diagnosis of second-line resistance and therefore delay the initiation of appropriate treatment, potentially contributing to the development of further resistance.[49] In South Africa, only 38% of RR-TB cases diagnosed in 2015 were reported to have received second-line DST.[4] Correct identification of second-line drug resistance, i.e. resistance to a fluoroquinolone and/or a second-line injectable drug will be required to allocate patients to revised treatment regimens appropriately, based on new policy objectives. These include increased access to new TB drugs such as bedaquiline and the second new TB drug to receive approval globally, delamanid, along with rollout of a new shortened DR-TB treatment regimen.

In 2016, the WHO produced a recommendation on the use of a 9–12-month shortened regimen for MDR-TB treatment that utilises existing second-line TB drugs and drugs not registered for TB treatment but found to be effective against TB (repurposed drugs).[66] The shortened regimen is based on a regimen first used under operational research conditions in Bangladesh that resulted in significantly improved treatment outcomes,[67] and more recent evidence from several other countries; however, there are as yet no clinical trial data.[68]

In response, the NDoH in South Africa has started a process of revision of the DR-TB guidelines, including use of the shortened MDR-TB regimen. Discussions have also included the possibility of a bedaquiline-containing nine-month regimen to be implemented at certain sites under operational research conditions.[69]

In line with these initiatives, and in order to improve access to second-line DST, the National Health Laboratory Service is in the process of replacing culture-based DST with the Hain MTBDRsl test, a rapid-line probe assay that detects most of the genetic mutations that confer resistance to the fluoroquinolones and the second-line injectable drugs.[70] While this test is more rapid, and has high specificity (when resistance is identified it is usually correct), sensitivity is suboptimal, i.e. a significant proportion of MDR-TB patients with second-line resistance may be missed with the test.[71]

While the use of a nine-month regimen containing bedaquiline is being contemplated, clinical trials are under way that should provide clearer evidence for effective MDR-TB regimens. Trials under way in South Africa include the STREAM trial testing a nine-month bedaquiline-containing regimen, the NeXT trial, which is trialling 6–9-month all-oral regimens containing bedaquiline (both for MDR-TB only), and the NiX-TB trial testing a three-drug regimen including bedaquiline, pretomanid (a similar drug to delamanid) and linezolid (a repurposed drug) for patients with XDR-TB.[72] Early results from the NiX-TB trial are promising; of those who completed the six-month treatment, all were cured.[73] The new initiatives currently being discussed and the promise of more effective treatment regimens provide hope that greater inroads can be made into the DR-TB epidemic in South Africa.

Box 3: Timeline of key events relevant to the emergence and response to DR-TB in South Africa

	Year(s)	
Emergence of INH, Rif and Strep resistance reported	1956–1970	
	1980	Expanded use of Rif for TB treatment
XDR-TB detected retrospectively in the Western Cape	1992	
MDR-TB across South Africa	1994	
TB declared a national emergency	1996	DOTS strategy introduced
	1997	First national guidelines for MDR-TB treatment
	1999	MDR-TB treatment guidelines revised
	2000	Standardised MDR-TB regimen introduced
First national survey of DR-TB	2001	Second-line treatment for all MDR-TB (DOTS Plus strategy introduced)
XDR-TB defined and identified at Tugela Ferry	2006	
	2008	Draft revised guidelines on MDR-TB treatment available
Xpert introduced and rolled out across country	2011	Revised guidelines including decentralised and community management
Second national DR-TB survey	2012	Bedaquiline accessible (compassionate use programme only)
	2014	Bedaquiline expanded clinical access programme
Introduction of second-line LPA	2017	Introduction of new and shortened regimens planned

Ongoing challenges

Challenges remain before universal access to effective, acceptable MDR-TB treatment becomes a reality. Central are issues around delivering a complex treatment regimen, often associated with adverse events, at lower levels of a struggling health system. Varying success with regard to decentralisation of effective MDR-TB services across South African districts can be partly explained by variable funding available for policy directives, insufficient infrastructure, lack of adaptation of models of care to different geographical and epidemiological settings, and poor district management capacity with insufficient provincial support. In the context of a health system buckling under a quadruple burden of disease,[74] a myriad of human-resource issues impact on DR-TB service delivery, including rapid turnover of staff, inadequate support, low motivation and a reluctance to 'take on' additional workload, and ineffective mechanisms of accountability.[75]

Given the high rate of HIV infection among TB and DR-TB patients, the provision of integrated treatment services remains a priority. Interactions between antiretroviral and TB medications often complicate treatment,[76] and the management of DR-TB and HIV via two separate programmes is likely to result in additional burdens on patients and staff.[77,78]

A further challenge is the diagnosis and treatment of DR-TB among children. While it is estimated that 25 000 children globally develop MDR-TB each year, very few are diagnosed and treated.[39,79] This is largely due to the difficulties in obtaining bacteriological TB confirmation in young children and therefore DST.[80] As a result, the diagnosis of DR-TB is often inferred based on close contact with a known DR-TB patient. The investigation of all child contacts of each diagnosed DR-TB patient is challenging and insufficiently conducted in most high-burden settings, including South Africa.

Poor treatment adherence is often cited as contributing to the DR-TB epidemic and the development of additional resistance during second-line treatment. As currently used second-line drugs are associated with significant adverse events and are poorly tolerated,[81] low completion rates are unsurprising; patients may stop treatment when the side-effects become intolerable, when they start to feel better, or due to perceived futility when they remain sputum culture-positive months into treatment.[82] Maintaining adherence, even to a shortened nine-month regimen, requires consistent and sympathetic support from healthcare workers and other significant individuals in patients' lives. Providing such support has been difficult in the face of overburdened clinics and the stigma attached to DR-TB.

Similarly, activities needed to receive a DR-TB diagnosis and continue treatment over a prolonged period are often associated with catastrophic expenditures for patients and their families.[83,84] Drug-resistant TB patients are eligible for disability grants in South Africa, but these grants are often delayed, and are insufficient to support families where the patient had been the family breadwinner.[83,85,86]

Conclusions and recommendations

South Africa is uniquely positioned to develop and implement innovative strategies to respond to the DR-TB epidemic, having relatively well-developed healthcare infrastructure, including laboratory services. There is strong government commitment to improve both the diagnosis and treatment of DR-TB, exemplified by recently implemented strategies. These include the staged implementation of the Xpert test for all individuals investigated for TB; decentralisation and deinstitutionalisation policies; scale-up of access to the new drug bedaquiline, and increased financial allocations for DR-TB services.

However, the implementation of DR-TB services is a provincial competency, and success in combating the epidemic will depend on the extent to which implementation challenges within each province are addressed and overcome. Towards the end of 2015, the WHO reviewed the decentralisation of DR-TB services in South Africa, and reported that the extent and quality of services varied across provinces.[53] Recommendations arising from the review include strategies to reduce community transmission and improve service delivery.

Recommendations to reduce transmission include early identification of DR-TB patients, screening of household contacts, educating household members about DR-TB transmission, and universal DST for all patients under TB investigation. Within healthcare facilities, infection-control programmes should be supported, outpatient treatment should be provided whenever possible, and in some cases health facilities should be redesigned. In order to improve DR-TB service delivery, the review recommended the following: accelerated decentralisation of DR-TB care; full integration of DR-TB services into district-level services; alignment of the DR-TB programme with other health system aspects; alignment of the DR-TB data-management system with the District Health Information Software, implementation of a unique patient identifier; greater provincial oversight, and functional provincial DR-TB clinical management teams providing clinical expertise, guidance and oversight on patient management.

Implementation of the shortened MDR-TB treatment regimen and further scale-up of bedaquiline and other drugs have the potential to improve individual patient outcomes dramatically and to reduce ongoing community transmission of DR-TB. However, to optimise the window of opportunity afforded by these new strategies, models of service delivery have to take localised health systems and human-resource constraints into account, while striving to be patient-centred.

References

1 Weyer K. Case study: South Africa. Bull World Health Organ. 2007;85(5):391–2.

2 World Health Organization. Tuberculosis control in South Africa, Joint Programme Review. Geneva: WHO; 1996. Contract No.: WHO/TB/96.208.

3 Weyer K, Fourie PB, Nardell E. A Noxious Synergy: Tuberculosis and HIV in South Africa. The Global Impact of Drug Resistant Tuberculosis. Boston: Open Society Institute; 1999. pp. 128–201.

4 World Health Organization. Global Tuberculosis Report 2016. Geneva: WHO; 2016. Contract No.: WHO/HTM/TB/2016.13.

5 Cox H, Dickson-Hall L, Ndjeka N, et al. Delays and loss to follow-up before treatment of drug-resistant tuberculosis following implementation of Xpert MTB/RIF in South Africa: A retrospective cohort study. PLoS Med. 2017;14(2):e1002238.

6 Glatthaar E. Tuberculosis control in South Africa. S Afr Med J. 1982; Special Issue, November 1982:36–41.

7 Wilkinson D. High-compliance tuberculosis treatment programme in a rural community. Lancet. 1994;343(8898):647–8.

8 Edginton M. TB, past, present and future. HST Update. 2000;56:3–6.

9 Weyer K, Brand J, Lancaster J, Levin J, van der Walt M. Determinants of multidrug-resistant tuberculosis in South Africa: results from a national survey. S Afr Med J. 2007;97(11 Pt 3):1120–8.

10 Weyer K, Kleeberg HH. Primary and acquired drug resistance in adult black patients with tuberculosis in South Africa: results of a continuous national drug resistance surveillance programme involvement. Tuber Lung Dis. 1992;73(2):106–12.

11 Collins TF. The history of southern Africa's first tuberculosis epidemic. S Afr Med J. 1982;62(21):780–8.

12 Tibbit LR. The economics of short-course therapy for tuberculosis in the Cape Divisional Council area. S Afr Med J. 1982;Spec No:31–3.

13 Westwater ML. Multidrug resistant tuberculosis in South Africa. Lancet. 1996;347(9018):1837.

14 Weyer K, Groenewald P, Zwarenstein M, Lombard CJ. Tuberculosis drug resistance in the Western Cape. S Afr Med J. 1995;85(6):499–504.

15 Symons G, Shean K, Pietersen E, et al. A historical review of XDR tuberculosis in the Western Cape province of South Africa. S Afr Med J. 2011;101(9):636–8.

16 Wilkinson D, Pillay M, Davies GR, Sturm AW. Resistance to antituberculosis drugs in rural South Africa: rates, patterns, risks, and transmission dynamics. Trans R Soc Trop Med Hyg. 1996;90(6):692–5.

17 Davies GR, Pillay M, Sturm AW, Wilkinson D. Emergence of multidrug-resistant tuberculosis in a community-based directly observed treatment programme in rural South Africa. Int J Tuberc Lung Dis. 1999;3(9):799–804.

18 Schaaf HS, Botha P, Beyers N, et al. The 5-year outcome of multidrug resistant tuberculosis patients in the Cape Province of South Africa. Trop Med Int Health. 1996;1(5):718–22.

19 Wilkinson D, Davies GR. The increasing burden of tuberculosis in rural South Africa – impact of the HIV epidemic. S Afr Med J. 1997;87(4):447–50.

20 Ashurst M. WHO warned that multidrug resistant TB will spread. BMJ. 1996;313(9).

21 World Health Organization. WHO Report on the TB epidemic. Geneva: WHO; 1997. Report No.: WHO/TB/97.225.

22 Dye C, Espinal MA, Watt CJ, Mbiaga C, Williams BG. Worldwide incidence of multidrug-resistant tuberculosis. J Infect Dis. 2002;185(8):1197–202.

23 South African National Department of Health. Management of drug-resistant tuberculosis: policy guidelines. Pretoria: NDoH; 2011.

24 World Health Organization. Global Tuberculosis Report 2015. Geneva: WHO; 2015. Contract No.: WHO/HTM/TB/2015.22.

25 South African National Department of Health. Tuberculosis Strategic Plan for South Africa 2007–2011. Pretoria: NDoH; 2007.

26 Ndjeka N. Drug-resistant tuberculosis in South Africa. South African TB Conference; Durban, South Africa, June 2014.

27 South African National Department of Health. The Management of Multidrug Resistant Tuberculosis. Pretoria: NDoH; 1999.

28 World Health Organization. Guidelines for the management of drug-resistant tuberculosis. Geneva: WHO; 1997. Contract No.: WHO/TB/96.210.

29 Pillay M, Sturm AW. Evolution of the extensively drug-resistant F15/LAM4/KZN strain of Mycobacterium tuberculosis in KwaZulu-Natal, South Africa. Clin Infect Dis. 2007;45(11):1409–14.

30 van Rie A, Warren RM, Beyers N, et al. Transmission of a multidrug-resistant Mycobacterium tuberculosis strain resembling "strain W" among noninstitutionalized, human immunodeficiency virus-seronegative patients. J Infect Dis. 1999;180(5):1608–15.

31 Gandhi NR, Moll A, Sturm AW, et al. Extensively drug-resistant tuberculosis as a cause of death in patients co-infected with tuberculosis and HIV in a rural area of South Africa. Lancet. 2006;368(9547):1575–80.

32 Coetzee G, Koornhof H. MDR/XDR tuberculosis in South Africa. South Afr J Epidemiol Infect. 2006;21(4):150–1.

33 Boehme CC, Nicol MP, Nabeta P, et al. Feasibility, diagnostic accuracy, and effectiveness of decentralised use of the Xpert MTB/RIF test for diagnosis of tuberculosis and multidrug resistance: a multicentre implementation study. Lancet. 2011;377(9776):1495–505.

34 National Institute for Communicable Diseases. South African Tuberculosis Drug Resistance Survey 2012–14. National Health Laboratory Service; 2016.

35 Ndjeka N. Drug-resistant tuberculosis in South Africa. Pretoria: South African National Department of Health; 2013.

36 Wallengren K, Scano F, Nunn P, et al. Drug-Resistant tuberculosis, KwaZulu-Natal, South Africa, 2001–2007. Emerg Infect Dis. 2011;17(10):1913–6.

37 Shah NS, Auld SC, Brust JC, et al. Transmission of Extensively Drug-Resistant Tuberculosis in South Africa. N Engl J Med. 2017;376(3):243–53.

38 Dheda K, Limberis JD, Pietersen E, et al. Outcomes, infectiousness, and transmission dynamics of patients with extensively drug-resistant tuberculosis and home-discharged patients with programmatically incurable tuberculosis: a prospective cohort study. Lancet Respir Med. 2017;269–81.

39 Zignol M, Sismanidis C, Falzon D, Glaziou P, Dara M, Floyd K. Multidrug-resistant tuberculosis in children: evidence from global surveillance. Eur Respir J. 2013;42(3):701–7.

40 Schaaf HS, Shean K, Donald PR. Culture confirmed multidrug resistant tuberculosis: diagnostic delay, clinical features, and outcome. Arch Dis Child. 2003;88(12):1106–11.

41 Moore BK, Anyalechi E, van der Walt M, et al. Epidemiology of drug-resistant tuberculosis among children and adolescents in South Africa, 2005–2010. Int J Tuberc Lung Dis. 2015;19(6):663–9.

42 Rawlinson J, Klaasen S, Bamford L, Visser R. Improving the management of patients with multi-drug resistant tuberculosis in the Lower Orange District and Northern Cape Province. Initiative for Sub-district Support. Durban: Health Systems Trust; 2001.

43 Finlay A, Van der Walt M, Holtz TH, Thorpe L, Wells CD, Weyer K. Treatment outcomes of patients with multidrug-resistant tuberculosis in South Africa using a standardized regimen, 1999–2000. 42nd Annual Meeting of the Infectious Disease Society of America; Boston, USA; 2004.

44 Rawlinson J. Multi-drug resistant tuberculosis in South Africa. HST Update. 2000;56:8–10.

45 Espinal MA, Dye C, Raviglione M, Kochi A. Rational 'DOTS plus' for the control of MDR-TB. Int J Tuberc Lung Dis. 1999;3(7):561–3.

46 Weyer K. Multidrug-resistant tuberculosis. Continuing Medical Education (CME). 2005;23(2):74–84.

47 Farley JE, Ram M, Pan W, et al. Outcomes of multi-drug resistant tuberculosis (MDR-TB) among a cohort of South African patients with high HIV prevalence. PLoS One. 2011;6(7):e20436.

48 Hoek KG, Schaaf HS, Gey van Pittius NC, van Helden PD, Warren RM. Resistance to pyrazinamide and ethambutol compromises MDR/XDR-TB treatment. S Afr Med J. 2009;99(11):785–7.

49 Calver AD, Falmer AA, Murray M, et al. Emergence of increased resistance and extensively drug-resistant tuberculosis despite treatment adherence, South Africa. Emerg Infect Dis. 2010;16(2):264–71.

50 Cegielski JP, Dalton T, Yagui M, et al. Extensive Drug Resistance Acquired During Treatment of Multidrug-Resistant Tuberculosis. Clin Infect Dis. 2014.

51 World Health Organization. Guidelines for the programmatic management of drug-resistant tuberculosis. Geneva: WHO; 2006. Contract No.: WHO/HTM/TB/2006.362.

52 Schnippel K, Rosen S, Shearer K, et al. Costs of inpatient treatment for multi-drug-resistant tuberculosis in South Africa. Trop Med Int Health. 2013;18(1):109–16.

53 South African National Department of Health and the World Health Organization. Towards Universal Health Coverage: Report of the evaluation of South Africa drug resistant TB programme and its implementation of the policy framework on decentralised and deinstitutionalised management of multidrug resistant TB. Geneva: WHO; 2016.

54 Loveday M, Wallengren K, Brust J, et al. Community-based care vs. centralised hospitalisation for MDR-TB patients, KwaZulu-Natal, South Africa. Int J Tuberc Lung Dis. 2015;19(2):163–71.

55 Padayatchi N, Friedland G. Decentralised management of drug-resistant tuberculosis (MDR- and XDR-TB) in South Africa: an alternative model of care. Int J Tuberc Lung Dis. 2008;12(8):978–80.

56 Brust JC, Shah NS, Scott M, et al. Integrated, home-based treatment for MDR-TB and HIV in rural South Africa: an alternate model of care. Int J Tuberc Lung Dis. 2012;16(8):998–1004.

57 Loveday M, Wallengren K, Voce A, et al. Comparing early treatment outcomes of MDR-TB in decentralised and centralised settings in KwaZulu-Natal, South Africa. Int J Tuberc Lung Dis. 2012;16(2):209–15.

58 Cox H, Hughes J, Daniels J, et al. Community-based treatment of drug-resistant tuberculosis in Khayelitsha, South Africa. Int J Tuberc Lung Dis. 2014;18(4):441–8.

59 Cox H, Daniels J, Muller O, et al. Impact of decentralized care and the Xpert MTB/RIF test on rifampicin-resistant tuberculosis treatment initiation in Khayelitsha, South Africa. Open Forum Infectious Diseases. 2015; Advance access Feb 4.

60 Churchyard GJ, Stevens WS, Mametja LD, et al. Xpert MTB/RIF versus sputum microscopy as the initial diagnostic test for tuberculosis: a cluster-randomised trial embedded in South African roll-out of Xpert MTB/RIF. Lancet Glob Health. 2015;3(8):e450–7.

61 South African National AIDS Council. National Strategic Plan (NSP) for HIV and AIDS, TB and STIs 2012–2016. Pretoria: NDoH; 2011.

62 Pym AS, Diacon AH, Tang SJ, et al. Bedaquiline in the treatment of multidrug- and extensively drug-resistant tuberculosis. Eur Respir J. 2015.

63 Ndjeka N, Conradie F, Schnippel K, et al. Treatment of drug-resistant tuberculosis with bedaquiline in a high HIV prevalence setting: an interim cohort analysis. Int J Tuberc Lung Dis. 2015;19(8):979–85.

64 South African National Department of Health. Introduction of new drugs and drug regimens for the management of drug-resistant tuberculosis in South Africa: policy framework. 2015. Contract No.: Version 1.1 Pretoria NDoH; June 2015.

65 DR-TB STAT Task Force. DR-TB STAT: Summary and Updates. December, 2016.
URL: http://drtb-stat.org

66 World Health Organization. The shorter MDR-TB regimen 2016 [Internet] [cited 12 December 2016]
URL: http://www.who.int/tb/Short_MDR_regimen_factsheet.pdf.

67 Aung KJ, Van Deun A, Declercq E, et al. Successful '9-month Bangladesh regimen' for multidrug-resistant tuberculosis among over 500 consecutive patients. Int J Tuberc Lung Dis. 2014;18(10):1180–7.

68 Moodley R, Godec TR, Team ST. Short-course treatment for multidrug-resistant tuberculosis: the STREAM trials. Eur Respir Rev. 2016;25(139):29–35.

69 Enwerem M. DR-TB Treatment Guidelines Revision 4th to 5th July 2016: Report of the expert meeting to advance the implementation of short MDR-TB regimen in South Africa. South African National Department of Health, World Health Organization, USAID; 2016.

70 Barnard M, Warren R, Gey Van Pittius N, et al. Genotype MTBDRsl line probe assay shortens time to diagnosis of extensively drug-resistant tuberculosis in a high-throughput diagnostic laboratory. Am J Respir Crit Care Med. 2012;186(12):1298–305.

71 Theron G, Peter J, Richardson M, et al. The diagnostic accuracy of the GenoType((R)) MTBDRsl assay for the detection of resistance to second-line anti-tuberculosis drugs. Cochrane Database Syst Rev. 2014(10):CD010705.

72 RESIST-TB (Research Excellence to Stop TB Resistance). Drug-resistant tuberculosis clinical trials progress report (updated January 2017).
URL: www.resisttb.org

73 Conradie F, Diacon AH, Mendel C, et al. Interim results of Nix-TB clinical study of pretomanid, bedaquiline and linezolid for treatment of XDR and treatment intolerant/failed MDR-TB. 47th World Conference of Lung Health; Liverpool, United Kingdom: International Union Against Tuberculosis and Lung Diseases; 2016.

74 Abdool Karim SS, Churchyard GJ, Karim QA, Lawn SD. HIV infection and tuberculosis in South Africa: an urgent need to escalate the public health response. Lancet. 2009;374(9693):921–33.

75 Loveday M, Padayatchi N, Wallengren K, et al. Association between health systems performance and treatment outcomes in patients co-infected with MDR-TB and HIV in KwaZulu-Natal, South Africa: implications for TB programmes. PLoS One. 2014;9(4):e94016.

76 Cohen K, Meintjes G. Management of individuals requiring antiretroviral therapy and TB treatment. Curr Opin HIV AIDS. 2010;5(1):61–9.

77 Chehab JC, Vilakazi-Nhlapo AK, Vranken P, Peters A, Klausner JD. Current integration of tuberculosis (TB) and HIV services in South Africa, 2011. PLoS One. 2013;8(3):e57791.

78 Page-Shipp L, Voss De Lima Y, Clouse K, et al. TB/HIV integration at primary care level: A quantitative assessment at 3 clinics in Johannesburg, South Africa. S Afr J HIV Med. 2012;13(3):138–43.

79 Dodd PJ, Sismanidis C, Seddon JA. Global burden of drug-resistant tuberculosis in children: a mathematical modelling study. Lancet Infect Dis. 2016.

80 Zar HJ, Workman L, Isaacs W, Dheda K, Zemanay W, Nicol MP. Rapid diagnosis of pulmonary tuberculosis in African children in a primary care setting by use of Xpert MTB/RIF on respiratory specimens: a prospective study. Lancet Glob Health. 2013;1(2):e97–104.

81 Ahuja SD, Ashkin D, Avendano M, et al. Multidrug resistant pulmonary tuberculosis treatment regimens and patient outcomes: an individual patient data meta-analysis of 9,153 patients. PLoS Med. 2012;9(8):e1001300.

82 Isaakidis P, Rangan S, Pradhan A, Ladomirska J, Reid T, Kielmann K. 'I cry every day': experiences of patients co-infected with HIV and multidrug-resistant tuberculosis. Trop Med Int Health. 2013;18(9):1128–33.

83 Ramma L, Cox H, Wilkinson L, et al. Patients' costs associated with seeking and accessing treatment for drug-resistant tuberculosis in South Africa. Int J Tuberc Lung Dis. 2015;19(12):1513–9.

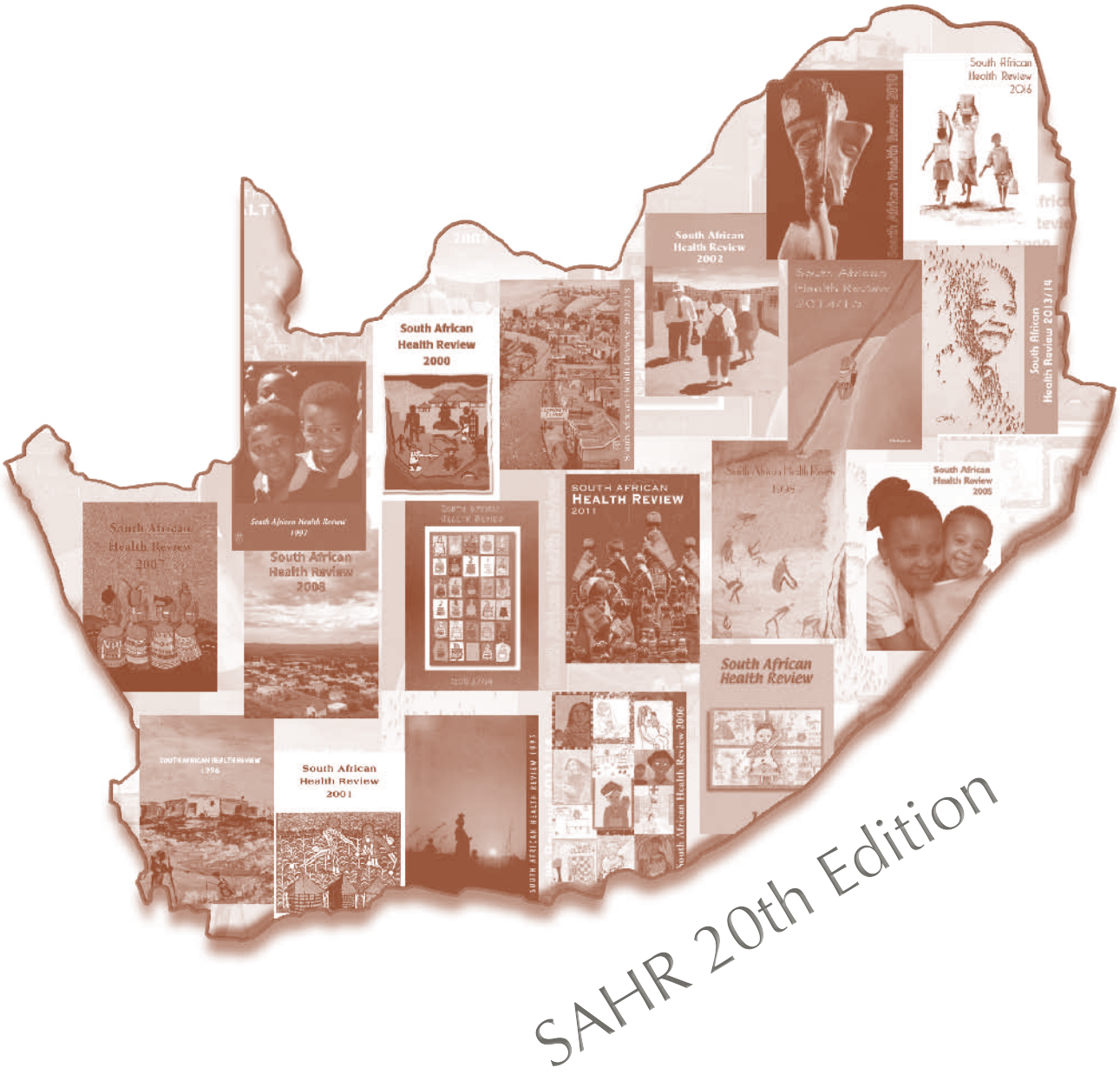
84 Wingfield T, Boccia D, Tovar M, et al. Defining catastrophic costs and comparing their importance for adverse tuberculosis outcome with multi-drug resistance: a prospective cohort study, Peru. PLoS Med. 2014;11(7):e1001675.

85 Cox H, Ramma L, Wilkinson L, Azevedo V, Sinanovic E. Cost per patient of treatment for rifampicin-resistant tuberculosis in a community-based programme in Khayelitsha, South Africa. Trop Med Int Health. 2015.

86 Richter LM, Lonnroth K, Desmond C, Jackson R, Jaramillo E, Weil D. Economic support to patients in HIV and TB grants in rounds 7 and 10 from the global fund to fight AIDS, tuberculosis and malaria. PLoS One. 2014;9(1):e86225.

Chronic diseases

Chronic diseases



16

Advancing the agenda on non-communicable diseases: prevention and management at community level

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South Africa is experiencing an increase in the prevalence of non-communicable diseases (NCDs), which imposes a heavy burden on healthcare services. The South African government has made great strides towards management and control of NCDs, including the development of management guidelines, health-promotion and prevention policies intended to assist healthcare workers, facilities and communities in NCD care. However, it appears that the facility-based component of NCD management and control efforts has received more attention than the community-level components.

The national strategic plan for NCDs highlights the importance of community-level interventions in chronic NCD care. Thus there is a need for community-based strategies for NCD prevention, control and management to complement facility-based health services.

This chapter explores the advancement of the NCD agenda in South Africa through an emphasis on community-level prevention and management. It describes interventions that used community actors such as community health workers in NCD care. The chapter discusses some of the challenges of these interventions, and ends with possible suggestions for South Africa.

The national strategic plan for non-communicable diseases emphasises the need for community-based strategies for prevention, control and management to complement facility-based health services.

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Introduction

Non-communicable diseases (NCDs) such as cardiovascular diseases (CVDs), cancers, chronic respiratory disease and diabetes are the leading cause of mortality and disability globally. Eighty per cent of NCD deaths reportedly occur in low- and middle-income countries (including South Africa), affecting disproportionately more individuals younger than 60 years than in high-income countries. In South Africa, the probability of dying between 30 and 70 years of age from CVDs, cancers, chronic respiratory disease or diabetes is about 27%.[1,2] These death and disease burdens are largely driven by preventable risk factors.

The risk factors for NCDs are well known and include tobacco use, harmful consumption of alcohol, unhealthy diet, obesity and physical inactivity.[3–5] Dietary factors and physical inactivity remain two of the most significant risk factors for NCDs in South Africa, with the former influenced by the food environment.[6] Many of these risk factors can be reduced through existing preventive interventions, as well as through early detection of individuals at risk and those who have undiagnosed conditions.[3] Prevention and early detection measures are therefore crucial for the control and management of NCDs, and failure to implement such interventions can be costly.

Globally, there have been efforts to reduce the burden associated with NCDs. This is evident in the formulation of NCD-related policies and the inclusion of a specific Sustainable Development Goal (SDG) targeted at reducing premature NCD mortality by one-third by 2030.[7] Furthermore, the World Health Organization (WHO) Global Action Plan for the Prevention and Control of NCDs 2013–2020 recommends that each country commit to setting targets and strategies to reduce NCD morbidity and mortality.[8] The development of NCD-related policies and the use of population-based approaches for tackling NCDs highlight the importance of dealing with these conditions.

However, policy development alone will not translate into NCD control. Policies must be translated into action at various levels of society, including community level. An improved response to NCDs at community level calls for new thinking that engages available resources to deliver care, especially in low-resource settings.

Current NCD policy and implementation

The South African National Department of Health (NDoH) has taken various steps to improve NCD management, including the establishment of units specifically responsible for NCD prevention and control. Also, NCD control-related policies have been designed and implemented over the years. In a landmark development, the 2011 summit on NCDs set the stage for a new multisectoral NCD response, which ended with stakeholders agreeing to new national NCD management and control targets contained in the South African NCD Declaration.[9] The Declaration paved the way for the 'Strategic plan for the prevention and control of non-communicable diseases 2013–17',[10] which detailed arrangements for NCD prevention and control in South Africa. Notably, the strategic plan focuses on preventing NCDs and promoting health; strengthening health systems for NCDs; and monitoring progress.[10]

Preventing NCDs and promoting health subsequently became a central focus of policies developed for NCD management. One such policy is the National Health Promotion Strategy and Policy 2015–2019,[11] which provides a framework for general disease prevention in South Africa. This aligns closely with the 2011 Declaration on NCDs[12] and also conforms to the overall WHO Global Action Plan for the Prevention and Control of NCDs.[8] Other policies targeting NCD risk factors include the Liquor Act of 2003[13] and the Tobacco Product Control Act of 1993 (amended in 1999, 2007, 2008 and 2016),[14] designed for alcohol and tobacco consumption control respectively. Policies and strategies are being designed that improve dietary intake and counter the overwhelming influence of 'Big Food' and its impact on NCDs.[6] The Strategy to Prevent and Control Obesity 2015–2020[15] and the National Food and Nutrition Security Policy[16] are some of the policies targeting the food environment and NCDs. As part of the strategy to reduce obesity by 10% by 2020, the South African Treasury plans to increase the price of sugar-sweetened beverages by means of a 20% fiscal tax.[17] The NDoH passed new Regulations on the Foodstuffs, Cosmetics and Disinfectants Act (54 of 1972)[18] to reduce salt intake from processed food in the country,[19] with implementation commencing in 2016.

While empirical evidence shows reduction in tobacco consumption in South Africa after the introduction of tobacco control, the impact of other NCD control policies remains to be seen. This suggests a gap between plans and implementation.[20]

In order to address apparent gaps between macro-level planning and micro-level implementation, the NDoH introduced the Primary Health Care (PHC) Re-engineering policy to facilitate integration of NCD prevention and control into general health management. The expectation is that health-facility teams working with Ward-based Outreach Teams (WBOTs), comprising nurses and community health workers (CHWs)[21] are able to deliver integrated NCD services to individuals in their households and communities. Although the PHC Re-engineering Strategy has its challenges,[22,23] notionally it provides a good platform for improved community-level prevention and management of NCDs. In designing this policy, health policymakers recognised the critical importance of community-level efforts in the fight against NCDs. The NDoH's Ideal Clinic initiative and the Integrated Clinical Services Model (ICSM) offer opportunities for NCD management and integration between facility and community levels. However, there is a need for 'consistency of purpose' connecting the macro (policy) and the micro (community) environments of NCD prevention and control.

While NCD policies and strategies exist in South Africa, their impact in reducing the NCD burden in the country will depend on the capacity and readiness of the health system to implement and monitor proposed strategies successfully.

Health-system readiness

The WHO defines the role of health systems in the prevention and control of NCDs as including universal coverage; protecting people from the burden of ill-health associated with NCDs through people-centered PHC; making resources available for the care of people with NCDs; as well as preventing complications and reducing mortality. The health system is also expected to build the capacity of communities to take responsibility for their health through actions

such as advocating for reduced exposure to modifiable NCD risk factors, and making healthy choices in their living and work environments.[8] At the very minimum, the South African health system should be able to perform these functions in combatting NCDs.

One of the main targets of the National Strategic Plan for NCDs is strengthening of national capacity and reorientation of the health system to address NCDs.[10,24] The PHC Re-engineering Strategy stipulates the use of WBOTs, District Clinical Specialist Teams (DCSTs), and School Health Teams to provide screening and disease-detection services in schools and communities. Availability and readiness of these cadres of healthcare workers (HCWs) remain a challenge.[22,23] Community-health systems for NCD prevention and control appear to lag behind facility systems. There is heavy reliance on facilities for NCD management. However, as discussed next, it is evident that the facility system is not adequately equipped to deal with the NCD challenge.

Availability and capacity of health providers in NCD management

Evidence suggests that between 1997 and 2006, little progress was made in improving the availability of HCWs in South Africa's public-health sector.[25,26] However, improvements have been made more recently. Between 2004 and 2010, the overall number of workers in the public-health sector increased quite considerably, from 153 383 to 210 511, mainly in the nursing sector.[27] However, this increase is not necessarily adequate to cater for the increasing burden of NCDs and other diseases.[28,29] Most of the documented increase in the number of HCWs has been in the number of facility-based staff, with little or no mention of community care workers[27] The capacity of available HCWs to implement policies and strategies is equally important, but is not adequate at present.

Studies assessing the management of patients with diabetes and hypertension at PHC facilities have reported suboptimal management and poor compliance.[30] In one study in Soweto, Brand and colleagues found that both hypertensive and diabetes patients were poorly managed and were not screened for CVD risk factors.[31] Staff shortages, resulting in reduced time to counsel patients with NCDs and poor communication between patients and health workers, are some of the factors reported as barriers to management and control of NCDs globally.[32]

There have been initiatives to improve the capacity of HCWs to deliver NCD care in South Africa. Nurses are the major care providers for NCD patients in PHC facilities in South Africa, and as such they have been trained in evidence-based management guidelines, known as 'Primary Care 101'.[33] An evaluation of the impact of the Primary Care 101 training found that diabetes and hypertension management skills improved among nurses, but the management of asthma and other chronic obstructive pulmonary diseases did not. This was attributed in part to the fact that diabetes and hypertension were common conditions in the studied population, which exposed the nurses to experiential learning.[34] There is a need to explore the utilisation of other cadres of health workers, including CHWs, to manage NCDs.

One of the strategies recommended for circumventing these health system-related challenges is 'task-shifting',[35] whereby a task normally performed by a physician is shifted to a health professional with a different or lower level of education and training, or to a specifically trained person who performs a limited task only, without having formal health education.[35,36]

The PHC Re-engineering Strategy encourages the shift of disease-management tasks from physicians in health facilities to nurses and CHWs in communities and other primary care settings. Implementation of the PHC Re-engineering Strategy and other strategies (e.g. the Ideal Clinic initiative) has led to an increase in the number of PHC facilities with functional clinic committees and WBOTs, thus increasing access to community-based PHC services.[37] There is a need to strengthen these strategies and enhance community capacity for NCD management.

Although the prevention of NCDs should be part of PHC services, these services are still weak in many places in South Africa. Patients still access health care at inappropriate levels,[21] and community-based hospice and palliative care is mainly provided by non-governmental organisations (NGOs) and not by government.

Medicine supply and management remains an ongoing challenge as medications are sometimes not available, especially in rural areas of South Africa,[38] and although Chronic Dispensing Units (CDUs) have been rolled out in some areas to ensure that patients receive medicines conveniently,[39] it is too early to comment on the effectiveness of this system. The new national adherence guideline stipulates three options of Repeat Prescription Collection Service (RPCS) for stable chronic-disease clients, namely; Adherence club, Central Chronic Medicines Dispensing and Distribution (CCMDD) and Spaced & Fast Lane Appointment (SFLA) (including those with certain NCDs such as diabetes and hypertension).[40] Community pick-up points for medications under the CCMDD system is one of the strategies approved, and community dispensing of chronic medication is encouraged and should be sustained and improved.

Health financing

The importance of health financing for management and control of NCDs at community level cannot be overemphasised. South Africa included NCDs in the National Development Plan (NDP) and has a target of 28% reduction of incidence by 2030. Funding for NCDs forms less than 0.1% of the national health budget; it is not clear how much of this funding is dedicated to community NCD services. There is evidence of increasing budgetary allocation to PHC care.[41] Table 1 shows the increased spending budget for services that provide PHC, with the highest annual growth observed in district management and community health clinics. Despite increasing budgetary allocations to PHC and community services, there is insufficient information on how much is dedicated to the community care system itself.

Table 1: Primary health care spending by budget programme, South Africa, 2007/08–2013/14

	Rand million							Average growth pa %
	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	
2.1 District Management	1 420	1 878	2 044	2 570	2 892	3 070	3 122	14.0
2.2 Community Health Clinics	5 104	6 625	7 846	8 924	9 951	10 522	11 179	14.0
2.3 Community Health Centres	2 833	3 405	3 877	4 326	4 998	5 360	5 785	12.6
2.4 Community-based Services	1 139	1 237	1 591	1 734	1 940	2 213	2 409	13.3
2.5 Other Community Services	688	719	882	1 158	1 144	1 145	1 199	9.7
2.7 Nutrition	209	177	246	298	311	336	354	9.2
6.4 Primary Health Care Training	266	323	316	405	390	411	431	8.4
8.1 Community Health Facilities	788	880	1 253	1 623	1 335	1 465	1 587	12.4
Total	**12 447**	**15 244**	**18 054**	**21 039**	**22 961**	**24 525**	**26 066**	**13.1**
Rand per capita uninsured	305	372	438	504	546	579	610	
PHC as % of total	19.9%	20.3%	20.4%	20.9%	20.9%	20.7%	20.6%	

Source: Naledi et al., 2011.[21]

Advocacy for community-level NCD management

The South African health system includes several policies and strategies for NCD management[9,11,42] However, it is not very clear how the community system has been strengthened and leveraged in the fight for disease control. Examples of where the community system has been successful include management of HIV and AIDS and tuberculosis. To strengthen the case for improved community-level NCD prevention and management, we present a few examples of how community resources have been utilised to improve disease management. Central to these community resources are CHWs.

Effectiveness of community-level NCD prevention and control interventions

Table 2 presents a summary of selected NCD interventions using community-based strategies, mainly utilising CHWs. Interventions described focus on NCDs such as hypertension, diabetes, cancer and CVDs.

Table 2: Community-based NCD interventions utilising community health workers in South Africa, 2006–2015

Author and year	Aim and setting	Intervention	Training, duration of training & retraining	Impact/outcome
Puoane et al. (2006)[43]	To describe the development of an intervention programme for primary prevention of NCDs in general and CVD. Western Province	CHWs (intervention group) received training on lifestyle modification focusing on healthy eating and physical activity. Interventions included: healthy eating, group walks, developing and staging drama to disseminate messages on NCDs, and formation of a health club.	Training focused on primary prevention of NCDs (including anthropometric measurements and blood-pressure measurement). Weekly lectures for a period of three hours over one year. No information on retraining.	The initiative created awareness among community members of the importance of primary prevention of diabetes. CHWs initiated the process of behavioural change among themselves.
Bradley and Puoane (2007)[44]	To identify factors that contribute to hypertension and diabetes, and to design and implement appropriate local interventions to prevent these NCDs and promote healthy lifestyles. Western Province	CHWs held community health clubs weekly. Activities conducted included: exercise sessions, discussions on various health topics including healthy eating and physical activity, and cooking demonstrations. On a monthly basis, CHWs measured blood pressure and, when necessary, referred members to the primary care clinic.	Interactive training programme developed in co-operation with CHWs. Focus was on improving the knowledge of CHWs in hypertension and diabetes, promotion of healthy lifestyles, and developing their skills in communication and advocacy. Weekly sessions for three hours over five months. No information on retraining.	No outcomes specified.
Puoane et al. (2012)[45]	To describe experiences in developing and implementing health clubs to reduce hypertension risk. Western Province	CHWs initiated a health club, where anthropometric and blood-pressure measurements were taken. Various topics related to hypertension were discussed in these health clubs.	Training of CHWs was in primary prevention of CVDs. Training included education on risk factors as well as facilitation skills. Training was conducted over a period of six months.	There was a decrease in obesity, while the proportion of people who were of normal weight or overweight decreased over a two-year period. Diastolic pressure remained the same, while systolic pressure increased.

Author and year	Aim and setting	Intervention	Training, duration of training & retraining	Impact/outcome
Ndou et al. (2013)[46]	To examine the outcomes of a pilot CHW programme to improve the management of hypertension and diabetes. Gauteng Province	CHWs provided social support and counselling to improve patient literacy and adherence, and to encourage appropriate visits to the PHC clinic. A monthly supply of medication was delivered to named patients.	The course focused primarily on home-based care and provided skills in adherence, counselling and health promotion, with a particular focus on chronic illnesses, including hypertension and diabetes. Training duration was 14 weeks.	Hypertension control improved with CHW home visits compared with usual clinic care. However, the inverse was found for diabetes control. When both conditions were considered, hypertension control was higher in the intervention group than with usual clinic care.
Gaziano et al. (2014)[47]	To determine whether training CHWs on hypertension in order to improve adherence to medications is a cost-effective intervention among community members in South Africa.	In this simulated intervention, six CHWs measured blood pressure using an automated blood-pressure cuff. Each CHW was given a list of hypertensive patients registered at a nearby clinic and it was estimated that she could make six home visits per day.	In this simulated intervention, six CHWs were trained to measure blood pressure using an automated blood-pressure cuff. Training was also given on the aetiology and prevention of hypertension and CVD. Training duration was two days.	The CHW intervention was found to be cost-effective and led to an incremental cost-effectiveness ratio of $320/ Disability-Adjusted Life Year averted.
Tum et al. (2013)[48]	To develop and pilot-test an intervention to address low cervical screening uptake as well as a potentially low breast-screening uptake. Tshwane	Community members were trained to become CHWs. However, one member was specifically trained to work in cancer prevention. The assessed outcomes for this study were: screening uptake; awareness; and value of the CHW. The study utilised a post-intervention design.	CHWs were trained and tasked to raise awareness of cervical and breast cancer and to motivate women to take up screening. Training was conducted over a period of three months.	Intervention showed that CHWs were valued but uptake of cervical screening and awareness remained low.
Gaziano et al. (2015)[49]	To investigate whether CHWs could do community-based screenings to predict CVD risk as effectively as physicians or nurses, with a simple, non-invasive risk-prediction indicator in low- and middle-income countries. South Africa, Bangladesh, Guatemala, Mexico	Observational study CHWs who successfully completed the training screened community residents to predict CVD risk.	Trained to calculate an absolute CVD risk score with a previously validated simple, non-invasive screening indicator. Duration of the training was 1–2 weeks and included both practical and didactic components. No information on retraining.	Mean level of agreement between the CHW and health professional scores was 96.8% for the overall study and 97% for South Africa.

Key findings and lessons learnt

Key findings from the studies described in Table 2 include the following:

- CHWs are effective when used in the delivery of clinical outcomes for NCDs;
- there are differences in training strategies;
- community-based interventions differ according to the targeted outcome; and
- NCD interventions are suitable for resource-poor settings, which is the case in many areas in South Africa.

In addition, several lessons can be learnt from the research studies presented in Table 2. The studies show that the scope of CHW practice ranges from NCD prevention to control. The study by Gaziano and colleagues clearly demonstrates that CHWs have the ability to screen community members for CVD risk; furthermore, the accuracy of CHWs was found to be similar to that of professional health staff.[49] However, despite CHWs' ability in executing NCD-related tasks, their effectiveness in improving NCD-related health outcomes is not well documented. Evaluation of health outcomes will strengthen the case advocating for the use of CHWs at community level, especially in resource-limited settings and areas where there is a lack of nurses and doctors.

The breadth of work undertaken by CHWs was found to vary widely, based on intended health outcomes. Their tasks included measurement of height and weight, monitoring of blood pressure and blood-glucose level,[35,37,39] as well as screening and health education.[38] These tasks are usually performed in formal health facilities; as such, the studies provide evidence that CHWs have the ability to extend services beyond health facilities when trained appropriately.

Training of CHWs is crucial in capacity-building, with the cited studies showing varied training duration. In a country where the educational attainment of CHWs varies, duration of training is critical. Furthermore, duration of training can have an impact on follow-up training. It has been shown that follow-up training is necessary for retaining knowledge;[50–52] this is even more the case for this cadre of workers who lack continuous education opportunities.

Despite the usefulness of these interventions, several issues should be borne in mind when considering them, especially in terms of

scale-up. High-performing CHW subsystems should be integrated into the PHC system, and there must be investment in supervision that extends into health facilities.[53] As CHW models become more formalised and integrated into the formal healthcare system, training must be better structured. Apart from training, it is equally important to ensure that CHWs have the appropriate materials in order to fulfil their tasks.[54]

In the interventions cited in Table 2, researchers had the necessary resources for the execution of tasks. Other studies have reported that in resource-poor settings, CHWs often lack the resources and supplies needed to perform their daily tasks,[55] thus lack of supplies can hinder performance. In addition, the scope of practice for CHWs may have implications for the number of workers needed to deliver services to communities.[53] Failure to increase the number of CHWs will mean that they either offer fewer services or reach fewer households. These are some of the elements that must be in place for CHW programmes to be successful and effective.

Potential gains

Gains in community-level NCD prevention and control, especially when CHWs are utilised, can be measured at three major levels, namely patient, care-provider and national-resource levels.

For the individual, gains include disease prevention due to health-promotion messages and services delivered early and closer to home in the community. There is also reduced transport and other associated costs for individuals already affected with NCDs if they receive services at home from a CHW.

For the care providers, gains include reduced facility visits with less overcrowding as fewer people develop NCDs and attendant complications.

For the country, gains include fewer resources spent on NCD management, with disease averted by health promotion and complications delayed or totally averted by early detection.

Based on the evidence presented in this chapter, we have formulated our recommendations focusing on three areas, namely the CHW programme, health information and financing.

These recommendations are formulated to improve the utilisation of CHWs in the prevention and control of NCDs at community level.

The CHW Programme

- Community and facility interaction: Successful interaction between the Ideal Clinic and the WBOT stream of PHC re-engineering is crucial. Community health workers are well positioned to be the fulcrum of a successful interaction. If properly co-ordinated, this can ensure smooth integration between community (promotive and preventive) and facility (curative and rehabilitative) NCD services.
- CHW training and retraining: There should be a standardised curriculum for NCDs. In addition, training should focus on core tasks, based on evidence, which will result in a more focused training programme. Retraining is crucial, thus dedicated trainers should be identified, as should appropriate intervals for retraining.
- Supportive supervision: Constant supervision that is non-judgmental can assist in improving the confidence of CHWs in executing their tasks. In addition, supervision has the potential to provide a non-threatening space that facilitates interactive learning.
- CHW scope of work: The CHW scope of work must be clearly defined, so that workers are able to provide a comprehensive service to communities. In resource-limited settings where CHWs are required to provide a plethora of services, defining their NCD-related tasks will ensure that they offer realistic service, without compromising on the quality of service.

Health information

As with HIV and AIDS, translating NCD policy into action will require a carefully designed monitoring system. Currently, indicators set for NCD monitoring appear inadequate and inappropriate for providing information for effective NCD control. Because of the greater emphasis on promotive and preventive health action, the South African health-information system should be improved to highlight progress in NCD prevention. Importantly, as most promotive and preventive health actions occur in the community, the health-information system should be strengthened for adequate information collection and reciprocal use at community level. Capacity for useful and relevant data collection must be enhanced. Healthcare workers providing community-level NCD activities are a useful resource that should be capacitated to form part of the health-information system for NCD. Process, outcome and impact indicators for NCD monitoring and management are needed, and several of these will be crucial at community level.

Financing

There is a need to pursue alternative funding for CHWs. Donor agencies should be leveraged to finance community involvement in NCD management, as has been the case with other chronic conditions such as HIV and AIDS. Furthermore, there is a need to look at the cost-effectiveness of utilising CHWs in a setting such as South Africa, as a cost-effective approach will strengthen the importance of community-based interventions for NCDs.

Conclusion

Evidence shows that there are flaws in the management of NCDs in the formal healthcare system, suggesting the need to provide services that extend beyond health facilities to communities in order to advance the NCD agenda. Community-level prevention and control of NCDs in resource-limited settings is crucial for continuity of care. Community health workers have provided health care within communities for decades; therefore, they can potentially provide NCD care while also connecting individuals to the formal healthcare system. Numerous systems, such as funding, training and retraining, and supportive supervision, should be put in place to enable CHWs to provide adequate services. Furthermore, they require support from other parts of the formal healthcare system, especially at the primary level of care. A strong community-based focus and a functional formal healthcare system have the potential to avert the burden of NCDs.

References

1 World Health Organization. Global Status Report on Noncommunicable Diseases 2014. Geneva: World Health Organization; 2014.

2 World Health Organization. Global Health Estimates 2013: deaths by cause, age and sex; estimates for 2000–2012. [Internet]. Geneva; 2014 [cited 13 Feb 2017]. URL: http://www.who.int/healthinfo/%0Aglobal_burden_disease/en/

3 Caleyachetty R, Echouffo-Tcheugui JB, Tait CA, Schilsky S, Forrester T, Kengne AP. Prevalence of behavioural risk factors for cardiovascular disease in adolescents in low-income and middle-income countries: an individual participant data meta-analysis. Lancet Diabetes Endocrinol [Internet]. 1 Jul 2015 [cited 2017 Feb 13];3(7):535–44. URL: http://www.thelancet.com/article/S2213858715000765/fulltext

4 Libman K, Freudenberg N, Sanders D, Puoane T, Tsolekile L. The role of urban food policy in preventing diet-related non-communicable diseases in CapeTown and New York. Public Health. 2015;129(4).

5 World Health Organization. Fact sheet: Cardiovascular diseases (CVDs). 2016. URL: http://www.who.int/mediacentre/factsheets/fs317/en/

6 Igumbor EU, Sanders D, Puoane TR, Tsolekile L, Schwarz C, Purdy C, et al. "Big food," the consumer food environment, health, and the policy response in South Africa. PLoS Med. 2012;9(7).

7 Sachs JD. From millennium development goals to sustainable development goals. Lancet. [Internet]. 9 Jun 2012 [cited 28 Aug 2016];379(9832):2206–11. URL: http://www.thelancet.com/article/S0140673612606850/fulltext

8 World Health Organization. Global action plan for the prevention and control of noncommunicable diseases : 2013–2020. Geneva: World Health Organization; 2013.

9 South African National Department of Health. South African Declaration on the Prevention and Control of Non-communicable Diseases. National Department of Health, Pretoria: NDoH; 2011 [cited 14 Feb 2017]. URL: http://www.cdia.uct.ac.za/usr/health/research/groupings/cdia/downloads/SA_NCD_Declaration.pdfv

10 South African National Department of Health. Strategic Plan for the prevention and control of non-communicable diseases 2013–17 [Internet]. 2013 [cited 13 Feb 2017]. URL: https://www.health-e.org.za/wp-content/uploads/2013/09/NCDs-STRAT-PLAN-CONTENT-8-april-proof.pdf

11 South African National Department of Health. The National Health Promotion Policy and Strategy 2015–19 [Internet]. Pretoria: NDoH; 2014 [cited 14 Feb 2017]. URL: https://www.sancda.org.za/south-african-health-promotion-policy-strategy-2015-19-new/

12 United Nations. Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases. In New York: United Nations; 2012 [cited 14 Feb 2017]. URL: http://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf

13 Department of Trade and Industry. National Liquor Policy [Internet]. 2015 p. Notice 446 of 2015. URL: http://www.gov.za/sites/www.gov.za/files/38808_gen446.pdf

14 Republic of South Africa Government Gazette. Tobacco Products Control Act 183 of 1993. URL: http://www.gov.za/sites/www.gov.za/files/Act83of1993.pdf

15 South African National Department of Health. Strategy for the Prevention and Control of Obesity in South Africa 2015–2020 [Internet]. 2015 [cited 24 Apr 2017]. URL: https://www.health-e.org.za/wp-content/uploads/2015/12/National-Strategy-for-prevention-and-Control-of-Obesity-4-August-latest.pdf

16 South African National Department of Agriculture and Fisheries. The national policy on food and nutrition security for the Republic of South Africa [Internet]. 2014. URL: http://www.gov.za/sites/www.gov.za/files/37915_gon637.pdf

17 National Treasury: Republic of South Africa. Taxation of sugar sweetened beverages [Internet]. 2016. URL: http://www.treasury.gov.za/public comments/Sugar sweetened beverages/policy paper and proposals on the taxation of sugar sweetened beverages-8 july 2016.pdf

18 South African National Department of Health. Foodstuffs, Cosmetics and Disinfectants Act, 1972 (54 of 1972). 1972 [cited 24 Apr 2017];54. URL: http://www.gov.za/sites/www.gov.za/files/38975_rg10465_gon591.pdf

19 Hofman KJ. Intersectoral case study: Successful sodium regulation in South Africa. [Internet]. 2013 [cited 10 Apr 2017]. URL: http://www.afro.who.int/en/clusters-a-programmes/4085-successful-sodium-regulation-in-south-africa-.html

20 Netshitenzhe M, Makaepea C. Final National Liquor Policy: National Liquor Review. Cape Town: Department of Trade and Industry; 2016 [cited 14 Feb 2017]. URL: http://www.dti.gov.za/parliament/2016/Liquor_Policy_30122016.pdf

21 Naledi T, Barron P, Schneider H. Primary Health Care in South Africa since 1994 and implications of the new vision for PHC re-engineering. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health Systems Trust. 2011.

22 Nxumalo, Nonhlanhla, Choonara S. A Rapid Assessment of Ward-based PHC outreach teams in Gauteng Sedibeng District – Emfuleni sub-district [Internet]. 2014 [cited 13 Feb 2017]. URL: http://citeweb.info/20142827119

23 Schneider H, Schaay N, Dudley L, Goliath C, Qukula T. The challenges of reshaping disease specific and care oriented community based services towards comprehensive goals: a situation appraisal in the Western Cape Province, South Africa. BMC Health Serv Res [Internet]. 2015;15(1):436. URL: http://www.biomedcentral.com/1472-6963/15/436

24 Beaglehole R, Bonita R, Ezzati M, Alleyne G, Dain K, Kishore SP, et al. NCD Countdown 2025: accountability for the 25 × 25 NCD mortality reduction target. Lancet [Internet]. 2014 Jul 12 [cited 4 Nov 2016];384(9938):105–7. URL: http://www.thelancet.com/article/S0140673614610916/fulltext

25 South African National Department of Health. Human Resources for Health South Africa: HRH strategy for the health sector 2012/13 – 2016/17 [Internet]. 2011 [cited 24 Apr 2017]. URL: http://www.gov.za/sites/www.gov.za/files/hrh_strategy_0.pdf

26 Dambisya Y. A review of non-financial incentives for health worker retention in east and southern Africa. Heal Syst Res Group, Dep [Internet]. 2007 [cited 24 Apr 2017]. URL: http://www.chwcentral.org/sites/default/files/A review of non-financial incentives for health worker retention in east and southern Africa.pdf

27 Blecher M, Kollipara A, Zulu N, De Jager P. Health financing. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health Systems Trust; 2011.

28 Lehmann U. Strengthening human resources for Primary Health Care: Primary Health Care: systems support. In: Barron P, editor. South African Health Review 2008. Durban: Health Systems Trust; 2008.

29 Matsoso M, Strachan B. Human Resources for Health for South Africa: HRH Strategy for the Health Sector 2012/13–2016/17. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health Systems Trust; 2011.

30 Igbojiaku OJ, Ross A, Harbor OC. Compliance with diabetes guidelines at a regional hospital in KwaZulu-Natal, South Africa : original research [Internet]. Vol. 5, Afr J Prim Health Care Fam Med. AOSIS; 2013 [cited 14 Feb 2017]. URL: https://journals.co.za/content/phcfm/5/1/EJC134584

31 Brand M, Woodiwiss AJ, Michel F, Booysen HL, Majane OHI, Maseko MJ, et al. Chronic diseases are not being managed effectively in either high-risk or low-risk populations in South Africa. S Afr Med J [Internet]. [cited 14 Feb 2017];103(12):938–41. URL: http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0256-95742013001200028&lng=en&nrm=iso&tlng=en

32 Khatib R, Schwalm J-D, Yusuf S, Haynes RB, McKee M, Khan M, et al. Patient and Healthcare Provider Barriers to Hypertension Awareness, Treatment and Follow Up: A Systematic Review and Meta-Analysis of Qualitative and Quantitative Studies. Barengo NC, editor. PLoS One [Internet]. 2014 Jan 15 [cited 14 Feb 2017];9(1):e84238. URL: http://dx.plos.org/10.1371/journal.pone.0084238

33 Fairall LR, Zwarenstein M, Bateman ED, Bachmann M, Lombard C, Majara BP, et al. Effect of educational outreach to nurses on tuberculosis case detection and primary care of respiratory illness: pragmatic cluster randomised controlled trial. BMJ [Internet]. 2005 [cited 24 Apr 2017];331(7519). URL: http://www.bmj.com/content/331/7519/750

34 Naidoo S, Mahomed OH, Asmall S, Taylor M. Nurses' knowledge of chronic disease management. Heal SA Gesondheid [Internet]. 2014 Mar 3 [cited 14 Feb 2017];19(1):1–8. URL: http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S2071-97362014000100031&lng=en&nrm=iso&tlng=en

35 Joshi R, Alim M, Kengne AP, Jan S, Maulik PK, Peiris D, et al. Task Shifting for Non-Communicable Disease Management in Low and Middle Income Countries – A Systematic Review. Moormann AM, editor. PLoS One [Internet]. 2014 Aug 14 [cited 14 Feb 2017];9(8):e103754. URL: http://dx.plos.org/10.1371/journal.pone.0103754

36 Lekoubou A, Awah P, Fezeu L, Sobngwi E, Kengne AP. Hypertension, Diabetes Mellitus and Task Shifting in Their Management in Sub-Saharan Africa. Int J Environ Res Public Health [Internet]. 2010 Jan 27 [cited 14 Feb 2017];7(2):353–63. URL: http://www.mdpi.com/1660-4601/7/2/353/

37 South African National Department of Health. Department of Health Annual Report 2015/2016 [Internet]. Pretoria: NDoH; 2016. [cited 13 Feb 2017]. URL: http://www.gov.za/documents/department-health-annual-report-20152016-22-nov-2016-0000

38 Magadzire BP, Budden A, Ward K, Jeffery R, Sanders D. Frontline health workers as brokers: provider perceptions, experiences and mitigating strategies to improve access to essential medicines in South Africa. BMC Health Serv Res [Internet]. 2014 Dec 5 [cited 22 Feb 2017];14(1):520. URL: http://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-014-0520-6

39 Magadzire BP, Marchal B, Ward K. Improving access to medicines through centralised dispensing in the public sector: a case study of the Chronic Dispensing Unit in the Western Cape Province, South Africa. BMC Health Serv Res [Internet]. 2015 Jun 17 [cited 22 Feb 2017];15(1):513. URL: http://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-015-1164-x

40 South African National Department of Health. Adherence Guidelines for HIV, TB and NCDs: Policy and service delivery guidelines for linkage to care, adherence to treatment and retention in care [Internet]. 2016 [cited 24 Apr 2017]. URL: https://www.nacosa.org.za/wp-content/uploads/2016/11/Integrated-Adherence-Guidelines-NDOH.pdf

41 National Planning Commission. National Development Plan 2030: Our future – make it work. South African Government [Internet]. Pretoria. 2010 [cited 13 Feb 2017]. URL: http://www.gov.za/documents/national-development-plan-2030-our-future-make-it-work

42 South African National Department of Health. South African Declaration on the Prevention and Control of Non-communicable Diseases. Pretoria: NDoH; 2011 [cited 14 Feb 2017]. URL: http://www.cdia.uct.ac.za/usr/health/research/groupings/cdia/downloads/SA_NCD_Declaration.pdf

43 Puoane T, Bradley H, Hughes G. Community intervention for the emerging epidemic of non-communicable diseases. South African J Clin [Internet]. 2006 [cited 13 Feb 2017]. URL: http://www.tandfonline.com/doi/abs/10.1080/16070658.2006.11734094

44 Bradley HA, Puoane T. Prevention of hypertension and diabetes in an urban setting in South Africa: participatory action research with community health workers. Ethn Dis [Internet]. 2007 [cited 13 Feb 2017];17(1):49–54. URL: http://www.ncbi.nlm.nih.gov/pubmed/17274209

45 Puoane TR, Tsolekile L, Igumbor EU, Fourie JM. Experiences in developing and implementing health clubs to reduce hypertension risk among adults in a South African population in transition. Int J Hypertens. 2012.

46 Ndou T, van Zyl G, Hlahane S, Goudge J. A rapid assessment of a community health worker pilot programme to improve the management of hypertension and diabetes in Emfuleni sub-district of Gauteng Province, South Africa. Glob Health Action [Internet]. 2013 Jan 19 [cited 13 Feb 2017];6(1):19228. URL: https://www.tandfonline.com/doi/full/10.3402/gha.v6i0.19228

47 Gaziano TA, Bertram M, Tollman SM, Hofman KJ. Hypertension education and adherence in South Africa: a cost-effectiveness analysis of community health workers. BMC Public Health [Internet]. 2014 Mar 10 [cited 13 Feb 2017];14(1):240. URL: http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-14-240

48 Tum SJ, Maree JE, Clarke M. Creating awareness and facilitating cervical and breast cancer screening uptake through the use of a Community Health Worker: a pilot intervention study. Eur J Cancer Care (Engl) [Internet]. 2013 Jan [cited 13 Feb 2017];22(1):107–16. URL: http://doi.wiley.com/10.1111/ecc.12005

49 Gaziano TA, Abrahams-Gessel S, Denman CA, Montano CM, Khanam M, Puoane T, et al. An assessment of community health workers' ability to screen for cardiovascular disease risk with a simple, non-invasive risk assessment instrument in Bangladesh, Guatemala, Mexico, and South Africa: an observational study. Lancet Glob Heal [Internet]. 2015 Sep [cited 21 Mar 2017];3(9):e556–63.
URL: http://linkinghub.elsevier.com/retrieve/pii/S2214109X15001436

50 Abrahams-Gessel S, Denman C, Montano C. Training and supervision of community health workers conducting population-based, noninvasive screening for CVD in LMIC: implications for scaling up. Glob Heart [Internet]. 2015 [cited 21 Mar 2017].
URL: http://www.sciencedirect.com/science/article/pii/S2211816014027367

51 Li VC, Goethals PR, Dorfman S. A Global Review of Training of Community Health Workers. Int Q Community Health Educ [Internet]. 2007 Oct [cited 22 Feb 2017];27(3):181–218.
URL: http://journals.sagepub.com/doi/10.2190/IQ.27.3.b

52 O'Brien MJ, Squires AP, Bixby RA, Larson SC. Role Development of Community Health Workers: An Examination of Selection and Training Processes in the Intervention Literature. Am J Prev Med. 2009;37(6):S262–9.

53 Singh P, Sachs JD. 1 million community health workers in sub-Saharan Africa by 2015. Vol. 382, Lancet. 2013. p. 363–5.

54 The Earth Institute Columbia University. One Million Community Health Workers: Technical Task Force Report [Internet]. Community Health. 2011 [cited 22 Feb 2017].
URL: http://www.millenniumvillages.org/uploads/ReportPaper/1mCHW_TechnicalTaskForceReport.pdf

55 Tsolekile LP, Puoane T, Schneider H, Levitt NS, Steyn K. The roles of community health workers in management of non-communicable diseases in an urban township. Afr J Prim Heal Care Fam Med [Internet]. 2014;6(1):1–8.
URL: http://www.phcfm.org/index.php/phcfm/article/view/693

17 Breast cancer in South Africa: developing an affordable and achievable plan to improve detection and survival

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It is projected that by 2030, more than 70% of the world's cancer burden will be in low- and middle-income countries (LMICs), such as South Africa, where breast cancer is the most commonly diagnosed cancer among women. South Africa is committed to the Sustainable Development Goals, which call for universal access to reproductive health services and a one-third reduction in premature deaths due to non-communicable diseases, including cancer, by 2030.

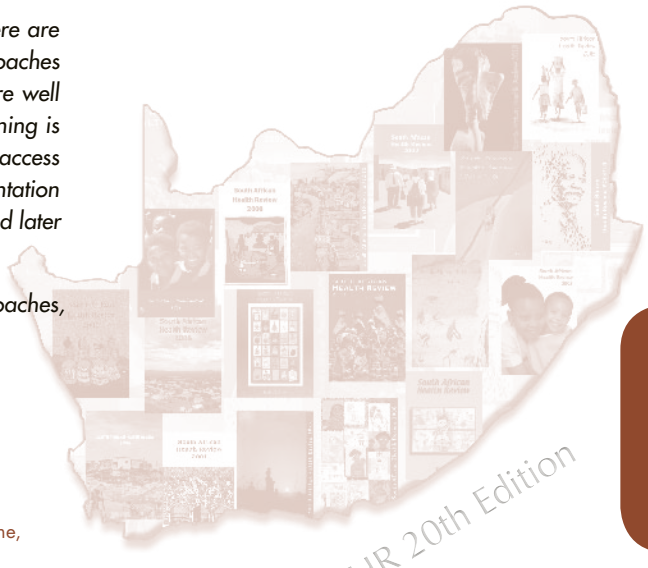
The South African National Department of Health is currently drafting the country's first national policy on breast cancer diagnosis and management. This chapter explores the pathways available in South Africa for achieving universal access to breast cancer-related services under the new policy. The chapter also discusses barriers to the implementation of equitable access, and highlights health-delivery models that could help achieve South Africa's goals.

The chapter begins with a description of successes in breast-cancer treatment, both globally and within South Africa, over the last 20 years as access to better diagnostic and treatment options has improved and awareness regarding the importance of early screening and treatment has grown. This description includes a summary of South Africa's current environment regarding breast cancer-related care.

Significant challenges remain in terms of access and quality of care. Yet, there are few data from or guidance for LMICs regarding the most cost-effective approaches for breast-cancer management. The benefits of mammographic screening are well documented, although the cost-effectiveness of routine mammographic screening is contested. An argument is presented for South Africa to approach universal access to breast care in a step-wise fashion, first reducing widespread late presentation and late-stage disease through provider-based population-level screening, and later moving (if possible) to more costly, technologically dependent approaches.

Finally, recommendations are made regarding optimal service-delivery approaches, recognising South Africa's integrated primary health care model.

Significant challenges remain in terms of access and quality of care. Yet there are few data from, or guidance for, low- and middle-income countries regarding the most cost-effective approaches for breast-cancer management.



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Introduction

Cancer is a leading cause of mortality globally.[1] As the world's population grows and ages, the global burden of non-communicable diseases (NCDs), including cancer, is expected to rise.[2] This is particularly true for low- and middle-income countries (LMICs). Without significant intervention, it is projected that by 2030 more than 70% of the world's cancer burden will be in LMICs.[3]

Breast cancer is the mostly commonly diagnosed cancer among women globally. In 2012, 1.67 million women were diagnosed with breast cancer, and more than half a million women died from the disease.[4] LMICs were disproportionately burdened. While 53% of diagnoses occurred in LMICs in 2012, 62% of breast cancer deaths occurred in these countries.[4] Without significant advances in screening and treatment efforts in the near future, the number of women dying from breast cancer annually is predicted to increase. Based on current trends, Ginsburg et al. estimate that by 2030 the number of women diagnosed globally with breast cancer will increase to almost 3.2 million per year,[5] nearly double the incidence in 2012.

According to South Africa's National Cancer Registry, breast cancer was the most commonly diagnosed cancer among women in 2011, with an age-adjusted incidence rate of 31.4 per 100 000 women and a lifetime risk of 1 in 29.[6] In 2012, 9 815 women were diagnosed with breast cancer, and 3 848 died from the disease.[7] The Sustainable Development Goals (SDGs), to which South Africa is committed, call for universal access to reproductive health services and one-third reduction in premature deaths caused by non-communicable diseases, including cancer, by 2030.[8] However, without significant shifts in the funding and advocacy for women's cancers, these goals may go unmet in South Africa and elsewhere.[5] Globally, just 5% of spending on cancer benefits LMICs, where the highest burden exists.[9]

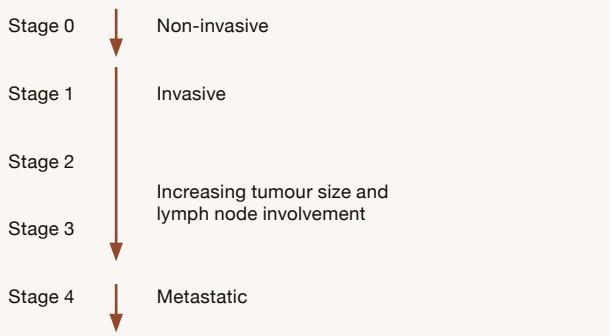
Fortunately, in South Africa activities are under way that could impact significantly on the magnitude of morbidity and mortality associated with breast cancer in coming years. The South African National Department of Health (NDoH) is currently drafting the country's first national policy on breast-cancer diagnosis and management. This chapter explores the pathways available in South Africa for achieving universal access to breast cancer-related services under a new policy. To mark this 20th anniversary of the *South African Health Review*, a summary is provided of progress in breast-cancer screening and treatment globally and in South Africa over the past 20 years. This includes a summary of South Africa's current environment regarding breast cancer-related care. Barriers to the implementation of equitable access – including perceived costs – are discussed, and health-delivery models are suggested that could help achieve South Africa's goals.

Twenty years of progress – then and now

Access to care

Historically in South Africa, access to breast-cancer screening and treatment services has been characterised by regional and socio-economic disparities. These disparities, compounded by relatively low levels of knowledge of the disease and how to detect it early, have tended to result in late presentation at health facilities. In 2001, Vorobiof et al. described the presentation of breast cancer in Johannesburg. A disproportionate number of black patients presented with locally advanced and metastatic disease (stage 3 or 4), and just 23.3% presented with early-stage disease (stage 1 or 2) (Figure 1).[10] In the intervening years, a change in awareness and access to care has doubled the percentage of women presenting with stage 2 cancer or lower to 46%.[11] However, large disparities and barriers to accessing care persist, and there is still room for improvement. In comparison, in the USA, over 82% of women are diagnosed with stage 2 cancer or lower.[12]

Figure 1: Breast cancer staging



It has been noted that delay in access to healthcare services is both patient- and provider-driven. Globally in the last two decades, understanding of barriers to breast care has shifted from patient (mis)beliefs and cultural factors to recognition that an interplay of biological, economic, geographical and psychosocial influences are important in delayed patient presentation.[13–15]

'Provider delay' is defined as the structural or provider-dependent factors that impact negatively on the time from first presentation to a healthcare practitioner to receiving primary treatment, be that surgical or non-surgical.[16] In 2016, Moodley et al. noted that limitations of the South African healthcare system and service-delivery mechanisms prevent optimal timing and access to breast-disease management and cancer treatment.[17] These delays impact negatively on patient survival.[16,18,19] In patients presenting with advanced disease, a delay of more than 60 days from tissue diagnosis to primary treatment was found to have an adverse impact on mortality.[20] Also, a recent meta-analysis studying delay from surgery to adjuvant therapy found that a delay of more than four weeks to chemotherapy and any delay to radiation adversely affected patient outcomes.[21]

Service-delivery models

Little has been written about breast-cancer services in South Africa; however, changes in the last 20 years have resulted in fundamental improvements to clinical care in some settings. To illustrate, according to local experts in breast-care services, historically in most areas and currently in areas without specialist care, women with breast masses would present to a primary care nurse and be referred to the surgical outpatient clinic or emergency department of the nearest hospital. The woman would likely be seen by a junior doctor. The most common route for diagnosis would be aspiration of the breast mass/masses using clinical palpation only. The specimen would be sent to

the nearest laboratory, and results could be expected a minimum of six weeks later. An inadequate specimen would necessitate repeat aspiration or surgical biopsy, which could be delayed, if performed at all. An alternative route would be surgical excision of the mass/masses or mastectomy without confirmatory diagnosis. Both approaches would provide quicker initial treatment, but at a cost of potential patient disfigurement or unnecessary or inadequate excision that could potentially compromise later oncological care.

Fortunately, service delivery has progressed considerably in some areas. In many public-sector settings, diagnosis now includes the global gold standard of triple assessment (i.e. clinical breast examination, imaging using ultrasound or mammography or both, and biopsy) performed by multi-disciplinary teams. In fact, a number of specialist breast-cancer centres have been developed in South Africa, usually by interested clinicians and receptive hospitals. Although access is still limited mostly to urban centres, where available these services receive patients from primary health care facilities, district hospitals, and in some cases, as walk-in, or 'self-referred' patients. These facilities usually feature multi-disciplinary breast-cancer teams including medical and radiation oncologists, surgeons, radiologists, pathologists, nurses and counsellors. Collaboration within multi-disciplinary teams facilitates expedient diagnosis and expert care. It can also improve the navigation of patients through diagnosis and treatment processes. In some instances, breast-cancer advocates, representing survivors and other interested parties, form a part of the team and contribute assistance with transportation, translation, and overall education for patients on the disease-management process. Advocates also assist in raising awareness on survivorship issues such as prosthesis following surgery, psychosocial support, and access to grants and social welfare, which may not be addressed routinely by the medical team.

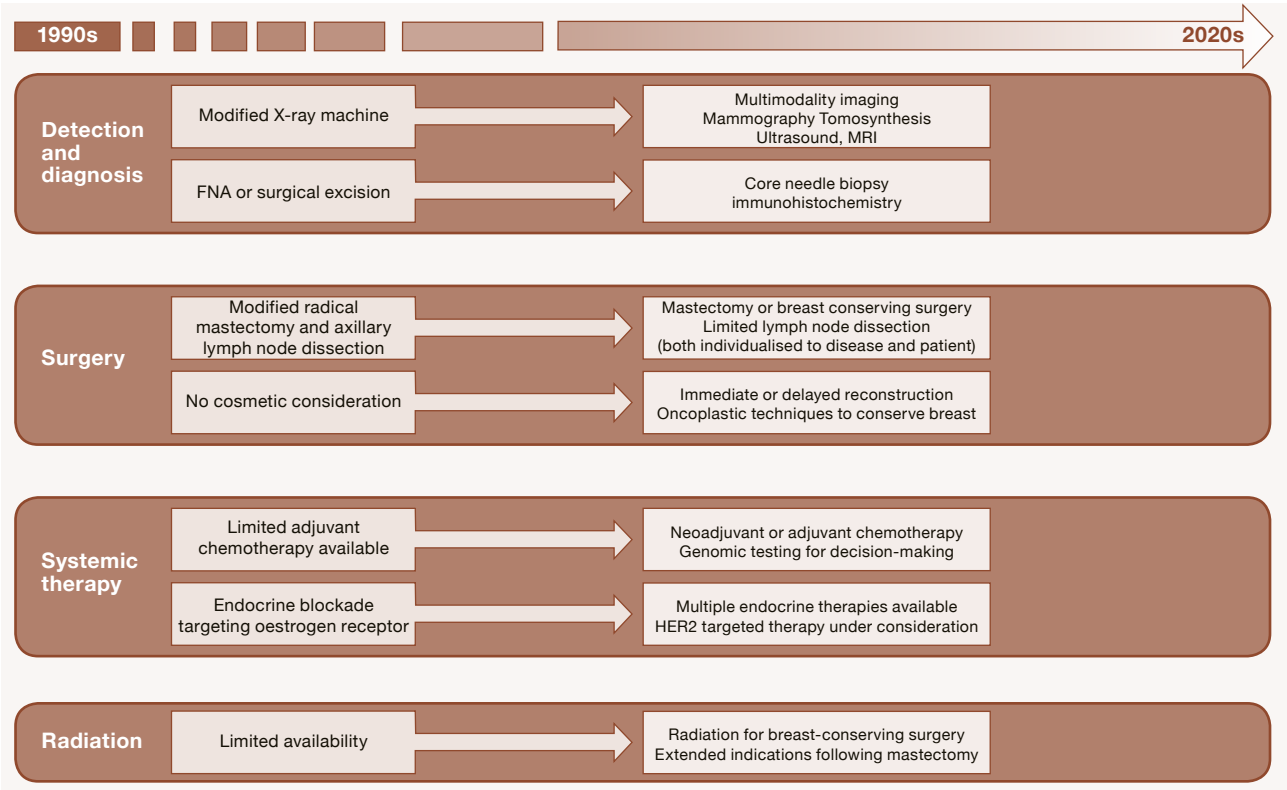
After diagnosis, cancer management and treatment in South Africa (breast and other cancers) are generally offered in centralised oncology units in select facilities, for example, regional or teaching hospitals. Access to these units requires formal referral, a common delivery model for specialist care globally. However, as a result of significant provider-driven delays in the diagnosis process, women with breast cancer frequently experience significant delays and unnecessary progression of disease prior to treatment initiation.

Advances in diagnosis and treatment

In addition to improved service-delivery models globally and in South Africa today, there has been a shift in understanding the pathogenesis of breast cancer and advances in care and treatment since the 1990s.[22,23] Many of the changes that have affected breast-cancer detection and treatment worldwide have also become influential in South Africa.

Advances in breast disease and cancer care (Figure 2) have been primarily via two routes: global advances in the diagnosis and treatment of cancer generally, and in the case of breast disease, the introduction in many settings of population-level mammographic screening.[22,23]

Figure 2: Chronological advances in detection and diagnosis of breast disease and oncological care



Key: FNA : fine needle aspiration HER2 : human epidermal growth factor receptor 2 MRI : magnetic resonance imaging

Advances in the understanding of cancer have led to progress in oncological care and a more holistic approach to patient management. The 'War on Cancer', initiated in 1971 with the signing of the National Cancer Act in the USA by then-President, Richard Nixon,[22] made funding available for randomised trials and the development of systemic therapies, such as chemotherapy. Globally, over the last 50 years, more precise laboratory-based diagnostics have become available.[22] Imaging services have also improved, facilitating better staging and more appropriate treatment of disease. Therapy options now include improved chemotherapy regimens, hormone therapy, immunotherapy, and targeted therapy, which allows for reduced damage to healthy cells during the treatment process.[22] In South Africa, improved chemotherapy and hormone therapy are available broadly, while targeted therapy is available in private practice only, and immunotherapy is not available for breast cancer (but is available for other cancers).

Surgical services have also advanced. The US-based National Surgical Adjuvant Breast Project Study Protocol 04, conducted in the early 1970s and evaluated with 25 years of follow-up, demonstrated that breast-conserving surgery plus radiation has equivalent outcomes to complete breast removal (i.e. mastectomy).[24] Subsequently, breast-conserving surgery has become the gold standard where available. In South Africa, breast surgery has evolved from an under-resourced section of general surgery to a well-developed, if not yet fully recognised, sub-speciality.

In tandem with increased global availability of funding for cancer research, the international feminist movement of the 1970s and 1980s compelled surgeons to discuss diagnostic and operative strategies with their breast-cancer patients. Newly formed breast-cancer patient advocacy groups included breast-cancer survivors or families of women with cancer. These groups facilitated education of women on their options, and led to greater accountability and more patient-centred care globally.

In South Africa, access to new or improved diagnostic, treatment and surgical services is not homogeneous. Late-stage presentation of disease continues to prohibit certain management approaches, and a lack of treatment facilities and specialist capacity to perform these procedures in the public sector also significantly limits access for many women.

Mammography and other screening options

The second major global innovation that has influenced the management of breast cancer is the initiation of mammographic breast-cancer screening in many settings. Mammography uses low-dose X-ray to screen for changes in breast tissue, and can identify such changes before they can be felt by the woman or a healthcare practitioner.[25]

Use of mammography increased substantially throughout the 1980s and early 1990s in the USA and other areas worldwide.[26] Subsequently, population-level screening with mammography has been credited with an increase in the detection of breast cancer, particularly early-stage disease.[26] Early detection of breast cancer followed by timely management is the most effective approach in improving survival. This is due to the staged progression of cancer, with earlier and more localised disease being more amenable to complete removal and long-term survival.[27,28]

Despite the seeming successes of mammographic screening where it has been implemented, there is controversy as to whether the reported increase in breast cancer detected is truly 'new' detection, or simply 'over-diagnosis' of very early disease, particularly not-yet-invasive disease that otherwise would not have progressed or impacted on survival.[26,29,30] There is also research showing that population-level screening has had only marginal impact on the diagnosis of late-stage disease.[26] However, despite the controversy surrounding population-level mammographic screening, advocacy groups have developed a powerful voice in advocating for increased, or at least sustained, availability of the service.

In South Africa there is currently no population-level mammographic screening programme, and there are significant questions as to whether initiating a new service would be feasible or cost-effective in improving health outcomes. Population-level mammographic screening is not recommended for very low-resource settings.[31] In such settings, the recommendations are to improve awareness of the importance of early detection, and to strengthen and scale up treatment for clinically detectable cancer.[32] However, South Africa is not a 'very low-resource setting'. Technically, South Africa is classified as an upper middle-income country.[33] South Africa also has strong advocacy groups calling for greater access to mammographic screening.

The lure of arguments for mammographic population-level screening is understandable, including from an economic perspective. Much of the literature exploring the cost-effectiveness of mammography concludes that it is a cost-effective or even 'highly cost-effective' healthcare intervention. However, such literature can be easily misinterpreted. Cost-effectiveness analysis outcomes are highly dependent on the data sources and service-delivery models studied, and as a result may not be readily applicable across regions, countries or even service-delivery settings. The 'mammography cost' literature tends to focus on high-income settings and comparisons of screening for different age groups or different screening intervals. This work may not be applicable in a country like South Africa where no population-level screening currently exists. Further, decisions as to whether or not an intervention is cost-effective are often based on older World Health Organization (WHO) threshold guidance that indicates that an intervention is cost-effective when it produces a "healthy year of life" for less than the equivalent of three times the country's gross domestic product (GDP).[34] This approach may seem straightforward; however, the threshold approach for determining cost-effectiveness has been strongly criticised, with opponents pointing out the relatively arbitrary nature of the WHO threshold, complications in highly inequitable countries like South Africa where per capita GDP may be high and poorly reflect actual societal willingness to pay, and the complete lack of consideration of affordability.[35,36]

Lower-cost methods of breast disease detection, which are easily available, include breast self-examination and clinical breast examination (i.e. a breast exam performed by a healthcare provider).[37–39] Research is still preliminary in this area; however, screening programmes based on clinical breast examination have been recommended as a 'promising technique' for the early detection of breast cancer in LMICs.[40,41] The highest burden of disease in LMICs is clinically detectable (i.e. palpable on clinical exam) and does not require mammography for detection.[42] In a cluster-randomised trial done in India, age-standardised incidence of advanced-stage breast

cancer was found to be lower among clinically screened women than unscreened women,[43] and economic models suggest that clinical breast examination performed annually from 40 to 60 years of age may be nearly as effective as mammography every two years in reducing mortality in resource-limited areas.[44]

Similar trends may be attributed to breast self-examination in some settings. The US Preventative Taskforce has concluded that breast self-examination does not contribute additional benefits in terms of preventing breast cancer mortality in settings where prevention using routine mammographic screening is commonplace.[45] A large randomised trial in China showed that breast self-examination did not reduce breast-cancer mortality among female factory workers.[46] However, in some low-income settings where population-level mammographic screening is not available, breast self-examination may have a role to play. In an Egyptian study, women who practised breast self-examination presented earlier and with smaller tumours than women who did not practise self-examination.[47]

In addition to the potential benefits of self-detection of breast cancer among women in low-resource settings, teaching breast self-examination also promotes breast awareness and supports general health-education efforts. Instruction on self-examination normally includes the signs of breast cancer and information on where to receive care. Broader awareness-raising campaigns can complement individual-level interventions. Campaigns promote greater awareness of breast conditions, including cancer, and availability of care, and reduce the stigmatisation of cancer among women.[40]

In addition to self-examination and clinical breast exams, ultrasound of the breast can be used to explore the characteristics of palpable and some impalpable breast lesions, particularly in dense and young breasts. It is used to guide breast biopsies for diagnostic purposes. Ultrasound has been shown to be as good as mammography in detecting invasive cancer, albeit with more false-positives.[48] However, it is not sensitive in determining calcification in the breast, which is indicative of pre-invasive cancer,[49] and it is therefore not recommended as a population-level method of screening for very early-stage disease.[50] Ultrasound of the breast is also highly dependent on the skill of the individual performing the service and can be resource-intensive. Because ultrasound can be used for multiple purposes, including screening of the liver and for gynaecological assessments, the availability of ultrasound may be greater than that of other imaging technologies[51] and it remains an important alternative for breast screening.

Strategies for achieving universal access

South Africa currently has no national-level policy on breast-cancer screening and treatment. However, a policy is currently being drafted by the NDoH, and with it comes an opportunity to establish national guidance. Current provider-dependent delays, which lead to poor survival outcomes, could be reduced through increased availability of multi-disciplinary teams in specialist breast-cancer centres. If not located in oncology treatment units, such teams should be closely linked to these units in order to facilitate rapid bi-directional referral, transfer of patient information, and more timely access to treatment. Such specialist breast-cancer centres should also liaise with local primary health clinics and district hospitals and could contribute to training of staff in those facilities. Advocate and counsellor members in the multi-disciplinary teams could co-ordinate community-based education and patient-support activities (e.g. through support groups) from diagnosis, through to treatment and follow-up, or link patients with palliative care where appropriate.

Currently many women in South Africa are unaware of their breast-cancer risk. Those who do recognise the need for assistance may travel long distances to access high-quality breast-care services.[52] Current inefficiencies in patient management and referral often result in patients making repeated visits to health facilities. Planning of specialist breast-cancer centres should include community outreach and involve careful consideration of the geographic spread of services and patient transport systems.

Globally, there is a false belief that it is too expensive to screen and treat cancers in LMICs.[40] However, cost-effective interventions for reducing breast-cancer mortality do exist.[40] Given the large proportion of women in South Africa who present with clinically detectable later-stage cancer, a low-cost option for population-level screening in the near term is clinical breast examinations conducted in primary health care clinics; this would be for all symptomatic and asymptomatic women aged over 35 years. Through a hub-and-spoke service-delivery model, trained primary care nurses could immediately refer women with abnormalities to specialist centres where diagnostic mammography and/or ultrasound and biopsy could be performed as needed. If walk-in access was prioritised at specialist centres, women could also initiate their diagnosis process at the specialist centres directly, thus reducing appointments and patient costs. Regardless, quick, co-ordinated referral would contribute to reduced delays in treatment initiation.

Finally, patients experiencing life-threatening and terminal illnesses of all kinds require palliative care, an inherently multi-disciplinary service, often including pain management and psychological and spiritual counselling and support.[53] Palliative care is currently available in South Africa, often through community- and home-based structures, but access varies geographically, and linkages between tertiary-care facilities and palliative-care services could be strengthened. Rising cancer incidence and improvements in screening and treatment will continue to increase the number of patients requiring long-term follow-up and lifelong surveillance for cancer recurrence. These women require careful tracking and follow-up within the health system, including annual mammography, gynaecological assessments, and routine monitoring of bone density.[54] Many cancer survivors in South Africa also contend with co-morbidities such as HIV, tuberculosis and other NCDs. This is important to keep in mind in efforts to strengthen cancer care in the country, as integration of services is critical to meet the needs of the population comprehensively.

Conclusions and recommendations

A special series on women's cancers, published in *The Lancet* in 2016, called for "all women who develop breast cancer to have an equal opportunity for early diagnosis and timely access to potentially curative treatment".[40] Currently in South Africa, access to high-quality cancer care is variable. The private sector offers high-quality, yet costly, care that is unaffordable for many South Africans. In the public sector, where more than 80% of South Africans seek health care,[55] high-quality breast-cancer services are available, but in limited supply. Survival rates are often dependent on patients'

awareness of breast health and knowledge of and access to quality screening services and specialty diagnostic and treatment centres.

Below is a list of recommendations towards addressing South Africa's current challenges in breast-cancer screening and treatment. It must be noted that these recommendations are made based on limited literature and reports detailing the current state of affairs in South Africa. The list is not exhaustive. Nonetheless, it is known that cancer diagnosis and treatment will be increasingly in demand in the coming decades. Fortunately, the public-health system in South Africa is changing, and service delivery should improve due to several efforts. A breast-cancer diagnosis and treatment policy is being drafted. Planning for and piloting of National Health Insurance is under way,[56] and primary health care re-engineering has engendered renewed focus on community-level service delivery. On a global scale, South Africa has committed to achieving the new SDGs by 2030. Breast-care advocacy groups in the country will have to focus actively on breast care as these larger changes occur; however, progress over the past 20 years demonstrates commitment on the part of health professionals and government alike to improve care and treatment in order to save women's lives.

Recommendations

- Incorporate breast-health education and awareness-raising, the early signs of breast cancer, and breast self-examination into existing health-education and outreach activities.
- Increase the number of specialist breast centres nationwide and ensure that they are staffed with multi-disciplinary teams.
- As a first step towards population-level screening, re-train primary health care nurses on how to perform clinical breast examinations and begin screening of asymptomatic women above 35 years of age (in addition to offering screening for all symptomatic women).
- Strengthen existing referral systems, including through facilitated patient-transport systems.
- Maximise the use of mammography and ultrasound for diagnosis by ensuring that the machines are placed in specialist breast centres with trained personnel.
- Increase support for and links to patient advocates and counsellors in communities and within specialist breast centres to ensure comprehensive, full-spectrum care.
- Establish strong monitoring and evaluation systems to track access to and utilisation of screening, diagnostic and treatment services nationwide.
- Support and lead clinical, social and economic research on breast cancer and breast-disease management in the country in order to address the current dearth of available information.

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References

1 International Agency for Research on Cancer. World Cancer Report 2014. Lyon: IARC; 2014.

2 Bloom D, Cafiero E, Jane-Llopis E, et al. The Global Economic Burden of Non-communicable Diseases. Geneva: World Economic Forum; 2011.

3 International Agency for Research on Cancer. World Cancer Report 2008. Geneva: World Health Organization; 2008.

4 Ferlay J, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2014;136:E359–86.

5 Ginsburg O, Bray F, Coleman MP, et al. The global burden of women's cancers: a grand challenge in global health. Lancet. 2016; Nov 1. doi:10.1016/S0140–6736(16)31392–7.

6 National Health Laboratory Service. National Cancer Registry: Summary statistics 2011. Johannesburg: National Health Laboratory Service; 2011.

7 International Agency for Research on Cancer. GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012 (South Africa) 2012. [Internet] [cited 19 May 2016].
URL: http://globocan.iarc.fr/Pages/fact_sheets_population.aspx

8 United Nations Department of Economic and Social Affairs. Sustainable Development Goals. Sustainable Development Knowledge Platform 2015. [Internet] [cited 26 November 2015].
URL: https://sustainabledevelopment.un.org/topics

9 The Lancet. Breast cancer in developing countries. Lancet. 2009;374:1567. doi:10.1016/S0140–6736(09)61930–9.

10 Vorobiof D, Sitas F, Vorobiof G. Breast cancer incidence in South Africa. J Clin Oncol. 2001;19:125S–7S.

11 Dickens C, Joffe M, Jacobson J, et al. Stage at breast cancer diagnosis and distance from diagnostic hospital in a periurban setting: A South African public hospital case series of over 1,000 women. Int J Cancer. 2014;135:2173–82. doi:10.1002/ijc.28861.

12 Iqbal J, Ginsburg O, Rochon PA, Sun P, Narod SA. Differences in breast cancer stage at diagnosis and cancer-specific survival by race and ethnicity in the United States. JAMA. 2015;313:165–73. doi:10.1001/jama.2014.17322.

13 Rayne S, Schnippel K, Firnhaber C, Wright K, Kruger D, Benn C-A. Fear of Treatments Surpasses Demographic and Socioeconomic Factors in Affecting Patients With Breast Cancer in Urban South Africa. J Glob Oncol. 2016; doi:10.1200/JGO.2015.002691.

14 Ukwenya AY, Yusufu LM, Nmadu PT, Garba ES, Ahmed A. Delayed treatment of symptomatic breast cancer: the experience from Kaduna, Nigeria. S Afr J Surg. 2008;46:106–10.

15 Oluwatosin O. Rural women's perception of breast cancer and its early-detection measures in Ibadan, Nigeria. Cancer Nurs. 2006;29:461–6. doi:10.1097/00002820–200611000–00006.

16 Otieno E, Micheni J, Kimende S, Mutai K. Provider delay in the diagnosis and initiation of definitive treatment for breast cancer patients. East Afr Med J. 2010;87:143–6. doi:10.4314/eamj.v87i4.62201.

17 Moodley J, Cairncross L, Naiker T, Momberg M. Understanding pathways to breast cancer diagnosis among women in the Western Cape Province, South Africa: a qualitative study. BMJ Open. 2016;6:e009905. doi:10.1136/bmjopen–2015–009905.

18 De Vuyst H, Lillo F, Broutet N, Smith JS. HIV, human papillomavirus, and cervical neoplasia and cancer in the era of highly active antiretroviral therapy. Eur J Cancer Prev. 2008;17:545–54. doi:10.1097/CEJ.0b013e3282f75ea1.

19 McLaughlin J, Anderson R, Ferketich A, Seiber E, Balkrishnan R, Paskett E. Effect on survival of longer intervals between confirmed diagnosis and treatment initiation among low-income women with breast cancer. Journal of Clinical Oncology. 2012 Nov 19;30(36):4493-500. doi:10.1200/JCO.2012.39.7695.

20 Ramirez A, Westcombe A, Burgess C, Sutton S, Littlejohns P, Richards M. Factors predicting delayed presentation of symptomatic breast cancer: A systematic review. Lancet. 1999;353:1127–31. doi:10.1016/S0140–6736(99)02142–X.

21 Gupta S, King WD, Korzeniowski M, Wallace DL, Mackillop WJ. The Effect of Waiting Times for Postoperative Radiotherapy on Outcomes for Women Receiving Partial Mastectomy for Breast Cancer: A Systematic Review and Meta-Analysis. Clin Oncol. 2016;28:739–49. doi:10.1016/j.clon.2016.07.010.

22 Melmed G. The war on cancer: a report from the front lines. Proc (Bayl Univ Med Cent) 2006;19:323–34.

23 Tiwari AK, Roy HK. Progress against cancer (1971–2011): How far have we come? J Intern Med. 2012;271:392–9. doi:10.1111/j.1365–2796.2011.02462.x.

24 Fisher B, Jeong J-H, Anderson S, Bryant J, Fisher ER, Wolmark N. Twenty-five-year follow-up of a randomized trial comparing radical mastectomy, total mastectomy, and total mastectomy followed by irradiation. N Engl J Med. 2002;347:567–75. doi:10.1056/NEJMoa020128.

25 American Cancer Society. Mammogram Basics 2016. [Internet]. [cited 8 February 2017].
URL: https://www.cancer.org/cancer/breast-cancer/screening-tests-and-early-detection/mammograms/mammogram-basics.html

26 Bleyer A, Welch HG. Effect of three decades of screening mammography on breast-cancer incidence. N Engl J Med. 2012;367:1998–2005. doi:10.1056/NEJMoa1206809.

27 Bleiche R, Ruth K, Sigurdson E, et al. Time to surgery and breast cancer survival in the United States. JAMA Oncol. 2016;2:330–9. doi:10.1001/jamaoncol.2015.4508.

28 Jedy-Agba E, McCormack V, Adebamowo C, dos-Santos-Silva I. Stage at diagnosis of breast cancer in sub-Saharan Africa: a systematic review and meta-analysis. Lancet Glob Health. 2016;4:e923–35. doi:10.1016/S2214–109X(16)30259–5.

29 Independent UK Panel on Breast Cancer Screening. The benefits and harms of breast cancer screening: an independent review. Lancet. 2012;380:1778–86. doi:10.1016/S0140–6736(12)61611–0.

30 Groen EJ, Elshof LE, Visser LL, et al. Finding the balance between over- and under-treatment of ductal carcinoma in situ (DCIS). Breast. 2016;31:274–83. doi:10.1016/j.breast.2016.09.001.

31 Anderson BO, Shyyan R, Eniu A, et al. Breast cancer in limited-resource countries: an overview of the Breast Health Global Initiative 2005 guidelines. Breast J. 2006;12 Suppl 1:S3–15. doi:10.1111/j.1075–122X.2006.00199.x.

32 Anderson BO, Braun S, Carlson RW, et al. Overview of breast health care guidelines for countries with limited resources. Breast J. 2003;9:42–51. doi:10.1046/j.1524–4741.9.s2.3.x.

33 World Bank. Country and Lending Groups 2015. [Internet]. [cited 11 February 2017]. URL: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

34 World Health Organization Commission on Macro Economics and Health. Macroeconomics and health: investing in health for economic development. Report of the Commission on Macroeconomics and Health. Geneva: WHO; 2001.

35 Marseille E, Larson B, Kazi DS, Kahn JG, Rosen S. Thresholds for the cost-effectiveness of interventions: alternative approaches. Bull World Health Organ. 2015;93:118–24.

36 Bertram MY, Lauer JA, De Joncheere K, et al. Cost–effectiveness thresholds: pros and cons. Bull World Health Organ. 2016;94:925–30. doi:http://dx.doi.org/10.2471/BLT.15.164418.

37 Gadgil A, Sauvaget C, Roy N, et al. Cancer early detection program based on awareness and clinical breast examination: Interim results from an urban community in Mumbai, India. Breast. 2017;31:85–9. doi:10.1016/j.breast.2016.10.025.

38 Gözüm S, Karayurt O, Kav S, Platin N. Effectiveness of peer education for breast cancer screening and health beliefs in eastern Turkey. Cancer Nurs. 2010;33:213–20. doi:10.1097/NCC.0b013e3181cb40a8.

39 World Health Organization. Breast cancer: prevention and control. 2017 n.d. [Internet]. [cited 9 February 2017]. URL: http://www.who.int/cancer/detection/breastcancer/en/index3.html

40 Samarasekera U, Horton R. Women's cancers: shining a light on a neglected health inequity. Lancet. 2016;389:771–3. doi:10.1016/S0140–6736(16)31798–6.

41 Kardinah D, Anderson BO, Duggan C, Ali IA, Thomas DB. Short report: Limited effectiveness of screening mammography in addition to clinical breast examination by trained nurse midwives in rural Jakarta, Indonesia. Int J Cancer. 2014;134:1250–5. doi:10.1002/ijc.28442.

42 Cubasch H, Joffe M, Hanisch R, et al. Breast cancer characteristics and HIV among 1,092 women in Soweto, South Africa. Breast Cancer Res Treat. 2013;140:177–86. doi:10.1007/s10549–013–2606-y.

43 Sankaranarayanan R, Ramadas K, Thara S, et al. Clinical breast examination: Preliminary results from a cluster randomized controlled trial in India. J Natl Cancer Inst. 2011;103:1476–80. doi:10.1093/jnci/djr304.

44 Okonkwo QL, Draisma G, der Kinderen A, Brown ML, de Koning HJ. Breast cancer screening policies in developing countries: a cost-effectiveness analysis for India. J Natl Cancer Inst. 2008;100:1290–300. doi:10.1093/jnci/djn292.

45 United States Preventative Services Taskforce. Screening for Breast Cancer – Questions and Answers 2014. [Internet]. [cited 8 February 2017]. URL: https://www.uspreventiveservicestaskforce.org/Page/Name/screening-for-breast-cancer–questions-and-answers.

46 Thomas D, Gao D, Ray R, et al. Randomized trial of breast self-examination in Shanghai: final results. J Natl Cancer Inst. 2002;94:1445–57.

47 Abdel-Fattah M, Zaki A, Bassili A, El-Shazly M, Tognoni G. Breast self-examination practice and its impact on breast cancer diagnosis in Alexandria, Egypt. East Mediterr Health J. 2000;6:34–40.

48 Berg WA, Bandos AI, Mendelson EB, Lehrer D, Jong RA, Pisano ED. Ultrasound as the primary screening test for breast cancer: Analysis from ACRINN 6666. J Natl Cancer Inst. 2016;108:1–8. doi:10.1093/jnci/djv367.

49 Tang XY, Yamashita T, Hara M, Kumaki N, Tokuda Y, Masuda S. Histopathological characteristics of breast ductal carcinoma in situ and association with imaging findings. Breast Cancer. 2016;23:491–8. doi:10.1007/s12282–015–0592–0.

50 Gartlehner G, Thaler KJ, Chapman A, et al. Adjunct ultrasonography for breast cancer screening in women at average risk: a systematic review. Int J Evid Based Healthc. 2013;11:87–93. doi:10.1111/1744–1609.12022.

51 Groen RS, Leow JJ, Sadasivam V, Kushner AL. Review: indications for ultrasound use in low- and middle-income countries. Trop Med Int Health. 2011;16:1525–35. doi:10.1111/j.1365–3156.2011.02868.x.

52 Rayne S, Lince-Deroche N, Hendrickson C, et al. Characterizing breast conditions at an open-access breast clinic in South Africa: a model that is more than cancer care for a resource-limited setting. BMC Health Serv Res. 2017;17:63. doi:10.1186/s12913–016–1959–4.

53 World Health Organization. Palliative Care (Fact sheet number 402). 2015 n.d. [Internet]. [cited 10 February 2017]. URL: http://www.who.int/mediacentre/factsheets/fs402/en/.

54 American Cancer Society. Follow up care after breast cancer treatment. 2016 n.d. [Internet]. [cited 10 February 2017]. URL: https://www.cancer.org/cancer/breast-cancer/living-as-a-breast-cancer-survivor/follow-up-care-after-breast-cancer-treatment.html

55 Health Systems Trust. Medical scheme coverage (%) 1995–2014 n.d. [Internet]. [cited 30 June 2016]. URL: http://indicators.hst.org.za/healthstats/77/data

56 South African National Department of Health. National Health Insurance: The First Eighteen Months. Pretoria: NDoH; 2013.

18

Cervical cancer prevention and early detection from a South African perspective

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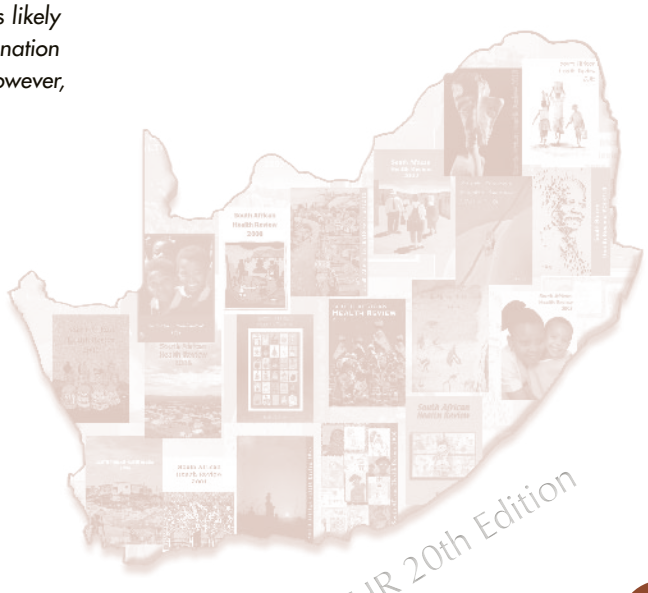
The objectives of this chapter are to review the history of cervical cancer prevention and to discuss and evaluate new and novel approaches from a South African perspective. Methods for prevention and early detection of cervical cancer have been well established since the 1960s, yet implementation of appropriate policies and healthcare interventions have not occurred in the majority of low- and middle-income countries (LMICs). In these countries, cervical cancer remains a significant cause of premature death and is the second most-common cancer in women after breast cancer. Further, good-quality data on the true incidence and mortality of cervical cancer are lacking in many LMICs due to lack of cancer registries and national cancer-control programmes.

Alternatives to cytology-based cervical cancer prevention have been studied in the past 20 years. Testing for high-risk types of human papillomavirus (HPV) and linking positive tests to immediate treatment is a promising approach. This approach, known as screen-and-treat, provides treatment during the same visit as the screening visit, and overcomes many of the obstacles to widespread screening. Point-of-care tests for HPV are also now available in South Africa. Primary prevention of cervical cancer using HPV vaccination in young girls aged 9–15 years is predicted to reduce the cumulative incidence of cervical cancer by 70–80% over the long term and is likely to be effective in HIV-positive women. South Africa introduced a HPV vaccination programme in 2014 for girls aged nine years or older or in Grade 4. However, screening will need to continue for older women.

Methods for prevention and early detection of cervical cancer have been well established since the 1960s, yet implementation of appropriate policies and healthcare interventions have not occurred in the majority of low- and middle-income countries.



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Introduction

Cervical cancer is the fourth most-common cancer among women globally and the second most-common cancer in South African women. The GLOBOCAN 2012 estimates, which reported on cancer incidence and mortality rates by sex and age group for 184 countries using population-based cancer registries (PBCRs), suggested that 14.1 million new cancer cases and 8.2 million cancer deaths occurred worldwide in 2012.[1] Overall, lung cancer was found to be the most common cancer, followed by breast cancer. There were an estimated 528 000 new cases of cervical cancer in 2012, with around 85% of cases diagnosed in low- and middle-income countries (LMICs).[1] The highest-risk regions with age standardised incidence rates (ASIRs) of over 30 per 100 000 persons included Eastern Africa, Melanesia, and South and Middle Africa. Rates were lowest in Australia and New Zealand (5.5 per 100 000 persons) and Western Asia.[1]

Accurate interpretation and estimation of cancer incidence is hampered by the absence of PBCRs; for example, in 2006 only 21% of the world population was covered by PBCRs (8% in Asia and 11% in Africa).[2] Additionally, in 2014, Parkin et al. found that 20 out of 54 countries in Africa had no data on cancer and only seven countries had high-quality regional data coverage.[2]

According to 2012 estimations, 265 672 new cervical cancer deaths were reported globally in that year, with cervical cancer deaths ranking as the fourth leading cause of female cancer deaths in the world and the second most-common female cancer deaths among women aged 15–44 years.[3]

According to 2012 estimates, there were 4 248 cervical cancer deaths annually in South Africa that year, with cervical cancer ranking as the first cause of cancer deaths among women of all ages. The age standardised mortality rate was estimated at 18 per 100 000 women in South Africa, compared with 6.8 per 100 000 internationally.[3]

In developing countries, cancer receives significantly fewer resources than other diseases due to multiple competing health and social and environmental needs, specifically HIV, malaria and tuberculosis, lack of clean water, poor sanitation, civil strife, environmental stability and widespread poverty.

Adding to the complexity of detecting and treating cervical cancer is the impact of the HIV epidemic, which has diverted limited resources away from preventive health activities such as cancer screening. Additionally, it is well recognised that people living with HIV have higher rates of human papillomavirus (HPV)-associated disease, and in 1993, cervical cancer was classified as an AIDS-defining illness.[4]

Health inequity and cervical cancer

The incidence of cervical cancer is strongly related to health inequity. Ways to prevent and detect cervical cancer have been known since the beginning of the last century, yet the impact of these interventions has not migrated to developing countries and cervical cancer remains a leading cause of premature death and disability in women.[5] Disability-adjusted life years (DALYs) per 100 000 population among women with cervical cancer was found to be highest in sub-Saharan Africa at 641 per 100 000, compared with 355 per 100 000 in Latin America and the Caribbean, 243 per 100 000 in South-East Asia, 466 per 100 000 in India, and 58 per 100 000 in Australia and New Zealand.[5] Worldwide, 169.3 million years of healthy life were lost because of cancer in 2008. Soerjamataram et al. estimated that infection-related cancers (liver, stomach and cervix) in Africa contributed 25% to the total cancer burden. Using the Human Development Index (HDI), a composite indicator that includes life expectancy, education and gross domestic product per head, Bray et al. concluded that in 2008, a significantly greater proportion of the cancer mortality burden was seen in low and medium HDI areas.[6]

Cervical cancer in South Africa

South Africa's pathology-based National Cancer Registry (NCR) was established in 1986 and is the main source of the country's cancer statistics. It collates and analyses cancer cases diagnosed in pathology laboratories (public and private) and reports annual cancer incidence rates stratified by age, sex and population groups. The NCR was incorporated into the National Institute for Occupational Health (NIOH) in 2009 and receives data on about 80 000 cases per year, of which 60 000 are new cases.[7] In 2011, the NCR recorded 4 907 cases of cervical cancer and 5 627 cases of breast cancer. Of all cervical cancer cases diagnosed in South Africa, 82.7% were diagnosed in black women and 9% in white women. Overall, cervical cancer represented 15% of all cancers diagnosed in women compared with breast cancer, which accounted for 21%.

Data for 2003–2007, derived from a registry of 2 808 cancer patients living in a rural area of the Eastern Cape (EC),[8] indicated that most cancers were diagnosed in women (60.4%), with cervical cancer being the most common (34%), followed by oesophageal cancer, breast cancer, Kaposi's sarcoma and liver cancer.

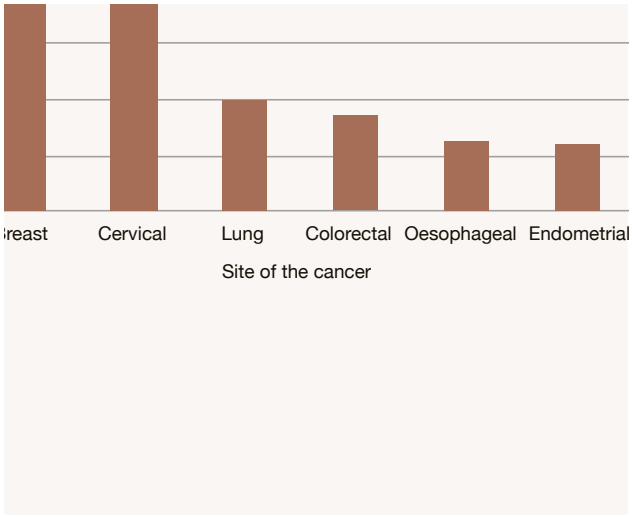
Further information on cervical cancer incidence was reported by the Institut Catalan d'Oncologia (ICO) Information Centre on HPV and Cancer in 2016.[9] Their data indicate that about 7 735 new cases of cervical cancer were diagnosed annually in South Africa in 2012, with cervical cancer being the most common cancer in women aged 15–44 years. The ASIR was estimated at 31.7 per 100 000 persons for South Africa compared with 14.0 per 100 000 persons globally. Figure 1 shows the ASIRs of cancer of the cervix compared with other cancer rates in women of all ages in South Africa using ICO Information Centre data.[9]

Natural history of cervical cancer and prevention

Infection of the cervix with high-risk types of human papillomavirus (harp) is necessary for the development of cervical cancer. There is now strong epidemiological, clinical and biological evidence of the causal relationship between infection with one or more of the 14 hrHPV types and cervical cancer. The most commonly associated HPV types are types 16 and 18, which account for around 70% of all cervical cancer cases.[10]

Cervical cytology testing involves collecting exfoliated cells from the cervix and examining these cells microscopically. An analysis by the International Agency for Research on Cancer (IARC) performed on eight of the world's largest screening programmes in the

Figure 1: Age standardised incidence rate per 100 000 women for cervical and other cancers in women of all ages in South Africa



Source: Bruni et al., 2016.[9]

1980s showed that well-organised screening programmes were effective in reducing the incidence of and mortality from cervical cancer.[11] Following the introduction of nationwide screening in the 1960s, cumulative mortality rates of cervical cancer demonstrated a significant falling trend. The greatest fall was in Iceland (84% reduction from 1965 to 1982) where the screening interval was the shortest and the target age range the widest. The smallest reduction in cumulative mortality (11%) was in Norway where only 5% of the population had been part of organised screening programmes.[12]

Overall, cervical cytology screening programmes have not been successfully initiated, implemented or sustained in low- and middle-income countries (LMICs), largely because of the complexity of the infrastructure required. Cervical cancer screening either does not occur or occurs sporadically, with the consequence that the incidence of cervical cancer and mortality from the disease remains high in LMICs.

HPV DNA genotyping

Once the epithelium of the cervix is infected by harp, usually through sexual contact, persistent infection may develop into cancer precursors (known as cervical intraepithelial neoplastic (CIN) grades 1–3, or more recently, using the Bethesda system, low- or high-grade squamous intraepithelial lesions (LSIL and HSIL), respectively).[13] Left untreated, these lesions may evolve into invasive cervical cancer, of which HPV types 16 and 18 are the most commonly detected.[14]

If cervical cancer precursors are detected, they can be removed either by ablation or excision, preventing progression to invasive cancer.

Cervical cancer prevention in South Africa

South Africa has historically provided opportunistic screening for cervical cancer prevention, despite being one of the better-resourced countries in sub-Saharan Africa.[15] Hence there are different rates of cervical cancer according to age, race, urban and rural areas, and socio-economic status. For example, Fonn et al. estimated that only 20% of South African women had been screened in 2000,[16] and during the period 2002–2003, coverage in the general rural population was estimated at 9.6% and coverage in the general urban population at 17.3 %.[4]

In 2000, The National Department of Health (NDoH) recommended that screening should start at age 30 and then be done every 10 years for three decades for asymptomatic women. Further, they recommended that all women with high-grade cervical cancer precursors or malignant lesions be referred to appropriate facilities for evaluation and treatment. There are many challenges when setting up screening programmes, particularly considering the impact of the HIV epidemic, which has channelled health resources away from preventive interventions such as for cervical cancer, and thus increased the risk of women developing HPV-related cancers. The gap between screening and treatment is acknowledged to be very high in South Africa, although there are few published data to support this statement.[17]

According to the National Health Laboratory Service (NHLS), just under a million smears were performed in South Africa between 2013 and 2014, of which 601 066 were classified as normal (66.5%), 8.6% were classified as LSIL, and 2.2% as HSIL.[a] Table 1 shows the data by province.

Table 1: Number of cervical smears performed and laboratory results by province, 2013–2014

Province	Cases (n)	Low-grade intraepithelial lesions (%)	High-grade intraepithelial lesions (%)
Eastern Cape	70 377	5.1	3.8
Free State	52 107	7.2	2.0
Gauteng	156 851	18.7	7.0
KwaZulu-Natal	181 705	14.3	7.7
Limpopo	82 085	6.7	3.1
Mpumalanga	55 116	3.4	6.9
North West	64 270	5.9	3.6
Northern Cape	12 522	2.1	6.2
Western Cape	128 411	8.6	3.8
Total	903 657	8.6	2.2

Source: Personal Communication, 2017.[a]

In order to determine the most appropriate age to begin cervical-cancer screening in South Africa, the NDoH extracted data on the number of HSIL cases (Table 2) and cervical-cancer cases (Table 3) during 2013–2015. While the diagnosis of HSIL remained relatively constant, the number of cervical-cancer cases rose steadily. Of importance is that the vast majority of significant disease, both malignant and precancerous, was found in women over the age of 30 years, suggesting that this is likely to be the most cost-effective age to begin screening.

a Personal Communication: Dr Manala Makua, Director of Women's Health and Genetics, South African National Department of Health, 9 January 2017.

Table 2: Number of women with HSIL in different age groups, 2013–2015

Year	HSIL		
	20–25 years	26–30 years	31+ years
2013	2017	5 481	31 235
2014	1816	4 868	30 461
2015	1634	4 649	31 228

Source: Personal Communication, 2017.[a]

Table 3: Number of women diagnosed with cervical cancer by age group, 2013–2015

Year	Cancer of the cervix		
	20–25 years	26–30 years	31+ years
2013	6	42	1 809
2014	10	41	1 953
2015	14	39	2 011

Source: Personal Communication, 2017.[a]

Alternative screening approaches to cytology-based programmes

HPV DNA testing

Over the past 20 years, numerous studies have been designed to avoid the complexity and expense of cytology-based screening programmes. Specifically, these include using visual inspection with acetic acid (VIA) followed by treatment with cryotherapy, and HPV DNA testing as a primary screen followed by either treatment, colposcopy and histological sampling, and/or co-testing with cytology.

A randomised screening trial was conducted in Khayelitsha, Cape Town, to evaluate the safety, acceptability and efficacy of screening women and treating those with positive tests without the intervention of colposcopy and histological sampling. A total of 6 555 unscreened women, aged 35–65 years, underwent testing for high-risk types of HPV. HPV DNA testing and VIA testing were performed by nurses in a primary care setting.[18] The study found that the HPV screen-and-treat arm was associated with a 3.7-fold reduction in the cumulative detection of CIN 2 plus (i.e. CIN 2, CIN 3 or cancer) by 36 months, and VIA was associated with a 1.5-fold reduction. For every 100 women screened, the HPV screen-and-treat strategy eliminated 4.1 cases of CIN 2 plus (CIN 2, CIN 3 or cancer) compared with VIA-and-treat, which eliminated 1.8 cases.

HPV DNA testing has recently evolved from a laboratory-based test into a point-of-care test.[19,20] One of these tests utilises the same platform (GeneXpert) as used in testing for tuberculosis and sensitivity to rifampicin in the South African National Tuberculosis Programme. This technology to perform testing for HPV (14 high-risk HPV types) is identical to that used for tuberculosis (although the cartridges contain different reagents), and it is now available in approximately 250 sites in South Africa. The test does not require batching and gives a result within one hour. It can be performed by a non-laboratory-trained assistant, on site, thus providing the ideal algorithm for 'screening and treating' women in both rural and urban areas.

Xpert HPV has been evaluated in a number of studies, including in Cape Town, where just over 1 000 women (500 HIV-positive and 500 HIV-negative) were screened using this technology. Participants were recruited from among women attending a colposcopy clinic with a high likelihood of disease and from an unscreened group of women from the general population of Khayelitsha. When the number of genotypes was restricted to the eight most common types, a sensitivity of 85% was obtained for CIN 2+ in HIV-positive women, with a specificity of 82%. In the case of HIV-negative women, a sensitivity of 85% was obtained, with specificity for CIN 2+ of 93%.[21]

Primary prevention of cervical cancer through HPV vaccination

Given its strong aetiological association with high-risk HPV infection, cervical cancer provides an ideal opportunity for vaccination intervention. Two vaccines have been developed for the prevention of cancer, namely the HPV vaccine and the vaccine against hepatitis B, which is aetiologically associated with liver cancer. Genital HPV infection is very common in sexually active men and women globally. Not all those infected will seroconvert, but low levels of type-specific neutralising antibodies against the viral capsid (L1) occur in around 50–70% of women, providing partial protection against subsequent infection with that type.[22]

There are currently two commercially available HPV vaccines: the bivalent vaccine against types 16 and 18, known as Cervarix® (GlaxoSmthKline), and the quadrivalent vaccine against types 6, 11, 16 and 18, known as Gardasil® (Merck/MSD). Both are prophylactic vaccines and should be given to girls and/or boys prior to exposure to the virus. Vaccination against HPV types 6 and 11 prevents the development of genital warts. High-risk HPV infection is associated with anogenital cancers other than cancer of the cervix, including vulval, vaginal, anal, penile and oro-pharyngeal cancers. A nonavalent vaccine (Gardasil 9®, Merck/MSD) which provides additional protection against types 31, 33, 45, 52, and 58 is currently undergoing clinical testing and has been licensed by the Food and Drug Administration (FDA).[23]

Rigorous randomised clinical trials have shown that all three vaccines are safe, immunogenic and effective in preventing disease associated with the types contained in the vaccines, and that protection persists for at least nine years (except for the non-valent vaccine where long-term data are awaited).

Cross-protection with non-vaccine oncogenic types

Prevention of cervical cancer by vaccinating girls aged 9–14 years (recommended by the World Health Organization (WHO)) is likely to prevent 70–80% of cervical cancers in those vaccinated. Considerable cross-protection against infection with types 31, 33, 45 and 51 has been demonstrated for the bivalent vaccine.[24] In addition, the quadrivalent vaccine has shown partial protection against types 31 and 33. One study, in which 3 459 subjects were included in an intention-to-treat analysis, found that administration of the quadrivalent vaccine reduced the combined incidence of infection with types 31 and 45 by 31.6%, and the incidence of infection with types 31, 33, 45, 52, 58 by 17.7%.[25]

Table 4: Summary of South African national HPV vaccination campaigns, 2014–2016

Date and year	Dose 1 coverage (n)	Date and year	Dose 2 coverage (n)	Total dose (1 & 2) (n)
10 March–11 April 2014	419 589	29 September–31 October 2014	329 665	749 254
23 February–20 March 2015	356 228	11 August–4 September 2015	329 000	685 228
16 February–11 March 2016	432 987	2 August–6 September 2016	320 292	753 279
Total	1 208 804		978 957	2 187 761

Source: District Health Information System[1,4]

Impact of HPV vaccination

Countries that introduced the HPV vaccine soon after it was licensed in 2006 have had more time to measure the impact of HPV vaccination. An Australian study found that 29% of women tested for HPV in the years prior to the HPV vaccine programme were HPV-positive for the HPV types in the quadrivalent vaccine, but only 7% of women post-vaccination had a positive test.[26] There was also a reduction of HPV infection in unvaccinated women, suggesting some herd immunity.

Two versus three doses

A proof-of-principle study in Costa Rica included a group of women who did not receive all their vaccine doses and who were HPV-negative at baseline. The study reported that vaccine efficacy for women who received, one, two or three doses was similar in preventing persistent HPV infection. HPV 16 and 18 antibody titres in women receiving two doses at least six months apart were non-inferior to the three-dose group.[27] As a result of this and other studies, the WHO recommends two doses administered six months apart in girls younger than 15 years; however, the WHO still recommends three doses in HIV-positive individuals.[28]

HPV vaccination in HIV-positive women

Numerous studies have shown that HPV infection in HIV-positive women is more common than in the general population and that cervical cancer occurs 2–22 times more commonly in HIV-positive women.[29] Denny et al.[30] evaluated the safety and immunogenicity of the bivalent vaccine in HIV-positive women aged 18–25 years. HIV-positive women were randomised to receive the bivalent vaccine or a placebo at 0, 1 and 6 months, and a group of 30 HIV-negative women were recruited and vaccinated for comparison. The safety and immunogenicity profile of the bivalent vaccine was comparable in HIV-positive and HIV-negative women, and parameters such as CD4 counts and viral loads were not affected in either of the vaccinated or placebo groups. Serology in the HIV-positive vaccinated group was sustained through the 12-month period.

In 2014, Toft et al.[31] published a review of HPV vaccination trials in HIV-positive populations (men, women and children) and concluded that prophylactic HPV vaccination is safe, immunogenic and, by extrapolation, likely to reduce HPV-associated cancer in people living with HIV.

Introduction and coverage of HPV vaccination in South Africa

Data on South Africa's HPV vaccination programme, presented at the 31st International Papillomavirus Conference in 2017, indicated that planning for the HPV vaccination programme began in 2012 and involved wide consultation with relevant stakeholders, including school governing bodies, school principal associations and labour unions.[b] The intention was to use an integrated school-based health system. Budget was ring-fenced in 2013 to begin vaccination in 2014, and the aim was to vaccinate over 500 000 girls from just under 18 000 schools. Eligible girls were offered a two-dose regime with bivalent vaccine at month 0 and month 6. According to Dr Dlamini,1 208 000 girls have been vaccinated to date.[b]

The following factors were cited as being critical to the success of the programme: using the school health system, political will, ring-fenced funding, social mobilisation, integration (girls were offered deworming medication as part of the screening process), and reliable methods for monitoring and evaluation.[b]

Major challenges faced were staff shortages, lack of adequate transport, and lack of computer skills. Challenges have also been encountered in tracking school and learner coverage, and there is a need to develop a system to identify missed schools, vaccine-stock management and the management of adverse events.[b]

Data on coverage of Grade 4 girls from 2014 (Table 4) show that coverage has been consistently high, with good follow-up of girls requiring dose 2.

b Personal Communication: Dr NR Dlamini, Chief Director: Child Adolescent and Child Health, Department of Health, 15 March, 2017.

Conclusions

Cervical cancer is the second-commonest cancer diagnosed among women in South Africa and the commonest cancer among women aged 15–49 years. It is a preventable cancer, and where national screening programmes have been successfully implemented and sustained, cervical cancer incidence and mortality have been dramatically reduced. However, the complexity of the infrastructure required to implement cytology-based screening programmes has precluded LMICs from either initiating or sustaining effective national cervical cancer screening. This has prompted research in the past 20 years to find alternatives to cytology-based programmes, specifically VIA and molecular testing for hrHPV. Different algorithms and approaches have been recommended, the most popular being a 'screen-and-treat' approach, where women are tested for hrHPV and given a result at the same visit using a point-of-care test.

Primary prevention of cervical cancer using HPV vaccination has the potential to reduce cervical cancer by at least 70–80% in those vaccinated and is likely to have a major impact on HPV-associated disease in the long term. A major challenge, however, is to ensure that the vaccine is rolled out to the populations that need them most.

Recommendations

- The National Cancer Registry should be updated and upgraded to a population-based registry to enable more accurate data collection for planning, monitoring and evaluation.
- Where cytology-based programmes are functioning well, their resources should be consolidated. However, where no such programmes exist in South Africa, the NDoH should consider alternative algorithms for cervical cancer prevention, as defined in this paper.
- Cervical cancer screening in asymptomatic women should be free and provided at primary or district levels of care.
- Healthcare workers should be adequately skilled in all areas of cervical cancer control, and curricula at healthcare institutions should be relevant and aligned.
- The gap between abnormal screening results and referral for colposcopy and/or treatment must be closed.
- Where possible and feasible, consideration should be given to linking HPV vaccination of girls with screening of their mothers.
- Ongoing monitoring of coverage and uptake of HPV vaccination should be ensured and the programme should be adapted regularly to ensure high-quality implementation and the desired outcome, namely a major reduction in HPV-associated disease.

References

1 Ferlay F, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. Int J Cancer. 2015;136(5):E359–86.

2 Parkin DM, Bray F, Ferlay J, Jemal A. Cancer in Africa 2012. Cancer Epidemiol Biomarkers Prev. 2014;23(6):953–66.

3 Ferlay J, Soerjomataram I, Ervik M, et al. GLOBOCAN 2012 v1.2. Cancer Incidence and Mortality worldwide. IARC CancerBase No. 11. Lyon, France, International Agency for Research on Cancer, 2013. [Internet] [cited January, 2017]. URL: http://globocan.iarc.fr

4 Castro KG, Ward JW, Slutsker L, et al. 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. MMWR.1992; 41:1–19.

5 Soerjomataram I, Lortet-Tieulent J, Parkin DM, et al. Global burden of cancer in 2008: a systematic analysis of disability-adjusted life-years in 12 world regions. Lancet. 2012;380(9856):1840–50.

6 Bray F, Jemal A, Grey N, et al. Global cancer transitions according to the Human Development Index (2008–2030): a population-based study. Lancet Oncol. 2012;13(8):790–810.

7 National Cancer Registry. Cancer in South African 2012. Full report. [Internet]. [cited January 2017]. URL: http://www.nioh.ac.za/assets/files/NCR%202012%20results.pdf

8 Somdyala NIM, Bradshaw D, Gelderblom WCA. Eastern Cape Province Cancer Registry Technical Report. Cancer incidence in selected municipalities of the Eastern Cape Province 2003–2007. Cape Town: South African Medical Research Council; August 2013.

9 Bruni L, Barrionuevo-Rosas, Albero G, et al. ICO Information Centre on HPV and Cancer (HPV Information Centre). Human papillomavirus and related diseases in South Africa. Summary Report 15 December 2016.

10 de Sanjose S, Quint WG, Alemany L, et al. Human papillomavirus genotype attribution in invasive cervical cancer: a retrospective cross-sectional worldwide study. Lancet Oncol. 2010;11(11):1048–56.

11 International Agency for Research on Cancer (IARC) Working Group on Cervical Cancer Screening. Summary chapter. In: Hakama M, Miller AB, Day NE, editors. Screening for Cancer of the Uterine Cervix. Lyon, IARC; 1986.

12 Laara E, Day NE, Hakama M. Trends in mortality from cervical cancer in the Nordic countries: Association with organised screening programmes. Lancet. 1987; May 30:1247–9.

13 Nayar R, Solomon D. Second edition of 'The Bethesda System for reporting cervical cytology' – atlas, website and Bethesda interobserver reproducibility project. Cytojournal 2004 (1):4.

14 Walboomers JM, Jacobs MV, Manos MM, et al. Human papillomavirus is a necessary cause of invasive cervical cancer worldwide. J Pathol. 1999;189(1):12–9.

15 Kawonga M, Fonn S. Achieving effective cervical screening coverage in South Africa through human resources and health systems development. Reprod Health Matters. 2008;16(32):32–40.

16 Fonn S, Bloch B, Mabina M, et al. Prevalence of pre-cancerous lesions and cervical cancer in South Africa: a multicentre study. S Afr Med J. 2002;92(2):148–56.

17 Moodley J, Kawonga M, Bradley J, et al. Challenges in implementing a cervical screening program in South Africa. Cancer Detect Prev. 2006;30(4):361–8.

18 Denny L, Kuhn L, Hu CC, et al. Human papillomavirus-based cervical cancer prevention: long-term results of a randomized screening trial. J Natl Cancer Inst. 2010;102:1–11.

19 Einstein MH, Smith KM, Davis TE, et al. Clinical evaluation of the cartridge-based GeneXpert human papillomavirus assay in women referred for colposcopy. J Clin Microbiol. 2014;52(6):2089–95.

20 Toliman P, Badman SG, Gabuzzi J, et al. Field Evaluation of Xpert HPV Point-of-Care Test for Detection of Human Papillomavirus Infection by Use of Self-Collected Vaginal and Clinician-Collected Cervical Specimens. J Clin Microbiol. 2016;54(7):1734–7.

21 Kuhn L, Saidu R, Boa R, et al. Optimizing Point-Of-Care HPV testing for cervical cancer prevention in South Africa. EUROGIN 2016; Saltzburg Austria, June 15–18, 2016.

22 Wentzensen N, Rodriguez AC, Viscidi R, et al. A competitive serological assay shows naturally acquired immunity to human papillomavirus infections in the Guanacaste Natural History Study. J Infect Dis. 2011; 204(1):94–102.

23 Joura EA, Guiliano AR, Iverson O-E, et al. for the broad spectrum HPV Vaccine Study. A 9-valent HPV vaccine against infection and intraepithelial neoplasia in women. N Engl J Med. 2015; 372:711–23.

24 Wheeler CM, Castellesgue X, Garland S, et al and the HPV PATRICIA Study Group. Cross protective efficacy of HPV 16/18 ASO4-adjuvanted vaccine against cervical infection and precancer caused by non-vaccine oncogenic HPV types: 4 year end of study analysis of the randomised double-blind PATRICIA trial. Lancet Oncol. 2012; 13:100–10.

25 Wheeler CM, Kjaer SL, Sigurdsson K, et al. The impact of Quadrivalent Human Papillomavirus (HPV; Types 6, 11, 16 and 18) L1 Virus-Like Particle Vaccine on Infection and Disease Due to Oncogenic Nonvaccine HPV types in sexually Active Women aged 16 – 26 years. J Infect Dis. 2009;199:936–44.

26 Tabrizi SN, Brotherton JM, Kaldor JM, et al. Assessment of herd immunity and cross protection after a human papillomavirus vaccination programme in Australia: a repeat cross-sectional study. Lancet Infect Dis. 2014;14(10):958–66.

27 Kreimer AR, Rodriguez AC, Hildesheim A, et al and the CVT Vaccine Group. Proof-of-principle evaluation of the efficacy of fewer than three doses of a bivalent HPV 16/18 vaccine. J Natl Cancer Inst. 2011;103:1444–51.

28 World Health Organization. Human papillomavirus vaccines: WHO position paper, October 2014. WER. 2014;89:465–91.

29 Forman D, de Martel, Lacey CJ, et al. Global burden of human papillomavirus and related diseases. Vaccine. 2012;30(S5):F12–23.

30 Denny L, Hendricks B, Gordon C, et al. Safety and immunogenicity of the HPV-16/18 ASO4-adjuvanted vaccine in HIV-positive women in South Africa: a partially-blind randomised placebo-controlled study. Vaccine. 2013;31:5746–53.

31 Toft L, Tolstrup M, Storgaard A, et al. Vaccination against oncogenic human papillomavirus infection in HIV infected populations: review of current status and future perspectives. Sex Health. 2014;11:511–23.

Safe treatment and treatment of safety: call for a harm-reduction approach to drug-use disorders in South Africa

19

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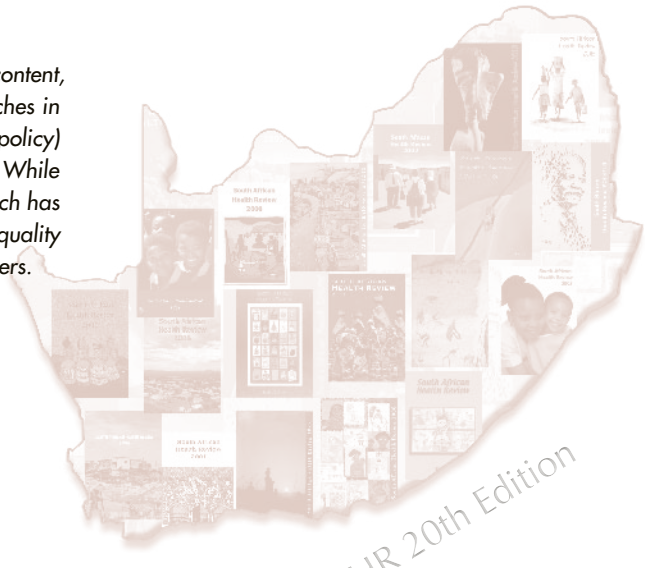
The complex political, structural and socio-economic factors that influence drug use and corresponding responses have contributed to the increasing drug-related burden of disease in South Africa. As a result, the country's healthcare system is called on to manage the consequences of a public-health problem that has no 'good solutions'.

Internationally, regulation of drug use has largely relied on the criminal-justice system and the view that people who use drugs are 'the problem', deserving of punishment or 'rehabilitation'. Over the past 30 years, a number of well-resourced democratic governments have acknowledged the failure of such methods. This has resulted in a more medicalised approach to dealing with drug use, one that views habitual drug use as a chronic disease in need of treatment. Some recent South African policy documents have called for such an approach. In practice, however, enforcement and punishment remain the dominant response, with the country only paying lip service to the provision of harm-reduction programmes. In addition, little attention has been given to the socio-economic context that encompasses and contributes to drug use, this despite evidence that the existing policy and practice framework has created greater harms than public good (particularly with regard to public health), that it is ineffective in a context hamstrung by poor governance more generally, and that it does not improve public safety.

Walt and Gilson's Health Policy Triangle framework – which examines context, content, process and actors – was used to examine how existing governance approaches in South Africa have structured and continue to influence the current 'drug (policy) problem', and to provide recommendations for a harm-reduction approach. While acknowledging the implementation barriers, we demonstrate how this approach has the greatest potential to increase service access while maximising equity and quality along the continuum from prevention to the resolution of substance-use disorders.

Regulation of drug use has largely relied on the criminal-justice system and the view that people who use drugs are 'the problem', deserving of punishment or 'rehabilitation'. Over the past 30 years, a number of well-resourced democratic governments have acknowledged the failure of such methods.



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Introduction

This chapter provides an analytical discussion on the effectiveness of South African drug policy and legislation in relation to health, social and safety outcomes. Drawing on Walt and Gilson's Health Policy Triangle framework,[1] a contextual overview is provided through examination of the following: policy-making, notably international approaches to drug use, political structures, departmental mandates, and the results of current policy on a vulnerable sector of society; the content of key drug-use policies, notably the National Drug Master Plan (NDMP); the actors involved, particularly the members of the Central Drug Authority (CDA); and the processes of policy development.

We argue that current approaches frame the use of drugs as a problem of the individual, without adequate consideration of the social and political context (the assumptions and definitions used in this chapter are presented in Box 1). This reinforces and intensifies social disruption and marginalisation and disallows effective responses. We further suggest that the dominant enforcement approach used to punish individuals who use drugs does not align with human-rights principles, and that it contributes to potential harms related to drugs and adds to the burden of disease.[2] We argue that a radical alternative to dealing with drug use is required in South Africa, and that this should run across all legislation, allowing for proper flow into programmatic responses. We believe that a comprehensive shift to a harm-reduction approach is an appropriate route to achieve health equity and improved safety while protecting individual and collective rights.[3]

Box 1: Definitions and assumptions

The terms and concepts used in this chapter are subject to intense debate and a variety of interpretations. The World Health Organization's (WHO) lexicon of definitions relating to drugs and alcohol does not provide a clear distinction between a medicine and a drug, but rather notes that the term 'drug' is used differently in medicine and in common parlance.[4] For the purposes of this chapter, we define drugs as substances taken for their psychoactive effects, often illegally.[5] In so doing, we acknowledge that the classification of some substances as legal and others as illegal is a function of economic interests, racial and cultural bias, social acceptability and medical use.[6]

Various terms exist to describe different drug-use patterns:

- *Drug dependence* refers to regular use of a drug to the extent that rapid cessation results in clinical withdrawal signs.[7]
- A *substance-use disorder* is defined in terms of the criteria set by the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*.[7]
- *Drug addiction* is overwhelming involvement with drugs that is harmful to the individual, society or both.[8]

We do not assume that drug use inevitably has negative physical, psychological, or behavioural consequences. A very small percentage of people (6%) who ever use a drug become 'addicted' (20% among heroin users);[9] almost all substance-use disorders resolve; and over two-thirds of people will recover without any specific intervention.[10] Consequently, we work on the understanding that the consequences of drug use must be understood in relation to the frequency, amount, and manner of use, which are shaped by the context.

The International Harm Reduction Association defines harm reduction as "polices, programmes and practice that aim primarily to reduce the adverse health, social and economic consequences of the use of legal and illegal psychoactive drugs without necessarily reducing drug consumption".[11] We suggest that harm reduction should also address the issues of current policy and the criminalisation of drug use, which contribute significantly to the harms related to the consumption of illicit drugs.

Methods

Data were obtained through a review of online sources, reference lists and the authors' knowledge of the literature. There is little published literature on how drug policy shapes health outcomes in South Africa. We therefore draw on reports and dissertations and make international comparisons where needed. Discussion between the authors, who are experienced in public health and infectious diseases, drug policy and addiction, anthropology, sociology and criminology, refined the analysis and informed the recommendations.

Findings

Understanding legislation and policy in South Africa requires that we not only examine the content of policies, but also the local context (and its political and historical underpinnings), the process of policy development, and the actors influential in this. This section examines these elements individually, while recognising that they should be understood in relation to each other. Thereafter, a discussion is presented on harm reduction as a means of alleviating some of the problems engendered by current policy approaches to drug use.

Context

International policy and approaches

Three international Conventions guide the approach to drugs: the Single Convention on Narcotic Drugs (1961),[12] the Convention on Psychotropic Substances (1971),[13] and the Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances (1988).[14] United Nations Member States are obliged to abide by the Conventions, and as such, the Conventions exert indirect control over the drug-control policies of most nations. As reflected in the language used, the Conventions were developed in a particular context and at a particular time. Nations are obliged to "prevent and combat" the "serious evil" of "drug addiction". This terminology has not been changed and it is therefore perhaps not surprising that the end of the 20th century was dominated by America's "war on drugs". Announced by President Nixon in 1971, this approach was based on moral discourses of drug use and trade as deviant and in need of eradication. It consequently focused on supply reduction and harsh punishment of people involved in drug trade and use, pitting the State against people who use drugs by extending the powers of the former and punishing the latter.

The supremacy of this moralistic approach started to face concerted challenges in the late 1990s as drug use came increasingly to be framed as a "chronic, relapsing disease of the brain".[15] This framing was proposed as a means to reduce stigma and improve clinical outcomes.[15] However, critics argue that the 'disease model' may increase stigma and has negatively impacted treatment outcomes through the focus on abstinence-based treatment,[16] arguably the only alternative to incarceration that sits comfortably within the framework of the Conventions.

The emerging HIV epidemic, and recognition that HIV is transmitted (inter alia) through injecting illicit drugs with contaminated needles due to restricted availability of sterile needles and syringes, led to wider acceptance of the harm-reduction approach. Harm reduction offers a non-judgemental response to drug use and a public-health alternative to the moral/criminal and disease models.[3] The

fundamental rights of people who use drugs is at the core of harm reduction, and this approach does account for social context.[3]

South African context

South Africa is a signatory to the three international Conventions on drug use. Approaches to drug use have also been greatly influenced by local political leadership. In apartheid South Africa, drug use was of concern to the State, particularly the effects it had on the governability of oppressed populations. In the transition to democracy, a more human rights-focused approach dominated all aspects of governance, including health and safety. This gave new impetus to public policy that responded to the needs of all citizens,[17] while aligning with global normative standards.[18] However, supported by the tone of the Conventions, local drug-use legislation and policy continues to view drug use as an 'evil', individualising the causes of and responses to it in ways that negatively impact the poor and marginalised and limit the realisation of their rights.[19]

The end of apartheid also led to the opening of borders and dismantling of specialised drugs units, which contributed to increased drug traffic through South Africa and the availability of heroin, cocaine and methamphetamine.[20] The relative cost of drugs has decreased – once inflation is accounted for, the price of heroin halved between 2004 and 2014.[21] As elsewhere, increasing socio-economic disparities and declining labour-market access have made the production and distribution of drugs economically attractive.[22] South Africa's inclusion in the global drug trade[23,24] has not been disrupted by law-enforcement strategies.[25] Legislative changes to the search and seizure powers of the police have changed operational practices, but have not had a notable impact on the availability of drugs on the street.

Epidemiology of drug use

There are limited data on the prevalence of drug use in South Africa. A nationally representative household survey estimated the lifetime prevalence of developing drug abuse at 4% and of developing drug dependence at 1%.[a,26] The South African Community Epidemiology Network on Drug Use provides self-reported surveillance data from drug-use disorder treatment centres across the country. These data are affected by selection bias, as financial and geographical barriers limit access.[27] However, the data provide insight into drug-use trends over time. Between January and June 2016, 10 540 patients were reported at 82 centres. Cannabis and alcohol were the most common primary substances of use, accounting for 33% and 26% of admissions, respectively. Other substances included heroin, also known on the streets as 'whoonga', 'nyaope' and 'pinch' (12%), methamphetamine also known as 'tik' (5%), methaqualone, also known as 'mandrax' or 'buttons' (5%), and cocaine, including 'crack' (4%).[28]

The health and social system

The Department of Social Development (DSD) oversees and implements prevention and treatment programmes for substance-use disorders, while the National Department of Health (NDoH) manages acute consequences, emergencies and psychiatric conditions as per their legislative mandate (discussed later).

The screening and treatment of substance-use disorders has not been a health priority, with few hours of instruction included in undergraduate medical training. Specialised postgraduate courses have only recently been introduced.[29] Few medical doctors screen for and have been trained in screening for substance use.[30] While the usefulness of maintenance therapies has been recognised, Stikland Hospital has the only State-funded medication-assisted withdrawal programme.[31] Despite international and national evidence pointing to the ineffectiveness of a strong law-enforcement approach, the Departments of Health and Social Development continue to receive fewer funds than South African law-enforcement bodies to manage the 'drug-use problem'.[32]

Drug-related harms

HIV prevalence is estimated to be 14% among people who inject drugs in three of South Africa's largest cities,[33] while hepatitis C prevalence is estimated at 65% in Pretoria.[b] The prevalence of tuberculosis among people who use drugs is unknown; however, substance use is an important risk factor.[34] Drug use is also directly and indirectly associated with violence[22] and crime.[35] Stimulant use is associated with high-risk sexual practices[36] and the intersection with the sex industry is described.[33,37]

These physical and behavioural consequences of drug use must be considered in the light of the effects of criminalisation and stigmatising approaches on people who use drugs, particularly by the media and state institutions.[38] Harms include:

- Exclusion from the formal economy: This applies particularly to males from poor communities who are arrested for drug possession. Criminal records limit entry to the formal economy and push people towards illicit activities and gangs.[39]
- Increased morbidity and mortality from communicable diseases: Viral hepatitis among people who inject drugs in Pretoria increased from 24% in 2012 to 65% in 2014.[b] This is linked to limited access to sterile injecting equipment and opioid substitution therapy.[2] In the case of tuberculosis, recent data at DP Marais Tuberculosis Hospital in Cape Town show that a quarter of those admitted had a recent history of methaqualone, heroin and/or methamphetamine use and over 90% of people leaving the hospital against medical advice used substances (including alcohol).[40]
- Inadequate service provision: Stigmatisation and fear of criminalisation have led to avoidance of health and social services.[41] This problem is amplified by harassment, and even arrest, of non-government actors attempting to close service gaps.[42]

Content

In South Africa, drugs are principally defined and legislated through three Acts, which draw on the international Conventions. The Medicine and Related Substance Act (101 of 1965)[43] defines the scheduling of drugs, thereby indicating legal and illegal use of substances. The Drugs and Drugs Trafficking Act (140 of 1992)[44] further defines illegal acts relating to substances, and covers penalties for drug use or possession and law-enforcement roles and processes. It is notably reactive, punitive, and prohibitionist.[45] The

a The terms 'abuse' and 'dependence' are the terminology used in the DSM-IV when the study was published. 'Dependence' was considered more severe than 'abuse' and was specified as 'with or without physiologic dependence'.

b Personal Communication: V Hechter, Sediba Hope Medical Centre Executive Officer, 10 February 2016.

result is lengthy sentencing (as much as 25 years for production); a focus on arrest rates to measure police performance; and the reinforcement of police actions that may be ineffective, divisive, or predatory.[46] The Prevention of and Treatment for Substance Abuse Act (70 of 2008)[45] outlines the broader social and legislative response to substance use with emphasis on the responsibilities of the DSD. Responsibilities include the development and oversight of the CDA, which in turn is required to oversee the implementation and evaluation of the NDMP.[47]

The third and current NDMP (2013–2017) describes itself as a "holistic approach" to drug regulation, treatment and prevention.[47] It introduces a local definition of harm reduction, namely "limiting or ameliorating the damage caused to individuals or communities who have already succumbed to the temptation of substance abuse", and claims that the international definition condones drug use.[47] It also indicates growing concern with human rights. Yet, scant attention is paid to how harms might be reduced in practice or what social problems should be resolved.

Public-health and public-safety interests should align with and reinforce one another because the problems they seek to address frequently have similar causes. However, in the NDMP, the overarching concern remains the eradication of drug use, with abstinence as the ultimate treatment goal. This implies that individual drug users are the problem, rather than the context they exist within, and it reinforces the continuation of a prohibitionist criminal-justice approach.[18]

Actors

The CDA comprises 18 national government departments, three other government bodies and 13 drug experts. It reports to the Inter-Ministerial Committee on Substance Abuse and is informed by Provincial Substance Abuse Forums that in turn are informed by and support Local Drug Action Committees. Despite this, the CDA has limited power, a negligible budget and little oversight capacity.[48] Civil-society engagement in the drug-policy process has largely been limited to abstinence-informed treatment providers, and religious and community organisations.[48] Discussions around (alternative) forward-thinking drug policy have been limited to a few outspoken public-health[49,50] and public-safety figureheads[51] who have suggested decriminalisation or legalisation. This position is often strongly countered by public commentary, with the media firmly supporting the punitive approach.[38] In 2016, voices of dissent found a platform in the South African Drug Policy Week[c] hosted by the TB/HIV Care Association, the first South African members of the International Drug Policy Consortium.

To date, there has been little public participation in drug-policy development. The current NDMP (2013–2017) claims broad community consultation but to the best of our knowledge, people who use drugs were not consulted in its development, reinforcing their marginalisation.[18]

Process

In terms of the legislation, the CDA should develop a NDMP based on expertise provided by the executive committee and wider and inclusive consultation. The NDMP then becomes the national policy document that informs the priorities, actions and focus of other government departments and related bodies as reflected in their individual drug-action plans.

However, the new NDMP is only due for completion in 2018. This timing does not align with the release of the NDoH's Drug Action Plan or the South African National AIDS Council's National Strategic Plan on HIV, STIs and TB (2017–2022). Furthermore, the CDA Executive Committee noted in relation to a recent policy position: "Regarding politics, it is important to emphasise that our position statement was authored by members of the Executive Committee of the Central Drug Authority (CDA). The broader CDA contains many civil servants representing different government departments and reporting to their ministers, each of whom may have different positions around cannabis and psychoactive substance use. For example, some departments are focused on adhering to the international agreements that South Africa has signed to outlaw drugs".[52]

The policy process thus seems to be influenced strongly by political or international relations agendas, with the CDA and the Departments of Health and Social Development often being excluded from key processes. For example, in March 2016 a Russia-Africa Anti-drug Dialogue was held in Durban with high-level police officers but was not attended by representatives from the CDA or the DSD.[53] National conservatism was further revealed in the highly publicised submission by the Africa Group Position (representing 14 African countries) at the 59th Commission on Narcotic Drugs, instead of the mandated Common African Position, developed by the African Union and endorsed by member states.[54] Moreover, the Minister of Police led South Africa's delegation to the 2016 United Nations General Assembly Special Session on the World Drug Problem, even though the DSD is legislated as government's lead agency. At the 60th meeting of the Commission on Narcotic Drugs in March 2017 there was no CDA representation, while the Department of International Relations and Cooperation and law enforcement were strongly represented.

Harm reduction as a viable and necessary alternative

Internationally, the criminalisation of drug use has resulted in the prejudicial arrest of populations deemed 'suspect', high arrest and low conviction rates, backlogged judicial facilities, and increases in police abuse and violence. These policing measures contribute to the marginalisation of people in need of State services, creating antagonistic configurations that ultimately limit the provision and uptake of health, social and other services.[2] These cyclical relationships, often spanning generations, define the State as 'the enemy' and delegitimise its authority while empowering criminal organisations.[55] The human rights violations experienced by people who use drugs negatively affect their health and access to services.[56] Criminalisation contradicts the constitutionally enshrined principles of equity and the right of freedom from discrimination and access to services.[57]

South Africa needs an approach to drugs that locates the individual within a social context, prioritises public health, and protects the rights of all. We believe this could be best achieved through adopting a harm-reduction framework that is fundamentally concerned with the rights of people who use drugs and the communities in which

c http://www.sadrugpolicyweek.com

they live. Harm reduction focuses on improving public-health and safety outcomes through providing people who use drugs with a range of services that are responsive, preventive and supportive, and ultimately aim at normative inclusion. For example, by limiting the onward transmission of HIV and viral hepatitis through the provision of sterile injecting equipment, these diseases are contained in the general population.[58] By providing opioid substitution therapy (OST) through the public-health system, people who use drugs and their families have access to unadulterated medication that improves their quality of life. The availability of OST through the public-health system has also been proven to lead to a radical decline in the interface between people who use heroin and the criminal justice system.[59] The WHO recognises that a legislative environment that supports public health is paramount to maximise health, and recommends the decriminalisation of drug use.[58]

Several countries have taken steps in this direction with positive effects. The Czech Republic's non-criminal approach to drug use averted the HIV epidemic among people who inject drugs, while the epidemic occurred in neighbouring countries that employed criminal-justice approaches.[2] Similarly in Portugal, civil penalties and health interventions replaced criminal sanctions, resulting in an eight-fold drop in HIV incidence with no significant increases in injecting or in the use of cannabis or amphetamines.[2,60] The success of harm-reduction approaches in Switzerland,[61] the Netherlands,[62] Spain[63] and Bolivia[64] is also well documented.

In a recent evaluation[d] of The Step Up Project, a harm-reduction initiative in which the authors have been involved, service users reported safer drug-use patterns and a belief in, and often a move towards, more conscious decision-making in respect of their drug use. One service user reported, "We realised that we have rights just because we are also human".[65]

From a policing perspective, adopting harm reduction allows police to focus on their core functions rather than wasting time and resources on arrests for drug possession or use. This in turn improves the relationship between police and neighbourhoods where 'the war on drugs' has alienated communities, predominantly those that are poorly resourced and heavily marginalised.

Police officers are harm-reduction champions in countries where harm reduction is well established (e.g. the Netherlands and Canada).[66] While South Africa has the potential to follow suit, this is hampered by the criminalisation of drug use, misconceptions about the effectiveness of harm reduction from a policing perspective, and law-enforcement targets that reward the punishment of individuals.[46] While policing organisations in South Africa are obliged to enact punitive legislation, many officers question the broader purpose of such legislation. Police are intimately familiar with the places and people they police and are often best positioned to discern the immediate results of the application of laws. Conversations with officers in Durban and Cape Town revealed that many recognise the futility of such actions as well as the cost and ineffectiveness of processes designed to meet numerical performance measurements rather than the more abstract 'public good'.[66] Such voices are often stifled by fears of being charged with insubordination, strengthened by a lingering understanding that effective responses require police to be 'tough on drugs'. Despite this, given the opportunity to speak, police officers can leverage their substantive knowledge of the daily lives of people who use drugs to become effective referral agencies. In these conversations, the authors began the process of identifying new pathways to reduce the harms caused by the policing of drugs, while increasing the effectiveness and efficiency of the policing of safety in communities.

d This evaluation was approved by the Research Ethics Committee of the University of the Western Cape, and included interviews with people who use drugs who accessed services provided by the Step Up Project.

Conclusion and recommendations

South African drug policy does not sufficiently heed growing evidence demonstrating the negative consequences of the war on drugs and prohibitionist policies. Rather than improving health, social or safety outcomes, such an approach serves to further marginalise already disadvantaged (and often traumatised) populations and undermines their right to dignity, privacy and service access. A new, inclusive approach is required that aims to address the social determinants contributing to drug use and to provide services that reduce drug-related harms. This requires a collective or social harm-reduction view of drug-use disorders, and a socio-medical framework aimed at reducing harms and improving quality of life.

The harm-reduction approach to drug use mitigates some contextually related problems and is a more equitable and effective policy framework, which is aligned with human rights principles and the social-justice agenda. It is slowly gaining traction in South Africa as a result of growing awareness of the negative public-health and safety impact of current policies and interventions. However, this currently small movement must gather momentum, especially in the policy arena.

A real commitment to harm reduction requires brave engagement by politicians, public servants and civil society to implement non-criminal approaches to drug use. It calls for reallocation of public spending from the war on drugs to harm-reduction approaches that would reduce the risks of infectious disease and address the health and social needs of people who use drugs. People who use drugs should be actively involved in dealing with the social problems that contribute to drug-use disorders and addiction as well as the architecture of intervention programmes.

The Department of Justice and Constitutional Development should task the South African Law Reform Commission to undertake a rigorous review of drug policy and provide recommendations for legislative change. This should be done in close consultation with the CDA Executive and with drug-policy experts located outside of the State. This process will be lengthy, and a concurrent effort to engage with the CDA and support a more progressive NDMP is essential. There have been indications that the CDA intends to include harm reduction in the NDMP, but as we have shown, their influence is often diluted by broader political agendas. The process should be accompanied by clearly stated mechanisms for instituting and operationalising harm-reduction programmes, particularly within public-health facilities and in community-based settings.

The National Department of Health should develop standard treatment guidelines for opioid substitution therapy as maintenance to manage people with heroin-use disorders, and requisite medications (i.e. methadone and buprenorphine/buprenorphine-naloxone) should be placed on the Essential Medicines List for use at primary-care level.

Integrated policy and practice with regard to health, safety and wellbeing should replace current punitive and prohibitionist approaches that stand in stark contrast to broader constitutional rights. At national level, we recommend that interdepartmental forums be arranged to align policy and ensure that interventions are in place across departments that lead to enhanced health and safety outcomes for people who use drugs.

Implementation of new policy will require significant shifts in thinking on the part of those who work in public-sector organisations such as the police, hospitals and social-welfare departments. Departments that directly engage with people who use drugs, such as health, police and social development, should sensitise and train staff to address misconceptions around drug use, the ineffectiveness and cost of current strategies, and the positive outcomes of non-criminalising approaches. Stigma and discrimination should be addressed and responded to. Medical, social science and police basic training should include harm-reduction and evidence-based understanding of drug use.

However, it is not sufficient to focus only on the State. Non-State groupings are equally significant in bringing about desired changes in policy, practice and outlook. Non-governmental organisations that are currently engaged in providing harm reduction and health services for people who use drugs should foster strong relationships with police. This would allow for proper and effective referral pathways and a continuum of interventions to address the needs of people who use drugs, in line with harm-reduction approaches.

Finally, civil-society groupings (including people who use drugs and their families) and individuals should form a strong and cohesive drug policy advocacy group. This group should find innovative techniques to push for greater access to public-health and welfare facilities and for programmes to address socio-economic inequity and poverty that usually underpin drug-use disorders. At the forefront of these advocacy groups and social movements should be people who use drugs, since they have the greatest expertise with regard to their circumstances. We recommend that all these processes take place in the immediate future before drug-use disorders become the next health epidemic. This is already on the horizon and South Africa's story of AIDS denialism should be instructive in terms of the need to prevent further harms afflicting to people who use drugs.

References

1 Walt G, Gilson L. Reforming the health sector in developing countries : the central role of policy analysis (review article). Health Policy Plan. 1994;9(4):353–70.

2 Csete J, Kamarulzaman A, Kazatchkine M, Altice F, Balicki M, Buxton J, et al. Public health and international drug policy. Lancet; 387(10026):1427–1480.

3 Marlatt GA. Harm reduction: come as you are. Addict Behav. 1996;21(6):779–88.

4 World Health Organization. Lexicon of alcohol and drug terms. Geneva: WHO; 1994.

5 Oxford Living Dictionary [Internet]. 2016 [cited 2017 Jan 10].
URL: https://en.oxforddictionaries.com/definition/drug

6 Taylor S, Buchanan J, Ayres T. Prohibition, privilege and the drug apartheid: The failure of drug policy reform to address the underlying fallacies of drug prohibition. Criminol Crim Justice. 2016 Sep 1;16(4):452–69.

7 American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington, DC: American Psychiatric Association; 2013.

8 Alexander B. The Globalisation of Addiction: A study in the poverty of spirit. Oxford: Oxford University Press; 2008.

9 Conway KP, Compton W, Stinson FS, Grant BF. Lifetime comorbidity of DSM-IV mood and anxiety disorders and specific drug use disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry. 2006;67(2):247–57.

10 White WL. Recovery / Remission from Substance Use Disorders. An Analysis of Reported Outcomes in 415 Scientifc Reports, 1868 – 2011. Philadelphia: Philadelphia Department of Behavioral Health and Intellectual disAbility Services; 2011.

11 International Harm Reduction Association. What is harm reduction? A position statement from the International Harm Reduction Association. London: International Harm Reduction Association; 2010.

12 United Nations. Single Convention on Narcotic Drugs. Final Act of the United Nations Conference for the Adoption of a Single Convention on Narcotic Drugs. Vienna: United Nations; 1961.

13 United Nations. Convention on Psychotropic Substances. Final Act of the United Conference for the Adoption of a Protocol on Psychotropic Substances. Vienna: United Nations; 1971.

14 United Nations. Convention Against Illicit Drugs and Psychotropic Substances. Final Act of the United Nations Conference for the Adoption of a Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances. Vienna: United Nations; 1988.

15 Leshner AI. Addiction is a Brain Disease, and it Matters. Science.1997;278(5335):45–7.

16 Hall W, Carter A, Forlini C. The brain disease model of addiction: challenging or reinforcing stigma? – Authors' reply. The Lancet Psychiatry. 2015 Apr;2(4):292.

17 Kumar C. Building democratic institutions: the role of national human rights institutions in good governance and human rights protection. Am Univ Int Law Rev. 2003;19(2):259–300.

18 Pienaar K, Savic M. Producing alcohol and other drugs as a policy "problem": a critical analysis of South Africa's "National Drug Master Plan" (2013–2017). Int J Drug Policy. 2016 Apr;30:35–42.

19 Buchanan J. Missing links? Problem drug use and social exclusion. Probat J. 2004;51(4):387–97.

20 Standing A. Organised Crime on the Cape Flats. Cape Town: Institution for Security Studies; 2006.

21 Howell S, Harker-Burnhams N, Townsend L, Shaw M. The wrong type of decline: fluctuations in price and value of illegal substances in Cape Town. SA Crime Q. 2015;(54)43–54.

22 Buchanan J, Young L. Examining the Relationship Between Material Conditions, Long Term Problematic Drug Use and Social Exclusion. In: Bradshaw J, Sainsbury R, editors. Experiencing Poverty. London; 2000. p. 120–43.

23 United Nations Office on Drugs Crime. World Drug Report. Vienna: UNODC; 2016.

24 INCB. Report of the International Narcotics Control Board for 2016. New York: United Nations; 2016.

25 United Nations Office on Drugs Crime. Afghan Opiate trafficking through the Southern Route. Vienna: UNODC; 2015.

26 Stein DJ, Seedat S, Herman A, Moomal H, Heeringa SG, Kessler RC, et al. Lifetime prevalence of psychiatric disorders in South Africa. Br J Psychiatry. 2008;192:112–7.

27 Myers BJ, Louw J, Pasche SC. Inequitable access to substance abuse treatment services in Cape Town, South Africa. Subst Abuse Treat Prev Policy. 2010;5(1):28.

28 Dada S, Harker Burnhams N, Erasmus J, Parry C, Bhana A, Timol F, et al. SACENDU Update. January – June 2016. Cape Town: South African Medical Research Council; 2016.

29 Pasche S, Kleintjes S, Wilson D, Stein DJ, Myers B. Improving Addiction Care in South Africa: Development and Challenges to Implementing Training in Addictions Care at the University of Cape Town. Int J Ment Health Addict. 2015 Jun 22;13(3):322–32.

30 Pasche SC, Stein DJ. Dealing with substance use disorders in general practice. S Afr Fam Pract. 2012;54(5):404–7.

31 Weich L. "Defeating the dragon" – can we afford not to treat patients with heroin dependence? S Afr J Psychiatry. 2010;16(3):75–9.

32 South African Government. Drugs and Drug Trafficking Act. No 140 of 1992. Cape Town: South African Government; 2010.

33 Scheibe A, Makapela D, Brown B, dos Santos M, Hariga F, Virk H, et al. HIV prevalence and risk among people who inject drugs in five South African cities. Int J Drug Policy. 2016;30:107–115

34 Deiss RG, Rodwell TC, Garfein RS. Tuberculosis and illicit drug use: review and update. Clin Infect Dis. 2009 Jan;48(1):72–82.

35 Parry C, Plüddemann A, Louw A, Leggett T. The 3-metros study of drugs and crime in South Africa: findings and policy implications. Am J Drug Alcohol Abuse. 2004;30(1):167–85.

36 Wechsberg WM, Parry CDH, Jewkes RK. Drugs, Sex, Gender-Based Violence, and the Intersection of the HIV/AIDS Epidemic with Vulnerable Women in South Africa. Policy Brief. In Research Triangle Park: RTI Press; 2010.

37 Parry CDH, Dewing S, Petersen P, Carney T, Needle R, Kroeger K, et al. Rapid assessment of HIV risk behavior in drug using sex workers in three cities in South Africa. AIDS Behav. 2009;13(5):849–59.

38 Howell S. "We have to start showing who is boss now": Constructing methamphetamine use and users in the South African print media. Crime Media Cult. 2015;11(2):137–56.

39 Pinnock D. Gang Town. Cape Town: Tafelberg; 2016.

40 Versfeld A. Tuberculosis and Substance Use: The Making of an intra-occurrence. Thesis. Cape Town: University of Cape Town; 2017.

41 United Nations Office on Drugs and Crime, Centers for Disease Control, TB HIV Care Association, OUT LGBT Wellbeing. "Hello Mr President, it's time to take notice of the harm reduction movement". Draft Report from the National People who Inject Drugs Community Consultation. Pretoria: UNODC; 2014.

42 Lopez Gonzalez L. Police arrest health workers for giving drug users clean water [Internet]. Bhekisisa: Mail & Guardian. 2016 [cited 2016 Jan 21].
URL: http://bhekisisa.org/article/2017-01-19-00-police-pounce-on-health-workers-for-giving-clean-water-to-pretoria-drug-users

43 South African Government. Medicines and Related Substances Control Act (101 of 1965). Cape Town: South African Government; 1965.

44 South African Government. Drugs and Drug Trafficking Act (140 of 1992). Gov Gaz. 1992;329(14143): 1–71.

45 South African Government. Prevention of and Treatment for Substance Abuse Act (70 of 2008). Gov Gaz. 2009;526(3):1–37.

46 Faull A. Missing the Target. SA Crime Q. 2010;31(March): 19–25.

47 Department of Social Development, Central Drug Authority. National Drug Master Plan 2013–2017. Pretoria: Department of Social Development; 2013.

48 Whiting S. Implementing the national drug master plan: lessons to be learnt. Cape Town: Parliament; 2015.

49 van Niekerk JP. Time to decriminalise drugs? S Afr Med J. 2011;101(2):79–80.

50 Reporter. Legalise nyaope, says UP professor. Sowetan Live [Internet]. 2015 Aug 8; [cited 2017 Jan 21].
URL: http://www.sowetanlive.co.za/news/2015/08/08/make-nyaope-freely-available-like-arvs

51 Mtyala Q. Legalise it – General Vearey. Cape Times [Internet]. 2016 Jun 7; [cited 2017 Jan 21].
URL: http://www.iol.co.za/capetimes/legalise-it–general-vearey-2031760

52 Stein D, for the EC CDA. Position statement on cannabis. S Afr Med J. 2016 May 16;106(6):569.

53 Bloom K. Comrades in arms: South Africa, Russia, and the new global war on drugs [Internet]. Daily Maverick. 2016 [cited 2017 Jan 20].
URL: https://www.dailymaverick.co.za/article/2016-03-07-comrades-in-arms-south-africa-russia-and-the-new-global-war-on-drugs/#.WITkj2XQDRY

54 Cullinan K. Elite "African Group" in Vienna undermines AU drug policy. Health-e News. 2016 Feb 7. [cited 2017 Jan 21].
URL: https://www.health-e.org.za/2016/02/07/elite-african-group-in-vienna-undermines-au-drug-policy/

55 Cooper-Knock SJ. Beyond Agamben: Sovereignity, policing and permissive space in South Africa, and beyond. Theor Criminol. 2017;21(1):1–20.

56 Kerr T, Small W, Wood E. The public health and social impacts of drug market enforcement: A review of the evidence. Int J Drug Policy. 2005 Aug;16(4):210–20.

57 South African Government. Constitution of the Republic of South Africa. Cape Town: South African Government: 1996.

58 World Health Organization. Consolidated Guidelines on HIV Prevention, Diagnosis, Treatment and Care for Key Populations. Geneva: WHO; 2014.

59 Dutra L, Stathopoulou G, Basden SL, Leyro TM, Powers MB, Otto MW. A Meta-Analytic Review of Psychosocial Interventions for Substance Use Disorders. Am J Psychiatry. 2008 Feb;165(2):179–87.

60 Domostawski A. Drug Policy in Portugal. The benefits of decriminalizing drug use. Lessons for drug police series. New York: Open Society Foundations; 2011.

61 Csete J. From the Mountaintops. What the World Can Learn from Drug Policy Change in Switzerland. New York: Open Society Foundations; 2010.

62 Grund J-P, Breeksema J. Coffee Shops and Compromise. Seperated illicit drug markets in the Netherlands. New York: Open Society Foundations; 2013.

63 Pares Franquero O, Bouso Saiz JC. Innovation Born of Necessity. Pioneering Drug Policy in Catalonia. New York: Open Society Foundations; 2015.

64 Farthing LC, Ledebur K. Habeas Coca: Bolivia's Community Coca Control. New York: Open Society Foundations; 2015.

65 Wildschut J, Versfeld A. "Now I Feel Human Again". Project Evaluation. TB/HIV Care Association Step Up Project. Cape Town: TB/HIV Care Association; 2016.

66 Marks M, Howell S. Cops, drugs and interloping academics: An ethnographic justification for harm reduction-based programmes in South Africa. Police Pract Res. 2015;4263(April).

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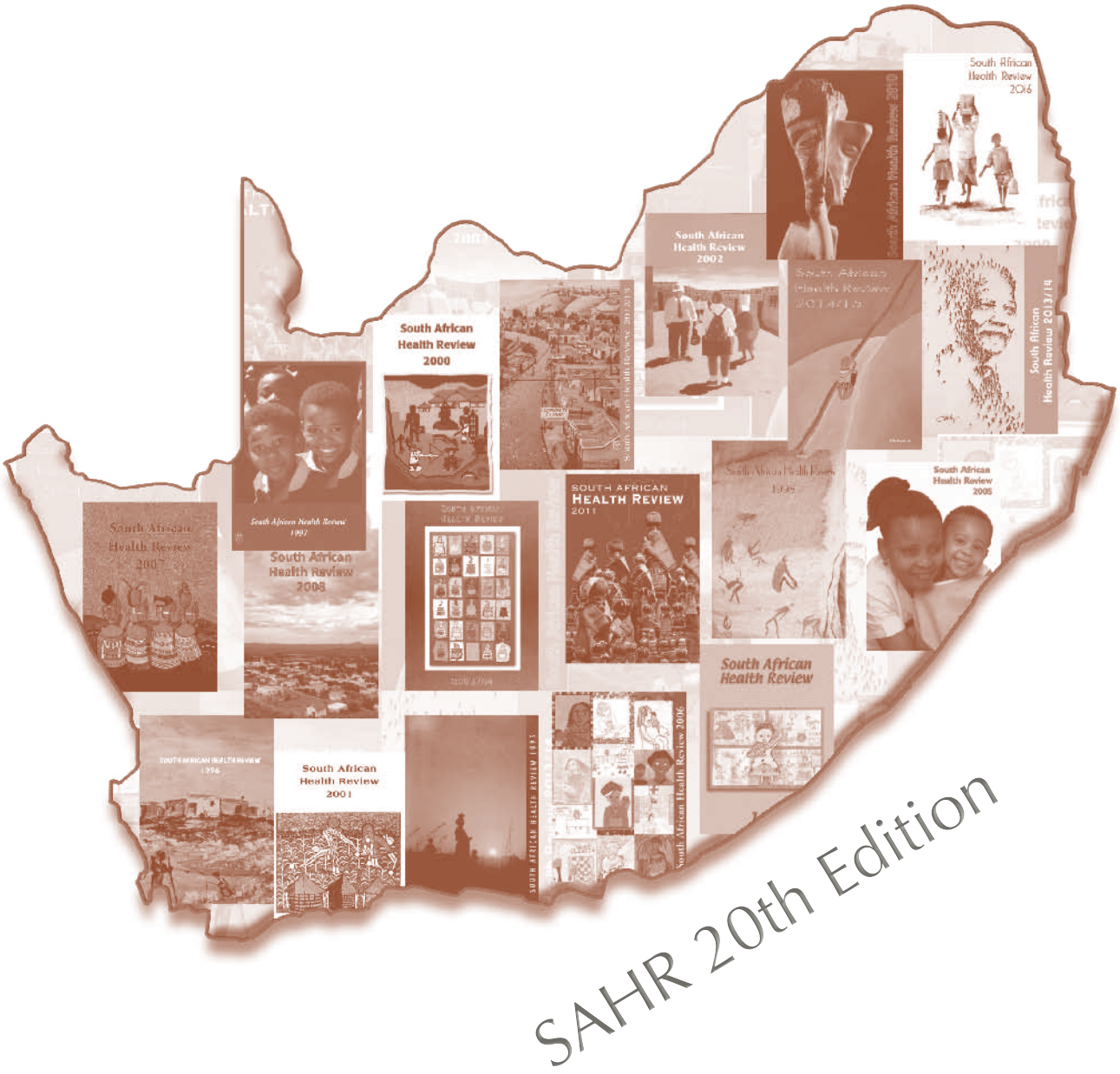

Twenty years of IMCI implementation in South Africa: accelerating impact for the next decade

20

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Emerging Public Health Practitioner Award

In many resource-limited settings, implementation of the World Health Organization Integrated Management of Childhood Illness (IMCI) strategy has been adopted as the preferred standard of care for sick children under the age of five years.

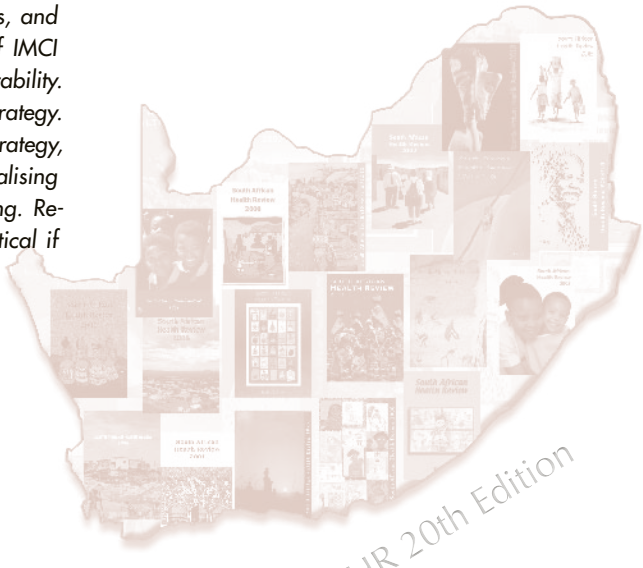
Implementation challenges have been experienced in all settings, mostly related to health-system constraints. There has been no recent review of IMCI implementation in South Africa, despite increasing questioning of the utility of the strategy both locally and internationally.

The aim of this chapter is to review and synthesise the available literature and experience of IMCI implementation in South Africa, against the backdrop of the international experience, and to offer recommendations on how best to strengthen IMCI implementation in this country.

Available programmatic data and local and international studies on IMCI implementation and evaluation were reviewed and synthesised.

Many of the challenges to successful IMCI implementation described in the international literature also occur in South Africa, such as human-resource constraints, inadequate budgets and limited delivery of the community component. A particular problem in South Africa is limited practice of the strategy by IMCI-trained professionals, and poor clinician adherence to IMCI guidelines. Monitoring and evaluation of IMCI implementation is weak and programmatic data are scarce, hindering accountability. The review suggests nine critical interventions required to revitalise the strategy. These include redefining IMCI as a programme rather than an integrating strategy, compartmentalising clinical components to promote task-sharing, rationalising clinical guidelines, and incorporating technological interventions into training. Re-prioritising and repositioning IMCI to address implementation failures is critical if IMCI is to achieve optimum impact on child health in South Africa.

There has been no recent review of Integrated Management of Childhood Illness implementation in South Africa, despite increasing questioning of the utility of the strategy both locally and internationally.



SAHR 20th Edition

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Introduction

Integrated Management of Childhood Illness (IMCI) is an integrated strategy that aims to reduce death, illness and disability, and to promote growth and development among children under five years of age. The strategy comprises both preventive and curative elements and has three components targeted at improving:

- case-management skills of healthcare staff;
- overall health-system functioning; and
- family and community health practices.

The rationale and extensive evidence base used by the World Health Organization (WHO) to develop the IMCI strategy is well described.[1,2] Since its launch in 1995, the strategy has been adopted by over 100 low- and middle-income countries, including South Africa.[3]

A 2016 Cochrane Review confirmed that IMCI reduces deaths in high under-five mortality settings by about 15%.[4] The inherent difficulty in evaluating complex health-system interventions has hindered efforts to interpret the true impact of this integrated strategy, and the ongoing role of IMCI as the preferred strategy for sick-child health care delivery in resource-constrained settings is currently undergoing global scrutiny.[5]

In 1998, the National Department of Health (NDoH) adopted IMCI as its primary strategy for providing care to sick children under the age of five years in primary health care (PHC) facilities.[6] As an integrated strategy, IMCI has faced unique and overwhelming challenges in an overburdened and under-resourced health system in which vertical programmes dominate. A critical review of the successes and failures of IMCI implementation in South Africa over the past 20 years offers insight into how IMCI delivery can be strengthened; it also potentially informs the introduction and successful implementation of other integrating strategies, which are increasingly being advocated in the current public health climate.[7]

This chapter review focuses on IMCI implementation in the South African context, and summarises the international experience of IMCI enactment before reviewing local successes, challenges and failures. Considering lessons learnt and the available evidence, the chapter offers recommendations on how the delivery of PHC services for sick young children in South Africa should be modified in the next decade, while retaining a re-designed IMCI as the backbone of a new child-health service package.

Methods

A number of electronic databases were searched, using combinations of the terms 'Integrated Management of Childhood Illness', 'IMCI', 'implementation', 'global' and 'South Africa'. Databases accessed included PubMed, Science Direct, EBSCOHost, the Cochrane Library, and Academic Search Complete. The references of articles identified through this search were also reviewed. Searches for local programmatic data were done manually through reports from the NDoH and Health Systems Trust, among others.

Key findings

The international context

Internationally, IMCI has been rolled out with varying success in different settings. Some components of the strategy are better implemented than others, with health-system constraints playing a key role in limiting implementation.[3,5,8] Cost and human-resource issues (particularly training) emerged as critical challenges to successful scale-up in a multi-country survey conducted in 2006/07.[9]

Similar implementation challenges have been identified consistently in many settings, including South Africa. These include the intensive training requirements, post-training supervision, healthcare-worker adherence to prescribed guidelines, and weak implementation of the community-based components of IMCI.[4,8–11] Qualitative studies have found that longer consultation times, lack of supervisory support, and a perception that the IMCI classifications were not important or relevant, contributed to poor adherence to IMCI guidelines by health workers across multiple settings.[12–15]

In 2016, an international review initiated by the WHO and UNICEF reported that implementation success was most often linked to stronger health systems, firm political will and a systematic approach to planning and implementation. Lack of clear guidance on programmatic monitoring and on implementation of the community components of the programme were highlighted as contributing to implementation failure.[5]

The South African context

The history of IMCI in South Africa

Integrated Management of Childhood Illness was introduced in 1996, and adopted two years later as a key part of the PHC strategy to deliver care to children under the age of five years. The introduction and championing of IMCI was led principally by the NDoH, which has continued to be the main driver of the initiative. The primary implementation focus was on training and capacity-building of healthcare workers, funded largely by external partners. Although IMCI was conceptualised as an integrated and multifaceted intervention, support for the implementation of community IMCI and the necessary health systems strengthening interventions was not prioritised at the outset, and this legacy has persisted ever since.

By 2004, implementation was in the expansion phase.[16] In 2006, 100% of districts and 76% of PHC facilities nationally reported that they were implementing IMCI, with almost half (48%) achieving the WHO target, namely that 60% of professional nurses working at each facility should be IMCI-trained.[17] As donor-partner funding for IMCI dissipated, available budgets for training diminished. The responsibility for ongoing training was handed over to provinces, although enduring reliance on the NDoH as the driver of the strategy continued. The intensive 11-day training course was modified to shorter or decentralised versions, and new modalities such as electronic support were introduced to reduce fiscal and human-resource demands.[18] Incorporation of IMCI training into pre-service medical and nursing curricula has been implemented variably, but relatively poorly.

A central NDoH technical team continues to review and revise IMCI clinical guidelines and tools, with responsibility for implementation devolved to provinces. Community components of the IMCI strategy have been implemented sporadically and have never achieved

large-scale expansion. Nevertheless, the NDoH remains committed to strengthening community-based IMCI initiatives, in alignment with PHC re-engineering, through the training of community health workers.[19]

Strengths and weaknesses of IMCI implementation

The South African experience echoes many of the international challenges, including inadequate supervision, challenges related to training, and poor implementation of community IMCI.[17,20,21] The conceptual framework for IMCI success relies on simultaneous implementation of all three pillars of the intervention; the prioritisation of capacity-building alone is considered a critical weakness.[22]

Table 1 summarises the key strengths and weaknesses of IMCI implementation in South Africa.

Leadership and clinical governance

An international review of IMCI implementation reported that a systematic approach to planning and implementation of IMCI led to greater impact.[5] While there was strong political support for IMCI at the outset in South Africa, there has been gradual erosion of interest in the strategy, particularly as clear evidence of its success failed to emerge. The lack of a structured implementation plan at the outset may have hindered the potential impact of the strategy. Provinces, districts and individual PHC centres were allowed to self-determine compliance, resulting in idiosyncratic execution. Limited supervisory support, mentoring and monitoring accentuated implementation failures.

Human resources

Over 10 000 healthcare workers have been trained in IMCI in South Africa, and training is ongoing. Despite this, availability of skilled clinicians to provide PHC care remains challenging because of inadequate staff numbers, high staff turnover, and rotation of IMCI-trained staff.

Additionally, acceptance of IMCI as the preferred child-health strategy is not uniform among healthcare workers in South Africa. It has been reported that doctors and nurses with special PHC training frequently view IMCI as an inferior strategy for case management, despite lack of evidence to support this. The criticism that IMCI is too simplistic was shared by practitioners in Tanzania and Kenya.[23,24]

Low rates of adherence to IMCI management guidelines have been reported in local studies, with poor identification of children requiring immediate treatment and referral.[25–27] Unfortunately, mismanagement of children under these circumstances may serve to reinforce the perception of IMCI as an inferior management strategy.

South Africa participated in WHO-led IMCI health facility surveys in 2001/02. These surveys indicated that integrated assessments were being performed inappropriately.[21] Despite good prescribing practices and high levels of inquiry into symptoms of childhood illness, gaps in nutritional assessment and caregiver counselling were noted.[21] Regrettably, no health-facility surveys have subsequently been undertaken (the WHO recommends surveys at least every five years) and routine monitoring data are neither disseminated nor easily accessible.

Health services: varying success

In Limpopo Province, nurses reported that they struggled to implement IMCI due to a lack of resources and the poor working environment.[20] In this same environment, poor adherence to IMCI algorithms and poor identification of danger signs were also described.[25]

In contrast, a prospective 'before-and-after' study of IMCI implementation in Cape Town reported improvements in assessment of danger signs, rational prescribing, and treatment initiation in clinics across four districts.[28] Excellent support of the IMCI strategy was offered: all nurses had received supervisory support within the last six months, and there were uninterrupted supplies of IMCI essential medicines and vaccines.

Table 1: Strengths and weaknesses in the implementation of IMCI components in South Africa

IMCI component	Strengths	Weaknesses	Comment
Capacity building for healthcare workers	• Political commitment to training • Large numbers of staff trained • Saturation targets for training reached in most districts • Adaptation of training curricula and materials to the local context has occurred	• Reliance on donor funding • Over-reliance on training to produce impact • Poor implementation despite training • Failure to promote IMCI as the prescribed (rather than preferred) strategy	Low acceptance among healthcare workers, poor adherence to IMCI guidelines and poor supervision all contribute to poor implementation
Community IMCI implementation	• New investment as part of PHC re-engineering • Community IMCI implementation growing in multiple provinces	• Historically overlooked • Ongoing human-resource challenges within the ward-based outreach teams • Community health workers (CHWs) and their role still being established in many districts • CHWs have multiple responsibilities besides child health • Families not viewed as critical partners in health improvement	Since the community components of the strategy have been historically overlooked, this component is still in its early stages and is yet to be rolled out across all districts.
Health systems strengthening	• IMCI essential drugs included in the Essential Drugs List • Health systems receiving attention from the NDoH on a broader scale due to parallel initiatives (National Health Insurance)	• Weak health system, with inadequate human and fiscal resource, as examples • No specific interventions to support systems for IMCI • Initial implementation of IMCI was not planned for across all spheres of the health system • Lack of a clear monitoring strategy for IMCI implementation	Poor monitoring and low priority given to the IMCI strategy reduces accountability at all levels of the system

This suggests that good outcomes with IMCI are possible in better-functioning health systems. Interestingly, the implementation of a partnership model for community IMCI intervention in a poor district in Limpopo Province, with adequate support, showed gains in important child-health indicators, which bolsters the notion that support and political will are significant determinants of implementation success.[29] More research is needed to strengthen understanding of these nuances in implementation.

Adaptation of IMCI to the local context

South Africa has adapted IMCI to address its own child-health priorities. Noting the high prevalence of HIV and tuberculosis (TB) and the significant contribution of these conditions to childhood morbidity and mortality, specific algorithms to support the management of HIV and TB were designed and implemented in 2005 and 2011, respectively. Additional algorithms have been incorporated in South Africa, including the management of children presenting with wheezing, sore throat and skin rashes.

An evaluation of the IMCI algorithm for HIV management conducted in 2009 found it to be slightly more effective at identifying children requiring HIV testing than routine practices.[30] However, use of the algorithm was poor, with 69% of children not classified for HIV status.[30] A recent Western Cape study found the IMCI TB algorithm to be of benefit in screening and diagnosing TB meningitis in this high-burden setting.[31] Currently, the IMCI HIV management guideline is not aligned with the South African national HIV management guidelines, which were updated in 2015,[32] potentially undermining the use of the IMCI strategy in HIV-positive children.

Routine monitoring and evaluation of the IMCI strategy

When conducting the current review, no routine activity-related data on ongoing IMCI implementation could be identified after 2006 from available district, provincial or national data sources. Monitoring of incidence and case-fatality rates for pneumonia, diarrhoea with dehydration, and severe malnutrition according to IMCI definitions is conducted via the District Health Information Software (DHIS), but only since 2014.[33] The reliability of the data being collected is poor and there are many possible contributors to outcomes for these three indicators, with IMCI implementation status likely to be a minor determinant. In short, there are no routine or valid indicators of IMCI implementation in South Africa.

Discussion: can IMCI delivery be rationalised and strengthened?

As currently implemented in South Africa, IMCI is unlikely to contribute to the updated United Nations Global Strategy for Women's, Children's and Adolescents' Health (2016–2030) objectives, namely "survive, thrive and transform". Nine critical modifications can significantly increase IMCI effectiveness and impact. These are listed below.

1 Renewed commitment to IMCI implementation

Despite IMCI being accepted as a mainstay of the Health Department's PHC strategy, there is no clarity on whether its use at every sick-child encounter is optional, preferred or prescribed (mandatory). The consequence is idiosyncratic implementation at clinic, district and provincial level, dependent on individual practitioners and facility managers. The successful Egyptian experience confirmed that strong government commitment, planning and institutionalisation are essential in securing the full benefits of IMCI.[34] This demands a dedicated budget line and competent programme management staff at all three levels of government, with co-ordinated support from partners. The NDoH should clearly declare its position on, and ongoing commitment to, IMCI.

2 Redefining IMCI as a programme rather than an integrating strategy

Internationally, there is a lack of consensus on the role of IMCI within future broader health-system strategies. Whereas many interventions such as the Expanded Programme on Immunization (EPI) or the Prevention of Mother-to-Child Transmission (PMTCT) of HIV are implemented as programmes, IMCI has been promoted as a strategy. The consequent absence of specific and easily understood targets, budget lines and dedicated staff create obvious limitations. A re-definition that assumes a programmatic approach with the essential attributes of results-based planning and management is an attractive option.

Preceding this change is a requirement for the country to define elements of a service package of care for children, spanning the home, community and health-facility setting. This initiative has already commenced in South Africa, under the guidance of the Ministerial Committee for Mortality and Morbidity in Children (COMMIC). The IMCI strategy should contribute to the design of this service package and align with its objectives.

3 Accepting that IMCI cannot be 'the' integrating strategy for child health

The IMCI strategy was conceived as a broad, integrating base upon which all other child-health activities would interact synergistically, across the community and health-facility spectrum. In reality, IMCI has been implemented as a stand-alone strategy, co-existing with other vertical programmes, both in South Africa and in most countries globally. Additionally, IMCI overlaps with the intervention areas of these established vertical programmes. This may be an example of 'over-integration', undermining uniformity in clinical practice.

There is increasing recognition that rather than attempting to integrate all programmes, a diagonal approach, which allows both vertical programmes (e.g. EPI, PMTCT) and horizontal programmes (such as IMCI) to operate, and that uses explicit intervention priorities, may be better for strengthening health-system functioning.[35]

4 Stronger district-led IMCI governance, supervision and mentoring

Although South Africa has committed to a district-based health system, and this is a *sine qua non* of the realisation of universal health coverage goals, there is sparse evidence of successes with this approach to date. In countries where IMCI implementation is stronger, empowered district-level management has been a key factor for success, as in the TEHIP project where decentralisation allowed districts autonomy over funds, enabling them to experiment with IMCI.[5] In contrast, an unpublished study of IMCI implementation in two Gauteng districts identified minimal clinical governance, suboptimal monitoring and use of inappropriate indicators to track progress, with multiple cadres co-ordinating similar supervisory and mentoring activities with poor role delineation.[a]

a Personal Communication: H Pandya, Division of Community Paediatrics, University of Johannesburg, 30 January 2017.

Integrated Management of Childhood Illness might be an ideal 'programme' in terms of undertaking pilot activity; attention could be focused on improving IMCI governance, supervision and mentoring practices within districts, as resources are already devoted to this. Experimentation with budget allocation would also be worth pursuing since IMCI expenditure is relatively well confined. Peer learning among districts could be encouraged, for example by setting up platforms (a website or national conference) to share experiences.

5 Facility-based integration of services, including task-sharing

The current application of IMCI within facilities is largely interpreted as one clinician administering all components (including triage, sick-child management, preventive care and health promotion) during a single consultation. While this is ideal, it has been cited as a barrier to correct use of IMCI, mainly because it is time-consuming.[13,20] It is therefore recommended that auxiliary nurses or even trained lay health-promotion providers deliver the prevention and promotion components of IMCI. This threatens the holistic single-provider delivery model, but could optimise resource use, allowing trained practitioners to focus on diagnostic and management tasks while auxiliaries complete less skill-intensive components, with potential for superior results.

A system of task-sharing, essentially combining well-child services (including immunisation services) and sick-child (IMCI) services, could increase coverage of key child-health interventions, and optimise each child consultation. Staff rotation between these two child-health service delivery points could assist in improving and maintaining skills in child health and allow for optimal human resource use at both points depending on patient load, with preventive and health-promotion services available regardless of the individual professional's practice.

6 Rationalisation and alignment of IMCI clinical algorithms with other clinical guidelines, and improved case-recording

An HIV-positive infant presenting to a clinic with a cough and fever can be managed appropriately using multiple different NDoH guidelines, including those for IMCI, the Essential Drugs List (EDL), and HIV and TB. This contributes to provider confusion and acts as a barrier to appropriate child care.

Current policy favours the use of IMCI guidelines. For IMCI to be truly integrative, guidelines with primary-level child-health components should be drafted in a manner that integrates them directly into IMCI where IMCI is the preferred delivery strategy. However, the original intention of IMCI (to address common causes of childhood mortality) must continue to govern the selection of conditions included in IMCI. Other available resources, such as the EDL, could then be applied uniformly to other childhood conditions beyond the scope of IMCI.

Rationalisation of the current IMCI strategy is necessary to ensure that key child-health conditions receive the focus they require for impact. Changing disease burdens (e.g. chronic diseases such as asthma, obesity, behaviour disorders) and technological advances (e.g. cell-phones, Internet availability) demand re-design of existing guideline content and delivery strategies. Healthcare provider input could be invaluable in improving the clinical tools both in terms of content and user-friendliness, thereby increasing acceptability and use.

Lastly, the use of nationally standardised child-health record templates, based on IMCI requirements, could mandate practitioners to follow IMCI algorithms. Electronic IMCI case registers have been introduced successfully in Burkina Faso, Malawi, Tanzania and Bangladesh, improving adherence to guidelines since health workers cannot skip protocol – the clinical encounter is recorded, tracked and the data transmitted to the health management information system.[5]

7 Better monitoring and evaluation, and accountability

Although the WHO has set guidelines and standard indicators on monitoring IMCI, it does not provide details on how IMCI implementation should be monitored and how results can be used to improve performance.[36] As discussed earlier, South Africa has weak systems for monitoring and evaluating IMCI implementation, fostering a lack of accountability. The monitoring of one or two key coverage and quality-of-care indicators should be prioritised, and these should be incorporated into the currently used maternal and child health dashboard. A possible quality-of-care indicator might be the proportion of children classified as having pneumonia who received an antibiotic, while a coverage indicator could include the proportion of children screened for TB. Creating accountability for IMCI implementation at the district level may strengthen both the support for IMCI implementation and the political will to implement changes beneficial to child health.

8 Innovation in training with greater supervision and mentoring

A priority training need in South Africa is to integrate IMCI and related strategies into pre-service training. Currently, a favoured mechanism for certifying competency in performing a task is the concept of an Entrustable Performance Activity (EPA); IMCI lends itself to this approach, and every graduating health professional in South Africa should be able to demonstrate IMCI competency as a certified EPA.

A particular training deficiency in South Africa is the failure to augment the competence of IMCI trainees immediately post-training. Supervision and mentoring activities vary considerably, but are generally of poor quality. The priority need is for district supervisors to facilitate application of a graduate's IMCI learning in a real-world clinic setting.

The realm of digital solutions to challenges in the field of child health are increasingly being tested in resource-limited settings.[5] There is global demand for the IMCI computerised training tool (ICATT) and for electronic versions of IMCI tools, optimised for mobile phones. A small study conducted in Cape Town found that using automated IMCI algorithms on a tablet computer effectively increased adherence to IMCI guidelines.[37]

9 More emphasis on the community level

Community IMCI implementation has long lagged behind the implementation of facility-based interventions, despite a growing body of evidence on the effectiveness of community-based interventions in the field of child health.[38] With the current interest in community-based health initiatives as a cornerstone of the PHC Re-engineering Strategy, IMCI can ill afford to be left behind. At this stage, IMCI should be established as the primary vehicle for delivery of child-health services in the community, with no overlapping or competing child-health programmes. Stewardship, and accountability for quality implementation of the programme should

be the responsibility of the district child-health team. Community IMCI should be implemented in the context of the larger IMCI programme, and should form an integral part of this programme, with its own budget, oversight and defined targets. Stringent monitoring of the implementation of this programme will be crucial, as with all other components of IMCI implementation.

Future research

Many of the recommended changes are based on the experience of other countries or on theoretical constructs. Research is needed into the contextual challenges of implementing these changes, and how these challenges can be overcome. Investigation of innovative solutions to the health-system challenges would be worthwhile. Examples include interventions focused on human resources, such as interventions to support and motivate IMCI adherence, as undertaken in Benin,[39] or the implementation of health-worker feedback, as tested in Niger.[40]

Conclusion

South Africa has had some successes in implementing IMCI, particularly related to training coverage for PHC professionals and adaptation of the IMCI package to child-health challenges encountered in this country. However, concerns about the overall lack of impact indicate that the strategy should be reviewed. Simply put, these minor successes constitute inadequate impact on improving child health in a country with both unique health challenges and a complex health system environment. Implementation successes with the PMTCT and EPI programmes indicate that where resources, motivation and political support co-exist, impact is possible. Prioritising IMCI as a programme across facilities and communities and truly adapting it to the local health context is the first step to achieve impact. Pioneering, in times when international uncertainty has surfaced, is the next step. With sustained effort, insight and adaptation, the untapped potential for IMCI to improve the lives of South African children could finally be realised.

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References

1 Gove S. Integrated Management of Childhood Illness by outpatient health workers: technical basis and overview. The WHO Working Group on Guidelines for Integrated Management of the Sick Child. Bull World Health Organ. 1997;75 (Suppl 1):7–24.

2 Mason E, Scherpbier R, Lawe-Davies O. WHO position statement on IMCI. Lancet. 2009;374(9692):782–3.

3 Chopra M, Binkin NJ, Mason E, Wolfheim C. Integrated Management of Childhood Illness: what have we learned and how can it be improved? Arch Dis Child. 2012;97(4):350–4.

4 Gera T, Shah D, Garner P, Richardson M, Sachdev HS. Integrated Management of Childhood Illness (IMCI) strategy for children under five. Cochrane Database Syst Rev. 2016. [Internet]. [cited 14 August 2016]. URL: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD010123.pub2/full.

5 Costello AM and Dalglish SL on behalf of the Strategic Review Study Team. Towards a Grand Convergence for child survival and health: a strategic review of options for the future building on lessons learnt from IMNCI. Geneva: World Health Organization; 2016.

6 Saloojee H. Integrated Management of Childhood Illness (IMCI) – traditional versus new approaches to clinical care. CME. 2007;25(4):172–5.

7 Frenk J, Gómez-Dantés O. False dichotomies in global health: the need for integrative thinking. Lancet. 2017;389(10069):667–70.

8 Bryce J, Victora CG, Habicht J-P, Black RE, Scherpbier RW. Programmatic pathways to child survival: results of a multi-country evaluation of Integrated Management of Childhood Illness. Health Policy Plan. 2005;20(suppl 1):i5–i17.

9 Goga AE, Muhe LM. Global challenges with scale-up of the Integrated Management of Childhood Illness strategy: results of a multi-country survey. BMC Public Health. 2011;11(1):1–10.

10 Ahmed HM, Mitchell M, Hedt B. National implementation of Integrated Management of Childhood Illness (IMCI): Policy constraints and strategies. Health Policy. 2010;96(2):128–33.

11 Hazel E, Bryce J. On bathwater, babies, and designing programs for impact: evaluations of the Integrated Community Case Management Strategy in Burkina Faso, Ethiopia, and Malawi. Am J Trop Med Hyg. 2016;94(3):568–70.

12 Walter ND, Lyimo T, Skarbinski J, et al. Why first-level health workers fail to follow guidelines for managing severe disease in children in the Coast Region, the United Republic of Tanzania. Bull World Health Organ. 2009;87(2):99–107.

13 Adam T, Amorim DG, Edwards SJ, Amaral J, Evans DB. Capacity constraints to the adoption of new interventions: consultation time and the Integrated Management of Childhood Illness in Brazil. Health Policy Plan. 2005;20 (Suppl 1):i49–57.

14 El-Ayady AA, Meleis DE, Ahmed MM, Ismaiel RS. Primary health care physicians' adherence and attitude towards Integrated Management of Childhood Illness guidelines in Alexandria Governorate in Egypt. Glob J Health Sci. 2016;8(5):217–24.

15 Lange S, Mwisongo A, Mæstad O. Why don't clinicians adhere more consistently to guidelines for the Integrated Management of Childhood Illness (IMCI)? Soc Sci Med. 2014;104:56–63.

16 World Health Organization. IMCI Health facility surveys in the African region. 2004. [Internet]. [cited 12 August 2016]. URL: https://www.google.com/url?q=http://www.afro.who.int/index.php%3Foption%3Dcom_docman%26task%3Ddoc_download%26gid%3D647&sa=U&ved=0ahUKEwjC97noyL_OAhVFiywKHQpuC104ChAWCAkwAg&client=internal-uds-cse&usg=AFQjCNFJdScMB0nLjhjpMe6IrB-4S9UlCQ.

17 Saloojee H, Bamford L. Key childhood health promotion and disease prevention programmes. In: Ijumba P, Padarath A, editors. South African Health Review 2006. Durban: Health Systems Trust; 2006.

18 World Health Organization. IMCI Computerised Adaptation and Training Tool. 2016. [Internet]. [cited 19 May 2016]. URL: http://www.icatt-training.org/

19 UNICEF South Africa. Integrated Management of Childhood Illness. 2016. [Internet]. [cited 12 August 2016]. URL: http://www.unicef.org/southafrica/health_nutrition_753.html.

20 Horwood C, Voce A, Vermaak K, Rollins N, Qazi S. Experiences of training and implementation of Integrated Management of Childhood Illness (IMCI) in South Africa: a qualitative evaluation of the IMCI case management training course. BMC Pediatr. 2009;9(1):1–9.

21 World Health Organization AFRO. Report of IMCI Health Facility Survey Free State, Gauteng, Western Cape. Geneva: WHO; 2002.

22 Bryce J, Victora CG, Habicht JP, Vaughan JP, Black RE. The multi-country evaluation of the Integrated Management of Childhood Illness strategy: lessons for the evaluation of public health interventions. Am J Public Health. 2004;94:406–415.

23 Silali MB. Utilization of Integrated Management of Childhood Illnesses IMCI for Child health in Western Kenya. J Biol Agric Health. 2014;4(25).

24 Kiplagat A, Musto R, Mwizamholya D, Morona D. Factors influencing the implementation of Integrated Management of Childhood Illness (IMCI) by healthcare workers at public health centers & dispensaries in Mwanza, Tanzania. BMC Public Health. 2014;14:277.

25 Horwood C, Vermaak K, Rollins N, Haskins L, Nkosi P, Qazi S. An evaluation of the quality of IMCI assessments among IMCI trained health workers in South Africa. PLoS ONE. 2009;4(6):e5937.

26 Mulaudzi MC. Adherence to case management guidelines of Integrated Management of Childhood Illness (IMCI) by healthcare workers in Tshwane, South Africa. S Afr J Child Health. 2015;9(3):89–92.

27 Thandrayen K, Saloojee H. Quality of care offered to children attending primary health care clinics in Johannesburg, South Africa. S Afr J Child Health. 2010(4):73–7.

28 Chopra M, Patel S, Cloete K, Sanders D, Peterson S. Effect of an IMCI intervention on quality of care across four districts in Cape Town, South Africa. Arch Dis Child. 2005;90(4):397–401.

29 Sivhaga K, Hlabano B, Odhiambo PO. Using partnership approach to reduce mortality and morbidity among children under five in Limpopo province, South Africa. Pan Afr Med J. 2012;13 Suppl 1:14.

30 Horwood C, Vermaak K, Rollins N, Haskins L, Nkosi P, Qazi S. Paediatric HIV management at primary care level: an evaluation of the integrated management of childhood illness (IMCI) guidelines for HIV. BMC Pediatr. 2009;9:(59).

31 Solomons R, Grantham M, Marais BJ, van Toorn R. IMCI indicators of childhood TBM at primary health care level in the Western Cape Province of South Africa. Int J Tuberc Lung Dis. 2016;20(10):1309–13.

32 South African National Department of Health. National consolidated guidelines for the prevention of mother-to-child transmission of HIV (PMTCT) and the management of HIV in children, adolescents and adults. Pretoria: NDoH; 2015.

33 Massyn N, Peer N, Padarath A, Barron P, Day C. District Health Barometer 2014/2015. Durban: Health Systems Trust; 2015.

34 Rakha MA, Abdelmoneim A-NM, Farhoud S, et al. Does implementation of the IMCI strategy have an impact on child mortality? A retrospective analysis of routine data from Egypt. BMJ Open. 2013;3(1).

35 Sepúlveda J. Foreword. In: Jamison DT, Breman JG, Measham AR, editors. Disease control priorities in developing countries. 2nd ed. New York: Oxford University Press for The World Bank; 2006: xiii–xixv.

36 World Health Organization, UNICEF. IMCI information package. Geneva: WHO; 1999.

37 Rhode H, Mash B. The effect of an automated Integrated Management of Childhood Illness guideline on the training of professional nurses in the Western Cape, South Africa. S Afr Fam Pract. 2015;57(2):100–5.

38 Lewin S, Munabi-Babigumira S, Glenton C, et al. Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. Cochrane Database Syst Rev. 2010. [Internet]. [cited 20 January 2017].
URL: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004015.pub3/full#footer-article-info

39 Rowe AK, Onikpo F, Lama M, Osterholt DM, Rowe SY, Deming MS. A multifaceted intervention to improve health worker adherence to Integrated Management of Childhood Illness guidelines in Benin. Am J Public Health. 2009;99(5):837–46.

40 Kelley E, Geslin C, Djibrina S, Boucar M. Improving performance with clinical standards: the impact of feedback on compliance with the Integrated Management of Childhood Illness algorithm in Niger, West Africa. Int J Health Plann Manage. 2001;16(3):195–205.

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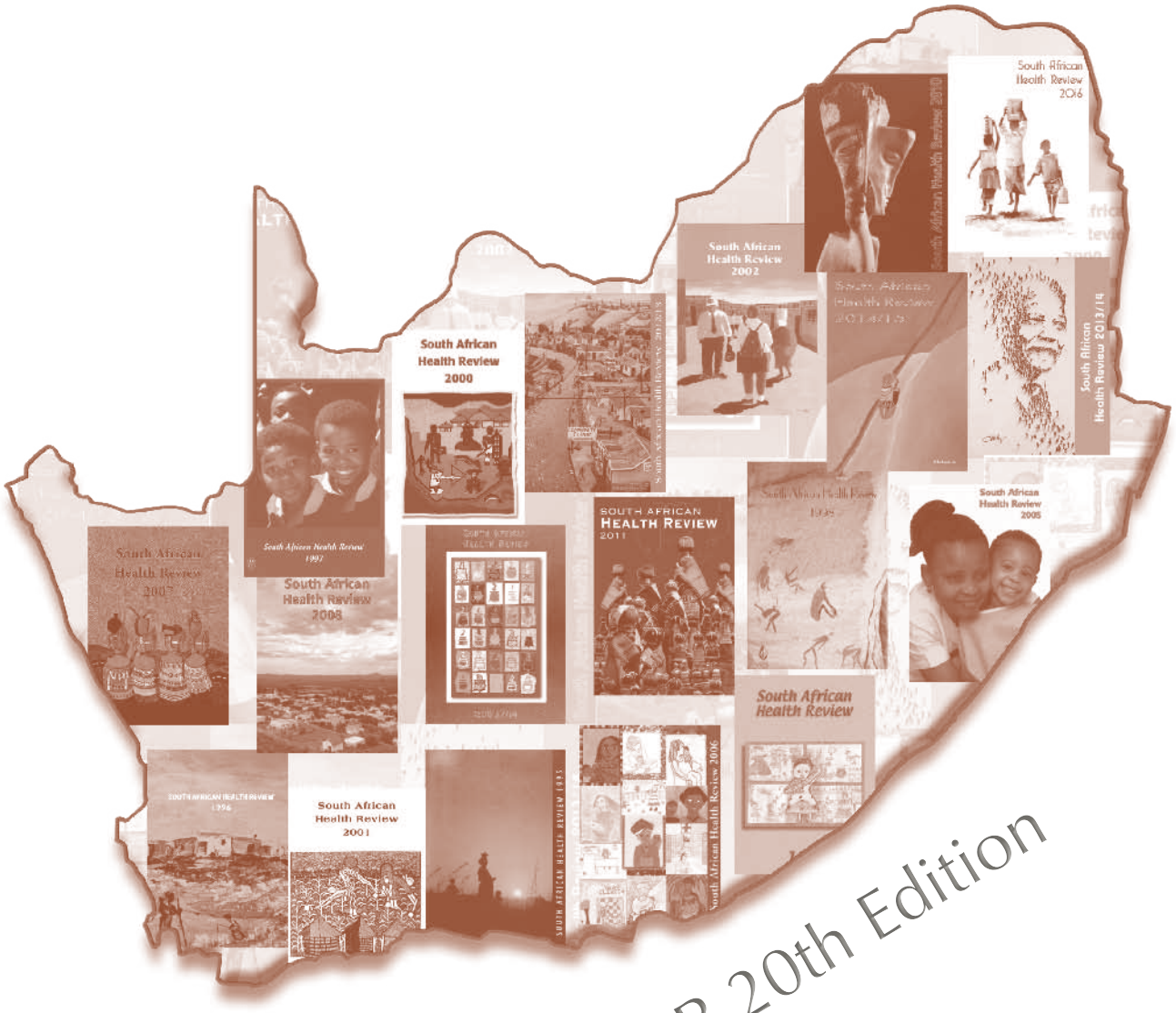

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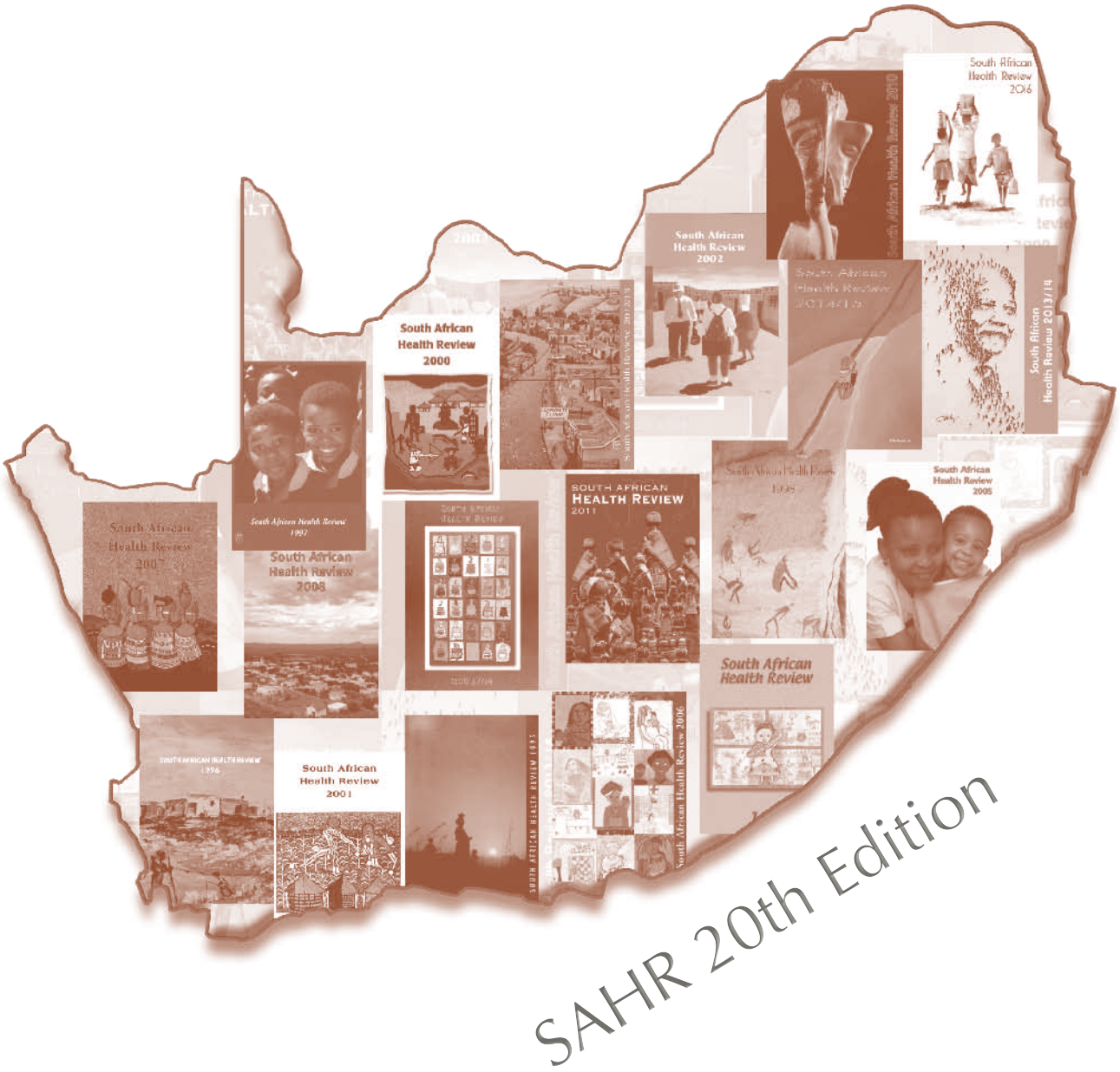

Health and Related Indicators

21

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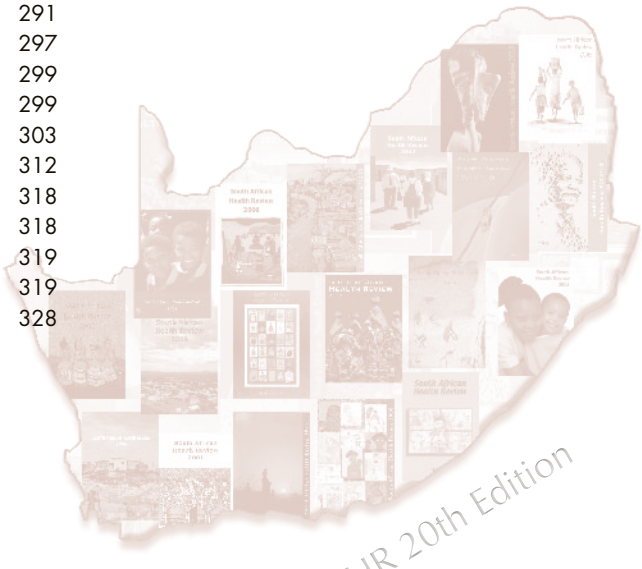
Contents



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Introduction

The transition from the Millennium Development Goal (MDG) era to that of the Sustainable Development Goals (SDGs) entails a deliberate broadening of the development focus in the form of the 2030 Agenda. Even in the case of the health-related SDG 3, the formulation has been widened, from a focus that was predominantly on maternal and neonatal health, and the key diseases of AIDS, tuberculosis and malaria, to a far broader remit, to "ensure healthy lives and promote well-being for all at all ages".[a] SDG 3 alone has 13 targets and 26 high-level indicators. For example, target 3.9 reads "By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination", which will require the tracking of three indicators:

- 3.9.1 – Mortality rate attributed to household and ambient air pollution;
- 3.9.2 – Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services); and
- 3.9.3 – Mortality rate attributed to unintentional poisoning.

The World Health Statistics 2016 has accordingly noted that the 2030 Agenda "has major implications for health monitoring", requiring "health data collection, analysis and communication in an integrated manner".[1] The World Health Organization (WHO) has also noted that this will require that "health monitoring will have to look beyond the health sector and consider economic, social and environmental indicators, as well as intersectoral actions". To some extent, that has always been the approach of the Health and Related Indicators chapter of the *Review*, informed by the concept of social determinants of health and comprehensive Primary Health Care. However, the chapter remains focused on national and provincial data, and their placement within the context of international data. The SDG's emphasis on equity demands extensive disaggregation of data, for example by sex, age, income, education, ethnicity, disability and geographic location. The choice of those categories will need to take into account the exigencies of each setting, and its history. In South Africa, continuing to track indicators by the locally-defined ethnic descriptors will remain important as a means to track progress towards equity. However, beyond ethnicity, more nuanced considerations of area-based inequality are needed, such as the application of deprivation indices.[2] The demands of the Guidelines for Accurate and Transparent Health Estimate Reporting (GATHER) standards also need to be taken into account.[3] The focus on those 'left out' has also been incorporated in the 'Innov8' approach to evaluating health programmes, where steps 3 and 4 of the 8-step process call for identification of those missed by the programme, and of the barriers and facilitators experienced by specific sub-populations.[4] In 2016, the WHO released an important guidance document, entitled "Strategizing national health in the 21st Century".[5] Chapter 9 of the handbook deals with monitoring, evaluation and review of national health policies, strategies and plan, and provides a useful standard against which to judge national systems design and operation. One local example of a deliberate effort to improve data quality and accessibility is the creation of the National Health Laboratory Service's Corporate Data Warehouse (CDW), and the ways in which the NHLS is building interfaces with private sector systems, such as Netcare's Bluebird system.[6] The sharing of data has also been enabled by the launch of the WHO Global Observatory for Health Research and Development.[7]

The 2016 *Review* drew attention to the WHO Global Reference List of 100 Core Health Indicators, which predated the finalisation of the SDGs.[8] A comparison of the 100 Core Health Indicators with the National Indicator Data Set (NIDS) was also provided, identifying the gaps. Globally, the development of an agreed set of data elements continues. In January 2017, the High-level Group for Partnership, Co-ordination and Capacity-building for statistics for the 2030 Agenda for Sustainable Development (HLG-PCCB) issued the "Cape Town Global Action Plan for Sustainable Development Data".[9] The Action Plan was expected to be formally adopted by the United Nations Statistical Commission in March 2017. The Plan calls for "enhanced data sharing across the national statistical system", and greater transparency, but importantly also identifies the need for greater use of data from "alternative and innovative sources". However, the point has been made that "accessible data are not enough".[10] Although making data publicly accessible achieves the aim of transparency, more is required to ensure meaningful public health gains. It has been suggested, for example, that "meaningful and equitable collaboration with local researchers and policy makers in low- and middle-income countries is needed to ensure the right research questions get asked and research results are used", and that this demands "long term investment in infrastructure, networks, and scientific careers". That, truly, has been the *'zeitgeist'* of the past 20 issues of the *Review*, and of the Health Systems Trust.

Domestication of the global decisions is required to enable consistent reporting into the global statistical system. There is also an obligation to ensure that the locally applied measures reflect each country's development priorities. Locally, the National Department of Health (NDoH) has finalised a revision of the NIDS, which will be applied from April 2017 to March 2019.[11] A number of the indicators are new, such as the count of stable clients served by the Central Chronic Medicines Dispensing and Distribution (CCMDD) service, and those aimed at quantifying the non-communicable disease (NCD) case load. Malaria cases and deaths will now be reported as part of DHIS and not as a separate system, which should improve the ability to disaggregate data across all nine provinces. Apart from data on HIV and tuberculosis, the availability and quality of routine morbidity data in South Africa is patchy, and will require urgent attention and investment.[12] In time, as National Health Insurance is implemented, the measures of universal health coverage (UHC) will gain greater prominence.[13] The distribution of monthly, quarterly and periodic surveillance indicators is shown in Table 1.

An alternative approach to the burgeoning number of health-related indicators has been proposed by the Global Burden of Disease 2015 SDG Collaborators.[14] They have applied statistical methods to 33 health-related SDG indicators, based on data from 188 countries over the period 1990 to 2015. Each indicator was rescaled from the worst (0) to best observed value (100) in that period. An overall health-related SDG index was then computed for each country, with each indicator weighted equally. Based on this measure, the highest SDG index was assigned to Iceland (85) and the lowest to the Central African Republic (20). South Africa was placed at position 134, with a health-related SDG index of 46, the same score

a https://sustainabledevelopment.un.org/sdg3

Table 1: Overview of number of routine indicators defined in the National Indicator Data Set, 2017–2019

Routine Core Health Facility – Monthly	Public Health
Indicator Group	
Adolescent health	1
ART monthly	2
CCMDD	1
Child and nutrition	16
Chronic	6
Communicable diseases	1
EPI	12
Eye care	2
HIV	16
Malaria	2
Management inpatients	8
Management PHC	6
Maternal and neonatal	25
Mental health	5
Oral health	2
Quality	10
Rehabilitation	2
STI	1
TB monthly	8
Women's health	6
Total	**132**

Routine ART Quarterly Indicators	Public Health
ART baseline	15
ART outcome	8
Total	**23**

TB Quarterly Indicators	
TB Quarterly	18
Total	**18**

Routine Non-Facility Health Services – Monthly	
Environmental health	14
EMS	12
School health	14
PHC WBOT	14
Total	**54**

Periodic Campaigns	
EPI campaign	17
HPV campaign	2
Total	**19**

Regular Surveillance	
STI surveillance	1
Total	**1**

Note: Updated as at 9 March 2017.

ascribed to Vanuatu, Botswana and Myanmar. While indices for HIV, TB and violence were scored low, South Africa scored above 80 for 3 indices: prevalence of wasting in children under 5 years, proportion of women of reproductive age (15–49 years) who have their need for family planning satisfied with modern methods, and age-standardised death rate attributable to household air pollution and ambient air pollution.

A broadly similar approach was used in devising the UHC service coverage index reported in the World Health Statistics 2016.[1] Sixteen tracer indicators across four categories (reproductive, maternal, newborn and child health; infectious diseases; NCDs; and service capacity, access, and health security), from a mix of household surveys and administrative data, were defined so that they ranged from 0% to 100%, with 100% implying full coverage. Based on this index, more than 60% of African countries are in the lowest quintile of coverage.

The Institute for Health Metrics and Evaluation Disease Expenditure (DEX) project[b] is attempting to combine burden of disease data (such as from household surveys, facility surveys, management information systems and claims data) and expenditure data (such as from National Health Accounts). The aim is "to identify disconnects between disease burden and spending, and thereby identify potential areas where little is being done to combat major portions of burden".

Data sources and collection

As before, while this chapter attempts to identify most of the key international and national data sources and literature on a range of health indicators, it cannot claim to be exhaustive. The data provided in this chapter are only a sub-set of those available. More data, particularly those showing trends over time, can be accessed on the redesigned Health Systems Trust (HST) website (www.hst.org.za). In addition, a substantial set of district-level data are presented in the *District Health Barometer* reports, which are also accessible from the HST website.

Although attention is drawn to known data quality or interpretation issues, it is not possible to verify, adjust and correct every data source in detail. Caution is therefore advised with regard to which types of indicators are presented and whether their use is suitable for the intended purpose.[15]

In addition to routine sources and annual surveys, several key surveys will either be in the field during 2017, or are expected to release results this year. These data will contribute significantly to monitoring a range of demographic and health indicators. The expected new sources include the:

- South Africa Demographic and Health Survey 2016
- South African National HIV Prevalence, Incidence and Behaviour Survey
- National TB Prevalence Survey
- National Income Dynamics Study Wave 5
- Study on global AGEing and adult health (SAGE) Wave 2.

b http://www.healthdata.org/dex/project-overview

Indicator definitions: The definitions of all indicators appearing in the tables are given at the end of the chapter on page 319.

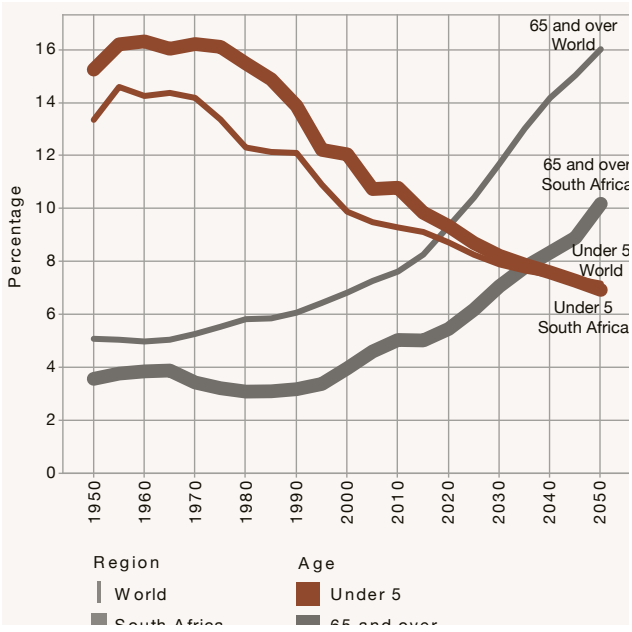
Trends and time-series: For most indicators, data are given for several years, often from multiple different sources. In most cases these data can thus *not* be used to assess trends and changes over time due to possible differences in methodology and data presentation issues. Even data from regular surveys may not be comparable over time, or revised data for a historical time series may be released, as for example with the General Household Surveys and mid-year population estimates. This may result in different values being published compared to previous editions. Therefore, when using time series data, the most recent revisions should be obtained from the online database and not from previous printed editions of this chapter. In the data tables, the column 'Subgroup' includes variables of disaggregation where these are available, including the time period, sex, age group, data series (recurring data sources) and any other categories.

Demographic indicators

Context	Estimates of population size provide the denominators for many of the indicators reported at national and sub-national levels. Within the country, there is considerable interest in the population shifts created by migration, largely from the more rural to the urbanised provinces of Gauteng and the Western Cape. Increasingly, South Africa will also have to deal with an ageing population, as fertility rates decline and life expectancy increases.
New data sources	Some of the key new sources of national data included in this section are: • Stats SA Community Survey 2016 • Stats SA Mid-year population estimates 2016 • Stats SA Recorded live births 2013–2015 • Stats SA Causes of death 2015 • Thembisa model version 2.5 (August 2016)[c] Internationally, new reports include: • US Census Bureau – An Aging World 2015
Key issues and trends	The intercensal Community Survey 2016 has provided key population data at national, provincial and municipal levels. For the first time, a series of questions about emigration was included. Populations shifts, from predominantly rural to highly urbanised provinces, have the potential to alter age distributions across the country. The speed with which the results of this survey were released was striking, and is a testament to the impact of computer-assisted personal interviewing. This was the first national Stats SA survey to use this technique.

The Stats SA Mid-year population estimates for 2016 projected the population for the provinces based on the 2014 geographic boundaries and not those used subsequent to the local government election held in 2016.[16] The 2017 estimates will, however, use the new boundaries. The 2016 national estimate was of a population of 55.91 million, with Gauteng the most populous province (13.5 million, 24%). It was estimated that about 30.1% of the population was aged younger than 15 years, while about 8.0% was aged 60 years or older. The proportion of those aged 60 and older is increasing over time. The population under 15 is not distributed evenly, with the highest proportion living in KwaZulu-Natal (3.86 million; 23.0%), rather than Gauteng (3.43 million; 20.4%). The proportion of those over 60 is higher in South Africa than the average for the continent. It is estimated, for instance, that by 2050 only 7% of Africans will be elderly (aged 65 or older).[17] However, even that will represent a quadrupling of the number of elderly persons in Africa from 2015. South Africa is one of 11 African countries where the elderly population already exceeds 1 million per country. Globally, an important 'crossing point' will be reached in about 2020, when for the first time ever those aged 65 and older will outnumber those aged under 5 years (Figure 1). This 'crossing point' will be reached later in around 2035 for SA. The mid-year estimates also provided the provincial total fertility rate estimates for the periods 2001–2006, 2006–2011 and 2011–2016, with all provinces showing declining fertility over time.

Figure 1: Young children (<5 years) and older people (65+ years) as a percentage of population, global and South Africa, 1950 to 2050



Source: Adapted from An Aging World 2015,[17] using data downloaded from United Nations.

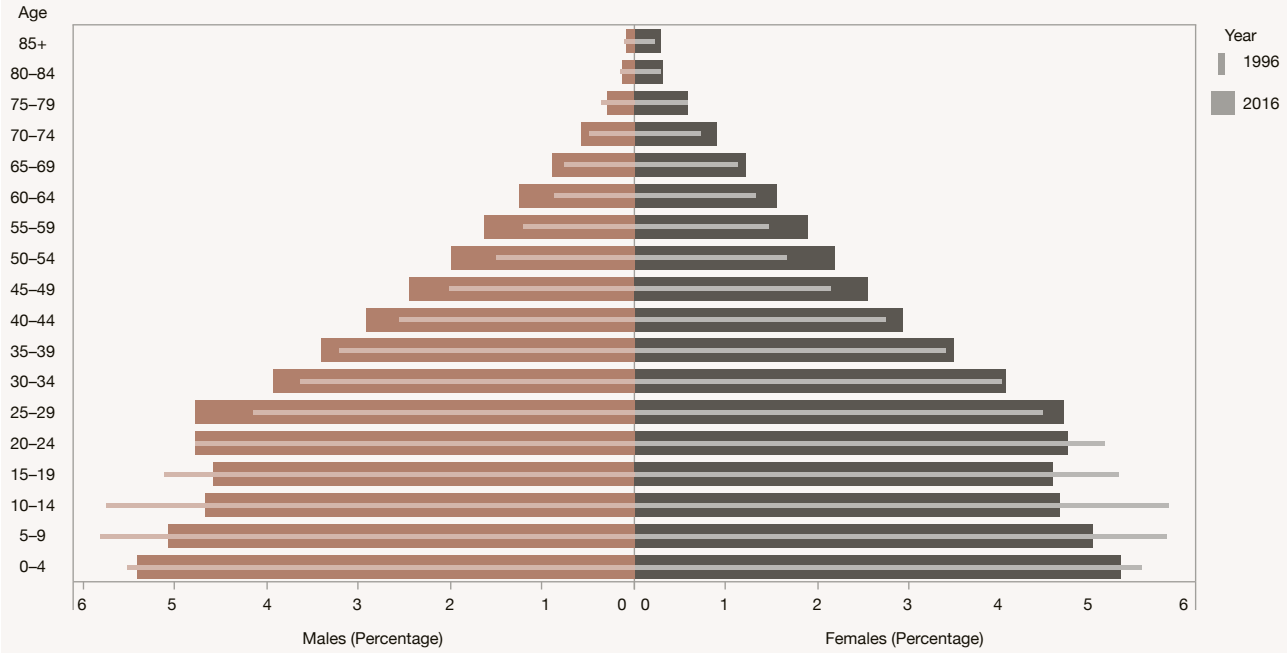
Stats SA has pointed out that "migration is an important demographic process in shaping the age structure and distribution of the provincial population". Such migration does not only change population size and characteristics, but also has major implications for demand for services, and eventually for equitable share allocations. The 2016 mid-year projections estimated that, in the period 2011–2016, Gauteng experienced a net inflow of 1 216 258 internal migrants, and the Western Cape 363 114. In the same period, the net outflows from the Eastern Cape were estimated at 247 437 people, and those from Limpopo 305 030 people, indicative of ongoing urbanisation.

c http://www.thembisa.org/about. This version includes updated demographic assumptions and province-specific calibrations.

In October 2016, Stats SA released its P0305 report on recorded live births, providing the data for 2015 and revising the figures for 2013 and 2014.[18] An improvement in timely registration of births is evident, with 55.5% of births registered during the first 30 completed days of life in 2013, 60.1% in 2014 and 65.1% in 2015. In 2015, 87.7% of births were registered within the year. Stats SA pointed out that "birth registration in South Africa is universal, free for first-time applicants and compulsory", but identified the potential to improve coverage, as well as the completeness of the data recorded. The age of the mother is often missing, as are the father's details.

The key new data source in 2016 was provided by the Stats SA Community Survey 2016, the second largest survey undertaken by Statistics South Africa since the previous survey in 2007. This is the second intercensal survey conducted in the post-apartheid era, and is based on a sample of 1 370 809 dwelling units. The Community Survey 2016 also provided municipal data disaggregated by municipal type, with the category B (local) municipalities further sub-divided into B1 (secondary cities and local municipalities with the largest budgets), B2 (local municipalities with a large town as the core), B3 (local municipalities with small towns, with relatively small populations and significant proportions of urban population but with no large town as core) and B4 (local municipalities which are mainly rural with communal tenure and with, at most, one or two small towns in their area). District municipalities were subdivided into those which were not water services authorities (C1) and those that were (C2). This demarcation provides a useful tool for considering urban-rural divides. The Community Survey 2016 returned a population estimate of 55.6 million, with 13.4 million (24.1%) residing in Gauteng. In terms of immigration, the Community Survey 2016 reported 1.6 million (2.8%) people as being foreign-born, compared with 2.2 million (4.2%) in Census 2011. The validity of these data are questionable, given the sensitivity of the question. A 2016 UNICEF report for instance, cited South Africa as having the highest number of immigrants in Africa, with almost 3.5 million estimated to have entered the country, of which 429 000 were under 18 years of age.[19] As in 2011, the top five countries from which immigrants arrived were Zimbabwe, Mozambique, Lesotho, Malawi and the United Kingdom. In terms of internal migration, Gauteng received the most migrants, followed by the Western Cape. The Eastern Cape and Limpopo had the highest number of out-migrants. Uniquely, the Community Survey 2016 included a series of questions about members of the respondent's household who had left South Africa to reside in another country in the period 2006–2016. Most emigrants were aged between 25 and 29 years old, and left South Africa between 2011 and 2015. The highest proportion were from Gauteng, and moved to Mozambique, Zimbabwe and Australia.

Figure 2: Population structure of South Africa, Census 1996 and Community Survey 2016



Source: Census 1996[20] and Community Survey 2016.[21]

Table 2: Demographic indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Adolescent fertility rate (per 1 000 girls aged 15–19 years)	2011	15–19 years Census	80.0	70.0	60.0	80.0	80.0	80.0	80.0	80.0	60.0	70.0	a
Ageing index	2001	both sexes mid-year	12.8	12.1	12.3	9.9	10.4	8.7	12.7	12.4	14.3	11.4	b
	2006	both sexes mid-year	16.1	14.5	14.5	11.7	12.5	10.7	16.5	13.6	16.7	13.7	b
	2011	both sexes Census	20.4	18.9	18.3	15.5	18.4	15.0	18.8	19.0	23.4	18.3	c
	2016	both sexes CS	15.0	20.0	23.0	14.0	15.0	14.0	24.0	17.0	24.0	18.0	d
		both sexes mid-year	15.0	20.0	21.0	13.0	15.0	14.0	23.0	16.0	25.0	17.0	e
		female mid-year	20.0	25.0	24.0	17.0	22.0	18.0	29.0	20.0	29.0	22.0	e
		male mid-year	10.0	15.0	19.0	9.0	9.0	11.0	19.0	13.0	22.0	13.0	e
Annual population growth rate	1996	mid-year	2.2	1.4	1.7	1.6	3.0	2.1	1.0	1.5	1.5	1.9	b
	2001	Census	0.4	0.6	3.6	2.2	1.8	1.5	-0.4	1.8	2.7	2.0	f
	2011	Census	0.4	0.1	2.7	0.7	0.8	1.8	1.4	1.6	2.5	1.4	g
	2015	both sexes mid-year										1.7	h
		female mid-year										1.5	h
		male mid-year										1.8	h
	2016	both sexes 0–14 years mid-year										1.3	e
		both sexes 15–34 years mid-year										0.9	e
		both sexes 60+ years mid-year										3.0	e
		both sexes all ages mid-year										1.6	e
Area (square km)	1996	Census	169 580	129 480	17 010	92 100	123 910	79 490	361 830	116 320	129 370	1 219 090	i
	2011	Census	168 966	129 825	18 178	94 361	125 755	76 495	372 889	104 882	129 462	1 220 813	c
Area as a % of total area of South Africa	1996	Census	13.9	10.6	1.4	7.6	10.2	6.5	29.7	9.5	10.6	100.0	i
	2011	Census	13.8	10.6	1.4	7.7	10.3	6.3	30.5	8.7	10.6	100.0	c
Average household size	1996	Census	4.6	4.1	3.7	5.0	4.9	4.6	4.3	4.6	3.9	4.4	i
	2001	Census	4.1	3.6	3.2	4.2	4.3	4.0	3.8	3.7	3.6	3.8	j
	2011	Census	3.7	3.2	3.0	3.9	3.7	3.7	3.7	3.2	3.4	3.4	c
	2016	CS	3.9	3.0	2.7	3.8	3.6	3.5	3.4	3.0	3.2	3.3	d
Crude death rate (deaths per 1 000 population)	2006	CS										14.3	l
		vital registration adjusted										15.4	m
	2011	vital registration unadjusted										10.0	n
	2015	vital registration unadjusted										8.4	o
	2016	mid-year										9.7	e
Live birth occurrences registered	2001		129 804	49 549	163 157	233 664	98 308	75 134	21 124	64 904	86 965	927 389	p
	2006		154 765	57 655	197 424	248 933	121 974	86 405	24 276	80 566	109 251	1 085 867	p
	2011		125 697	54 021	201 088	217 585	129 261	87 307	24 442	79 940	104 543	1 024 845	q
	2015		109 210	47 473	192 439	184 225	121 973	73 686	24 310	66 254	96 626	919 562	q
Population	1996	both sexes all ages Census	6 147 244	2 633 504	7 834 125	8 572 302	4 576 566	3 123 869	1 011 864	2 727 223	3 956 875	40 583 573	k
	2001	both sexes all ages Census	6 278 651	2 706 775	9 388 854	9 584 129	4 995 462	3 365 554	991 919	2 984 098	4 524 335	44 819 778	k
	2011	both sexes all ages Census	6 562 053	2 745 590	12 272 263	10 267 300	5 404 868	4 039 939	1 145 861	3 509 953	5 822 734	51 770 560	c
	2016	both sexes all ages CS	6 996 976	2 834 714	13 399 724	11 065 240	5 799 090	4 335 964	1 193 780	3 748 435	6 279 730	55 653 654	d
		both sexes all ages DHIS	6 731 182	2 768 642	13 543 184	10 806 538	5 724 448	4 290 010	1 191 995	3 757 769	6 362 257	55 176 026	q
		both sexes all ages mid-year	7 061 700	2 861 600	13 498 200	11 079 700	5 803 900	4 328 300	1 191 700	3 790 600	6 293 200	55 908 900	e
	2017	both sexes all ages DHIS	6 773 280	2 765 819	13 820 215	10 924 776	5 789 938	4 344 144	1 202 801	3 809 367	6 478 871	55 909 212	r

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Population % by province	1996	both sexes all ages Census	15.1	6.5	19.3	21.1	11.3	7.7	2.5	6.7	9.7	100.0	k
	2001	both sexes all ages Census	14.0	6.0	20.9	21.4	11.1	7.5	2.2	6.7	10.1	100.0	k
	2011	both sexes all ages Census	12.7	5.3	23.7	19.8	10.4	7.8	2.2	6.8	11.2	100.0	c
	2016	both sexes all ages CS	12.6	5.1	24.1	19.9	10.4	7.8	2.1	6.7	11.3	100.0	d
		both sexes all ages mid-year	12.6	5.1	24.1	19.8	10.4	7.7	2.1	6.8	11.3		e
Population density	1996	Census	38.4	21.0	448.4	95.1	41.7	36.7	2.3	29.9	31.5	34.4	i
	2001	DHIS	38.5	21.2	505.6	101.3	39.5	43.7	2.9	28.4	35.2	36.8	s
	2006	DHIS	37.9	21.0	603.2	103.0	40.4	49.2	2.9	31.1	40.6	39.5	s
	2011	Census	38.8	21.1	675.1	108.8	43.0	52.8	3.1	33.5	45.0	42.4	c
	2016	DHIS	39.8	21.3	745.0	114.5	45.5	56.1	3.2	35.8	49.1	45.2	s
		mid-year	41.8	22.0	742.5	117.4	46.2	56.6	3.2	36.1	48.6	45.8	e
	2017	DHIS	40.1	21.3	760.3	115.8	46.0	56.8	3.2	36.3	50.0	45.8	s
Public sector dependent population	2001		5 780 213	2 306 172	6 459 977	8 228 913	4 814 835	2 679 525	665 586	3 192 334	3 194 181	37 321 736	t
	2006	GHS	5 899 685	2 416 793	7 783 430	9 125 767	4 778 212	3 136 573	988 720	2 865 778	4 127 412	41 123 556	u
		non med scheme	5 973 067	2 500 165	7 367 197	9 042 592	4 837 448	3 026 159	973 088	2 990 885	3 913 235	40 603 609	v
	2011	GHS	5 849 615	2 438 067	8 033 100	8 954 513	4 809 452	3 127 211	1 000 581	2 983 651	4 198 800	41 422 899	w
		non med scheme	5 839 121	2 347 208	9 113 881	8 927 661	4 951 729	3 439 449	961 571	2 995 366	4 485 643	43 053 190	x
	2016	all ages GHS	6 306 098	2 398 021	9 759 199	9 761 216	5 310 569	3 657 414	981 961	3 222 010	4 770 246	46 124 843	y
		all ages non med scheme	6 418 080	2 476 376	10 117 149	9 835 132	5 398 547	3 768 727	1 010 092	3 310 104	4 995 841	47 099 377	z
Total fertility rate	1996	Census	3.9	3.0	2.6	3.5	3.9	3.5	2.8	3.1	2.6	3.2	aa
		Thembisa	3.5	2.4	2.1	3.1	3.6	3.3	2.9	2.5	2.4	2.9	ab
	2001	Census	3.3	2.5	2.6	3.0	3.6	3.1	2.4	2.8	2.4	2.8	aa
	2006	CS	3.0	2.7	2.2	3.0	3.5	3.0	2.8	3.0	2.1	2.8	ac
	2011	Census	2.9	2.5	2.3	2.7	3.3	2.9	2.8	2.8	2.3	2.7	aa
	2016	mid-year	3.1	2.4	2.3	3.1	2.9	2.5	2.4	2.9	2.2	2.4	e
	2016	Thembisa	2.5	2.5	2.3	2.4	3.0	2.5	2.6	2.7	2.3	2.5	ab

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Census 2011 Fertility.[22] National value estimated from graph since not included in report. Values multiplied by 1 000 to convert from rate per individual adolescent.
b Stats SA MYE.[23]
c Census 2011.[24]
d Community Survey 2016.[21]
e Stats SA MYE 2016.[16]
f Census 2011.[25] 1996–2001. Per cent per annum. As recorded in Census 2011 Municipal Fact Sheet.
g Census 2011.[25] 2001–2011. Per cent per annum. As recorded in Census 2011 Municipal Fact Sheet.
h Stats SA MYE 2015.[26]
i Census 1996.[20]
j Census 2001.[27]
k Census 2011.[24] Reporting updated data for previous census based on 2011 boundary changes.
l Community Survey 2007.[28]
m Stats SA Causes of death 2008.[29] Calculated from valid causes of death reports adjusted for estimated data completeness per 1 000 estimated population.
n Stats SA Causes of death 2013.[30]
o Stats SA Causes of death 2015.[31]
p Stats SA Live Births.[32] South African total includes foreign births and those with unknown district.
q Stats SA Live Births 2013–2015.[18]
r DHIS Population Estimates 2002–18.[33]
s DHIS.[34]
t Fiscal Review 2001.[35] Calculated using provincial medical schemes coverage (quoting October Household Survey 1999) and Stats SA Census 2001 population.
u Stats SA GHS 2009.[36] Calculated using provincial medical schemes coverage (from GHS 2006) and Stats SA population estimates for the relevant year (updated in 2010).
v Medical Schemes 2006–7.[37]
w Stats SA GHS 2010.[38] Calculated using provincial medical scheme coverage (GHS 2010) and National DoH/HISP Population Estimates for 2011.
x Medical Schemes 2011–12.[39] Calculated from total number of beneficiaries subtracted from total population (Stats SA mid-year estimates 2013 for the year 2011).
y Stats SA GHS 2015.[40] Calculated using provincial medical scheme coverage (GHS 2015) and Stats SA mid-year estimates for 2016.
z Medical Schemes 2015–16.[41] Calculated from total number of beneficiaries subtracted from total population (Stats SA 2016 mid-year estimates).
aa Census 2011 Fertility.[22]
ab Thembisa v2.5.[42]
ac CS Fertility 2007.[43]

Table 3: Demographic indicators by population group

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Adolescent fertility rate (per 1 000 girls aged 15–19 years)	2011	15–19 years Census	76.0	71.0	20.0	14.0		a
Ageing index	2001	both sexes mid-year	8.3	11.9	19.1	51.0		b
	2006	both sexes mid-year	10.1	14.6	26.5	63.8		b
	2011	both sexes Census	14.1	16.6	34.4	84.2	23.4	c
	2016	both sexes CS	13.0	20.0	37.0	93.0		d
		both sexes mid-year	13.0	17.0	38.0	93.0		e
		female mid-year	16.0	22.0	45.0	110.0		e
		male mid-year	9.0	13.0	30.0	76.0		e
Annual population growth rate	1996	mid-year	2.8	2.0	1.7	1.1		b
Average household size	1996	Census	4.7	4.7	4.3	2.9		f
	2001	Census	3.9	4.3	4.0	2.8		c
Population	1996	both sexes all ages mid-year	31 127 631	3 600 446	1 045 596	4 434 697	375 204	b
	2001	both sexes all ages Census 2001 boundaries	35 416 166	3 994 505	1 115 467	4 293 640		g
	2011	both sexes all ages Census	41 000 938	4 615 401	1 286 930	4 586 838	280 454	c
	2016	both sexes all ages CS	44 891 603	4 869 526	1 375 834	4 516 691		d
		both sexes all ages mid-year	45 109 900	4 897 200	1 386 000	4 515 800		e
Population % by population group	1996	Census	76.7	8.9	2.6	10.9	0.9	f
	2001	Census	79.0	8.9	2.5	9.6		g
	2011	Census	79.2	8.9	2.5	8.9	0.5	c
	2016	both sexes all ages CS	80.7	8.7	2.5	8.1		d
		both sexes all ages mid-year	80.7	8.8	2.5	8.1		e
Public sector dependent population	2006	GHS	34 948 929	3 597 214	860 874	1 681 326		h
	2015	GHS	39 539 832	3 851 821	698 706	1 047 354		i
	2016	GHS	40 328 251	3 952 040	769 230	1 205 719		j
Total fertility rate	1996	Census	3.5	2.6	2.5	2.0		a
	2001	Census	3.0	2.4	2.0	1.8		a
	2006	CS	2.9	2.5	2.0	1.8		k
	2011	Census	2.8	2.6	1.9	1.7		a

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Census 2011 Fertility.[22]
b Stats SA MYE.[23]
c Census 2011.[44]
d Community Survey 2016.[21]
e Stats SA MYE 2016.[16]
f Census 1996.[20]
g Census 2001.[27]
h Stats SA GHS 2009.[36]
i Stats SA GHS 2014.[45]
j Stats SA GHS 2015.[40]
k CS Fertility 2007.[43]

Socio-economic and risk factor indicators

Context	The Sustainable Development Goals have renewed attention on inter-sectoral action to address risk factors for health such as water and sanitation, air quality and nutrition.
New data sources	Nationally, new data have been reported in the: • Stats SA Vulnerable Groups Indicator Report 2014 • Stats SA General Household Survey 2015 • Stats SA Community Survey 2016 • Stats SA Quarterly Labour Force Survey Quarter 3 and 4 2016 • Stats SA Living Conditions of Households in South Africa 2014/2015 • Stats SA GHS Series Volume VIII: Water and Sanitation Internationally, data of interest have been reported in the: • World Bank. World Development Report 2015 • World Bank/IHME. The cost of air pollution: Strengthening the Economic Case for Action 2016 • WHO/UN-Habitat. Global Report on Urban Health 2016 • UNICEF. Clear the air for children: The impact of air pollution on children 2016
Key issues and trends	An updated Green Drop Report (waste water management) for 2014, which reflected data from 2012–2013, has been released, but an updated Blue Drop Report (water quality management) is still awaited. Overall, there are concerns about the quality of both potable water provision and waste water treatment, particularly in under-resourced local authorities with water provision obligations. Consumer satisfaction with the quality of water services is declining.

The Sustainable Development Goals (SDGs) have broadened the focus of the 2030 Agenda to "ensure healthy lives and promote well-being for all at all ages".[d] For example, target 3.9 reads "By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination". This places the social determinants of health front and centre, and demands greater access to reliable measures of socio-economic status and other risk factors. The World Health Statistics 2016 point out that "socioeconomic inequalities exist in all countries", and that even in high-income countries, "higher death rates and poorer self-assessments of health are observed in groups of lower socio-economic status compared with those who are better off". Aligning the efforts to track implementation of the 2011 Rio Political Declaration on the Social Determinants of Health with the new SDG targets will also reduce the burden on health systems.[46]

The World Bank's World Development Report 2015 focused on human behaviour, and efforts to change behaviour for the better.[47] Significantly for this source, a clear statement is made that "because the most obvious barrier to adopting new behaviour is cost, lowering prices should be the best way to improve adoption".

The joint WHO/UN-Habitat Global Report on Urban Health 2016 noted that the "percentage of the world's population living in urban areas is projected to increase from 54% in 2015 to 60% in 2030 and to 66% by 2050".[48] Already, it is estimated that more than 1 billion additional people were living in urban areas in 2014 than in 2000. Most importantly, it is estimated that "more than 90% of future urban population growth will be in low- and middle-income countries". From a positive perspective, urban areas offer some advantages, such as greater resources, higher density, and better infrastructure and service availability than rural areas. However, apart from the problems of poor access to water, sanitation, energy and communication, urban settings are also associated with increased NCD risk. UN-Habitat has developed a City Prosperity Index, based on five dimensions (productivity; quality of life; infrastructure; environmental sustainability; and equity). WHO has also developed an Urban Health Index (UHI), which has the potential to measure inequalities in health in an urban setting. The WHO/UN-Habitat report has also emphasised the need for public participation in urban governance, including in monitoring the outcomes of health interventions.

The World Bank and Institute for Health Metrics and Evaluation (IHME) have published a report on the cost of air pollution, noting that 87% of the global population in 2013 lived in areas which exceeded WHO norms for particulate pollution.[49] The report estimated that about 20 000 deaths in South Africa were attributable to air pollution, in both 1990 and 2013. Also in 2016, WHO published "Ambient air pollution: a global assessment of exposure and burden of disease", which estimated about 14 000 deaths (39 per 100 000 population, age-standardised) in South Africa were attributable to diseases such as acute lower respiratory infections, lung cancer, chronic obstructive pulmonary disease, stroke and ischaemic heart disease.[50] Both household and ambient air pollution are believed to be under-appreciated contributors to poor health, including in children.[51,52]

The most recent update to the Department of Water and Sanitation's Green Drop report relates to the Cumulative Risk Rating per wastewater treatment works from July 2012 to June 2013, which entailed assessment of 824 plants in 152 municipalities.[53] The assessments showed that 212 plants were at critical risk, 259 plants at high risk, 218 at medium risk, and only 135 plants at low risk. Over a 6-year period (2008–2014), the report concluded that "the municipal industry as a whole has not managed to contain and then turnaround the risk". An updated Blue Drop report, based on the 2015 data, is expected in April 2017, with the 2016 data expected in October 2017.

d https://sustainabledevelopment.un.org/sdg3

Third quarter data for 2016 showed 27.1% unemployment, based on the official definition.[54] This represented a 1.6% year-on-year increase. Unemployment was lowest in the Western Cape (20.1%) and highest in the Free State (34.2%). Of a total labour force (aged 15–64 years) of 36 750 000, it was estimated that 15 833 000 were employed, 5 873 000 were unemployed and 15 044 000 were not economically active.

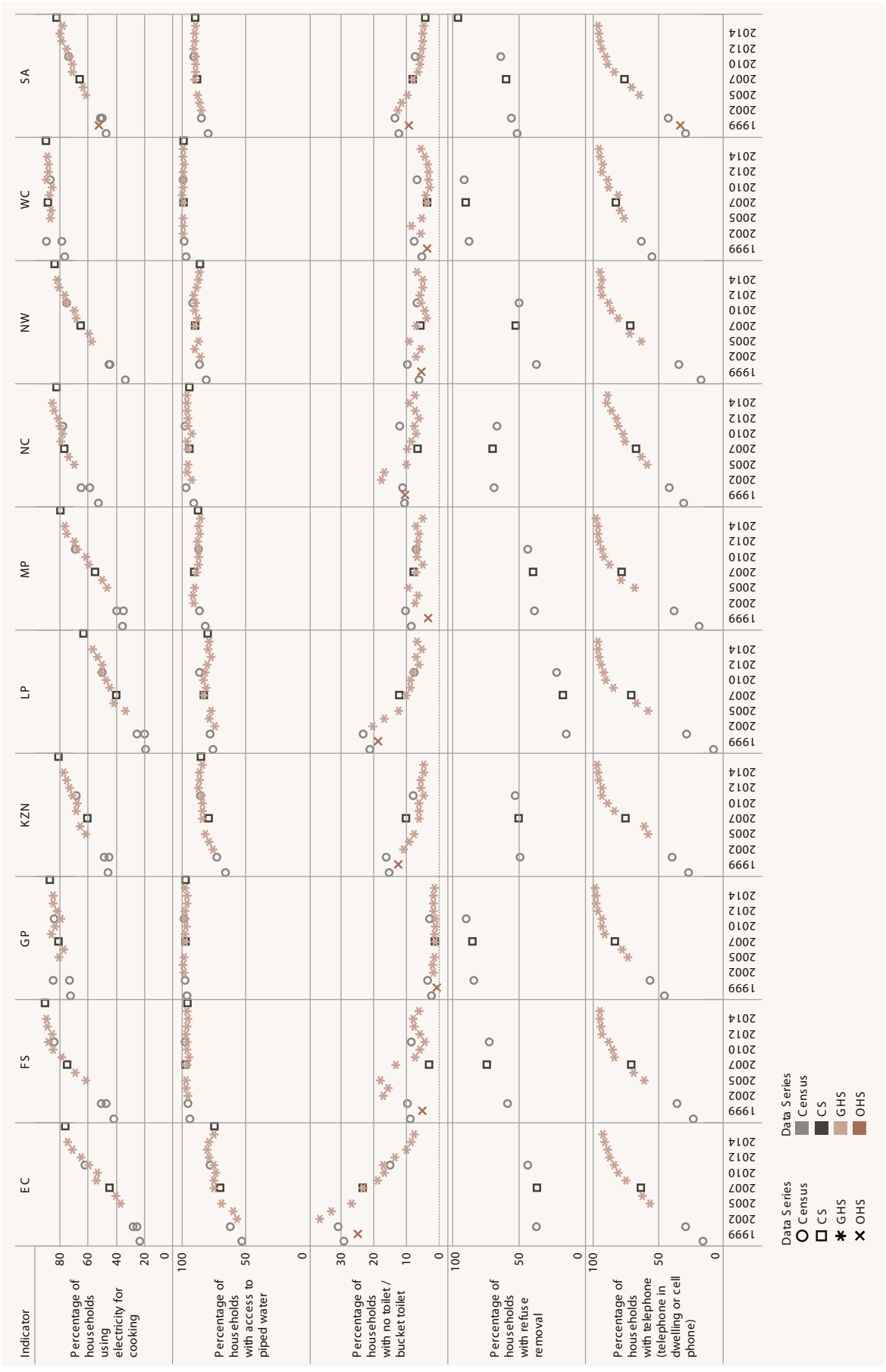
Stats SA reports annually on a number of socio-economic measures based on the General Household Survey.[40] The 2015 survey was based on a representative sample of private dwellings, as well as worker's hostels. The survey excludes those living in "collective living quarters", such as students' hostels, old-age homes, hospitals, prisons and military barracks. With reference to the water quality reports mentioned above, the 2015 survey showed that 89.4% of South African households had access to piped water in 2015. Even in more rural provinces, the situation had improved: the proportion of Eastern Cape households with access to piped water increased from 56.3% in 2002 to 74.9% in 2015. However, nationally, the proportion of households rating the quality of water-related services as 'good' dropped from 76.4% in 2002 to 62.0% in 2015.

Some data from the Living Conditions of Households in South Africa survey 2014/2015 were released in January 2017.[55] This survey noted a problem with low response rates, especially in Gauteng, and thus particularly with higher-income households. Under-reporting of household expenditure on certain categories might therefore be predicted. Data on poverty will only be released later in 2017.

Extensive data on socio-economic factors were also reported from the intercensal Community Survey 2016.[21] For example, the Community Survey showed 10.1% of households without access to piped water, up from 8.8% reported in Census 2011, but markedly better than the 19.7% reported in Census 1996. However, in 2016, only 44.4% of households had access to piped water in the home, 30.0% inside the yard, and 15.5% at a point outside the yard, such as at a community stand, a neighbour's tap or a communal tap. An in-depth analysis of water and sanitation issues was also published by Stats SA, drawing on General Household Surveys between 2002 and 2015 and the Community Survey 2016.[56]

Stats SA has released a series of reports aimed at highlighting the socio-economic conditions of particular vulnerable groups, such as children, the youth, women, older persons, and persons with disabilities.[57]

Figure 3: Trends in household access to selected services, 1996 to 2016



Source: Compiled from multiple editions of the Census, Community Survey (CS), General Household Survey (GHS) and October Household Survey (OHS) from Statistics SA.

Table 4: Environmental health indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Air pollution level in cities (particulate matter [PM])	1990	GBD PM2.5										11.7	a
	2012	2011–2012 WHO PM10										56.0	b
	2013	GBD PM2.5										14.3	a
	2016	WHO PM2.5 urban										31.0	c
		WHO PM2.5 urban and rural										27.0	c
Drinking Water System (Blue Drop) Performance Rating	2009		54.3	40.0	74.4	73.0	40.8	51.0	28.3	40.0	60.3	51.4	d
	2010		79.4	48.5	85.5	65.9	55.0	65.4	46.9	66.0	92.5	67.2	d
	2011		77.3	64.1	95.1	80.5	64.0	56.5	62.1	62.3	94.1	72.9	d
	2012		82.1	73.6	98.1	92.1	79.4	60.9	68.2	78.7	94.2	87.6	e
	2014		72.0	75.0	92.0	86.0	62.0	69.0	68.0	63.0	89.0	79.6	f

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Cost Air Pollution 2016.[49]
b Global Health Observatory.[58]
c Air Pollution 2016.[50] Annual median concentration, population weighted and modelled.
d Blue Drop 2011.[59] Some values revised since original reports.
e Blue Drop 2012.[60]
f Blue Drop 2014.[61] No report has been produced for 2013.

Table 5: Socio-economic indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Education level: percentage of population with no schooling	1996	20+ years Census	20.9	16.1	9.5	22.9	36.9	29.4	21.7	22.7	6.7	19.3	a
	2001	20+ years Census	22.8	16.0	8.4	21.9	33.4	27.5	18.2	19.9	5.7	17.9	b
	2011	20+ years Census	10.5	7.1	3.6	10.7	17.3	14.0	11.3	11.8	2.7	8.6	c
		20+ years GHS	7.4	5.7	2.6	7.8	12.9	10.3	11.3	10.0	1.7	6.5	d
	2015	both sexes 20+ years GHS	6.1	3.4	2.3	6.7	9.8	8.3	8.1	7.2	1.5	5.1	e
Human development index (high value = best)	1996	both sexes all ages	0.64	0.67	0.77	0.66	0.63	0.66	0.68	0.61	0.76	0.69	f
	2015	both sexes all ages HDR										0.67	g
Literacy rate	1996	Census	59.0	62.7	80.6	61.2	53.0	57.0	58.9	58.3	78.7	65.8	a
	2014	female 20+ years GHS	90.4	92.3	97.6	89.8	84.8	85.8	89.4	89.6	97.9	93.1	h
		male 20+ years GHS	90.1	94.5	97.9	94.6	93.5	92.8	88.5	89.5	97.3	95.3	h
Percentage of households by type of housing	2001	Census formal	47.3	62.9	65.6	56.6	70.7	67.3	80.2	68.6	78.4	63.8	b
		Census informal	11.0	26.1	23.9	10.8	6.6	16.0	12.5	22.3	16.2	16.4	b
		Census traditional	38.1	7.2	1.3	27.9	19.7	12.9	3.5	5.3	2.2	14.8	b
	2011	Census formal	63.2	81.1	79.8	71.6	89.8	83.8	82.4	76.2	80.4	77.6	c
		Census informal	7.7	15.7	18.9	8.3	5.2	10.9	13.1	21.2	18.2	13.6	c
		Census traditional	28.2	2.4	0.4	19.0	4.5	4.5	3.2	1.7	0.5	7.9	c
	2016	CS formal	65.1	83.6	81.4	72.7	88.9	84.7	83.5	78.3	82.4	79.2	i
		CS informal	7.4	14.0	17.7	8.5	4.8	10.9	12.8	18.4	16.6	13.0	i
		CS traditional	26.6	1.6	0.2	18.1	5.1	3.2	2.3	1.9	4.9	7.0	i
Percentage of households using electricity for cooking	1996	Census	23.2	42.0	72.9	45.8	19.5	35.6	52.4	33.8	76.5	47.1	a
	2001	Census	27.8	47.0	73.2	48.3	25.0	40.0	59.0	44.6	78.8	51.4	b
	2011	Census	62.1	84.5	83.9	68.6	49.9	69.3	78.1	75.3	86.9	73.9	c
	2015	GHS										78.1	e
	2016	CS	76.8	90.8	87.8	81.8	63.8	79.8	82.8	84.0	90.1	82.8	i
Percentage of households with access to piped water	1996	Census	53.5	94.0	96.0	66.3	75.5	82.2	91.2	81.4	96.8	79.8	a
	2001	Census	62.4	95.7	97.5	73.2	78.0	86.7	96.6	86.2	98.3	84.5	b
	2011	Census	77.8	97.8	98.2	85.9	86.0	87.4	97.4	91.6	99.1	91.2	c
	2015	GHS	74.9	96.1	97.7	84.2	78.8	85.5	96.5	86.1	99.2	89.4	e
	2016	CS	75.1	96.2	97.5	85.4	80.0	88.1	94.3	86.1	99.0	89.9	i
Percentage of households with no toilet / bucket toilet	1996	Census	29.1	8.8	2.5	15.2	21.1	8.7	10.7	6.3	5.4	12.4	a
	2001	Census	30.8	9.7	3.6	16.2	23.3	10.3	11.2	9.6	7.7	13.6	b
	2011	Census	15.0	8.6	2.9	8.0	7.8	7.2	12.0	6.8	6.7	7.2	c
	2016	CS										4.6	i
Percentage of households with refuse removal	1996	Census										51.2	a
	2001	Census	36.6	58.6	84.2	49.2	14.2	38.7	68.7	37.0	87.8	55.4	b
	2011	Census	43.5	72.7	89.9	53.1	21.8	43.7	66.3	50.2	91.1	63.6	c
	2016	CS										96.0	i

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Percentage of households with telephone (telephone in dwelling or cell phone)	1996	Census	15.6	22.9	45.3	26.9	7.4	18.2	30.8	16.8	55.2	28.6	a
	2001	Census	29.0	35.3	56.1	39.0	28.0	37.9	41.8	34.5	63.1	42.4	b
	2006	GHS	62.3	69.2	77.9	61.0	67.0	79.0	63.0	72.4	79.3	70.2	j
	2015	GHS	93.0	95.1	98.5	97.0	96.9	98.0	88.9	95.0	95.6	96.5	e
Population using safely managed sanitation services	2015	GHS	81.7	81.1	91.0	77.3	53.8	65.8	80.7	66.4	93.3	79.9	e
Poverty prevalence	2011	15–34 years IES	68.7	50.8	30.8	64.8	70.5	63.2	58.8	58.7	34.5	54.4	k
		Census food poverty line	40.5	31.6	26.8	37.4	41.5	35.3	28.2	33.4	23.2	32.7	l
		IES LBPL rebased										37.0	m
		IES UBPL rebased										53.8	n
Proportion of people with access to improved sanitation	2015	all ages GHS	81.7	81.1	91.0	77.3	53.8	65.8	80.7	66.4	93.3	79.9	o
Proportion of population with sustainable access to an improved water source	2015	all ages GHS	75.7	99.3	98.6	86.7	89.8	91.4	99.1	93.0	99.4	92.5	o
Unemployment rate (official definition)	2006	LFS	32.0	26.5	23.2	26.6	32.0	28.0	28.7	29.7	15.0	25.5	p
	2011	15–34 years LFS										35.7	k
		35–64 years LFS										14.7	k
		Q1 LFS	26.9	27.9	26.9	20.3	19.3	30.8	31.3	25.0	22.2	25.0	p
	2014	15–34 years LFS										35.9	k
		35–64 years LFS										15.7	k
		Q3 female 15+ years LFS	27.7	37.6	28.5	26.1	17.9	33.6	30.9	30.7	24.7	27.8	q
		Q3 LFS	29.1	32.2	24.6	20.8	15.9	26.6	28.7	25.2	22.9	24.3	p
	2016	Q3 LFS	28.2	34.2	29.1	23.5	21.9	30.4	29.6	30.5	21.7	27.1	r
		Q4 LFS	28.4	34.7	28.6	23.9	19.3	31.0	32.0	26.5	20.5	26.5	s

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Census 1996.[20]
b Census 2001.[27]
c Census 2011.[44]
d Stats SA GHS 2011.[62]
e Stats SA GHS 2015.[40]
f Stats SA HDI 2001.[63]
g Africa Human Development 2016.[64]
h Gender & Education Vol 2.[65]
i Community Survey 2016.[21]
j Stats SA GHS 2006.[66]
k Social Profile Youth 2009–14.[67]
l Census 2011 Poverty.[68] Census results considered less accurate compared to specific income/poverty surveys. Income data from Census 2011 significantly overestimated the proportion of households that claimed to have no income, resulting in higher levels of poverty.
m Poverty Trends 2006–2011.[69] Lower-bound poverty line – equates to 18.6 million people in 2011.
n Poverty Trends 2006–2011.[69] Upper-bound poverty line – equates to 27.1 million people in 2011.
o GHS Series VIII.[56]
p Stats SA Labour Force Survey.[70]
q Vulnerable Groups 2014.[57]
r Labour Force Survey Q3 2016.[54]
s Labour Force Survey Q4 2016.[71]

Table 6: Socio-economic indicators by population group

Indicator	Year	Subgroup	African/Black	Coloured	Indian/Asian	White	Ref
Unemployment rate (official definition)	1998	OHS	32.0	15.8	14.7	4.4	a
	2002	LFS	35.2	24.6	18.7		b
	2005	LFS	31.5	22.4	15.8	5.0	b
	2010	Q2 LFS	29.5	22.5	10.1	6.4	b
	2015	Q3 LFS	28.8	22.8	12.5	5.9	b
	2016	Q4 LFS	30.0	22.0	11.1	6.6	c

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Stats SA OHS.[72]
b Stats SA Labour Force Survey.[70] Data omitted where sample size too small.
c Labour Force Survey Q4 2016.[71]

Health status indicators

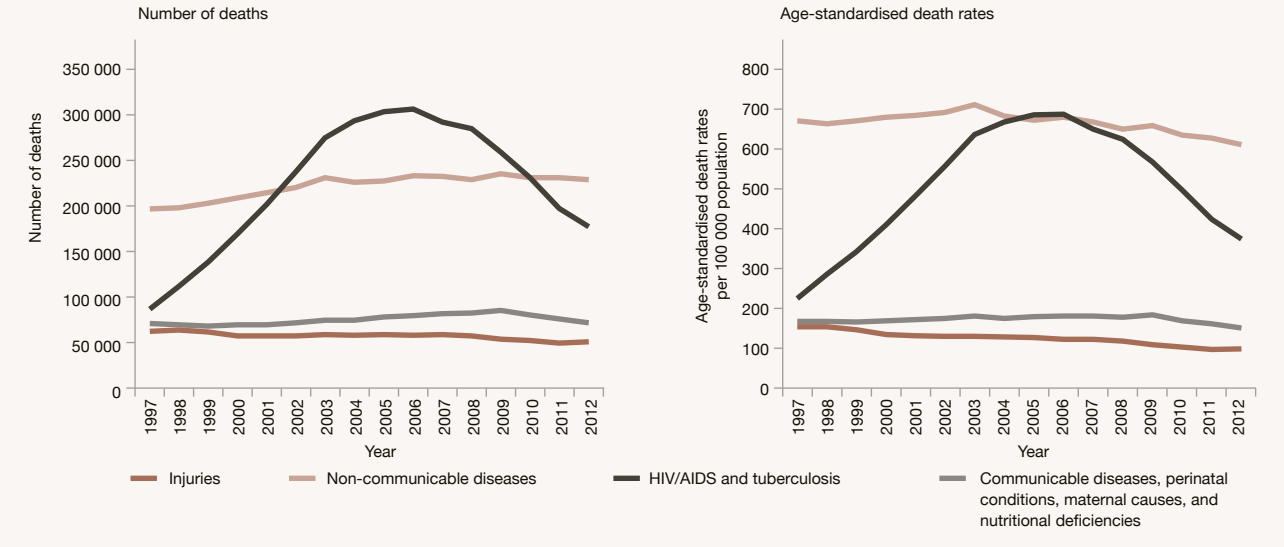
Mortality

Context	The improvement in life expectancy at birth in South Africa has been maintained, reaching 60.3 years for males and 66.4 years for females in 2015. However, there is increasing concern about the rising toll from NCDs.
New data sources	Nationally, new data have been reported in the: • Second National Burden of Disease Study 1997–2012 (national and provincial reports) • Medical Research Council Rapid Mortality Surveillance (RMS) Report 2015 • Stats SA Causes of death 2015 Internationally, reports of interest include: • Global Burden of Disease Study 2015
Key issues and trends	It is important to recognise the possible reasons behind widely differing estimates emanating from global modelling efforts and those conducted locally, which are able to take local context and policy shifts into account far more easily. Provincial data, such as from the Second National Burden of Disease Study and the Global Burden of Disease Study 2015, can be used to set appropriate priorities at provincial level.

Globally, the torrent of data issued by the Global Burden of Disease (GBD) collaboration continues unabated. In October 2016, the GBD 2015 collaborators issued a systematic analysis of available data from 1980–2015 indicating global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death.[73] At a global level, life expectancy at birth has increased by more than 10 years between 1980 and 2015, from 61.7 years to 71.8 years. The authors also note that several sub-Saharan African countries have shown marked gains in life expectancy between 2005 and 2015, most likely due to the enhanced access to antiretroviral therapy. Importantly for the 2030 Agenda, the authors noted that the number of deaths from most non-communicable causes are increasing in most countries. Reversing that trend will place considerable demands on global health systems.

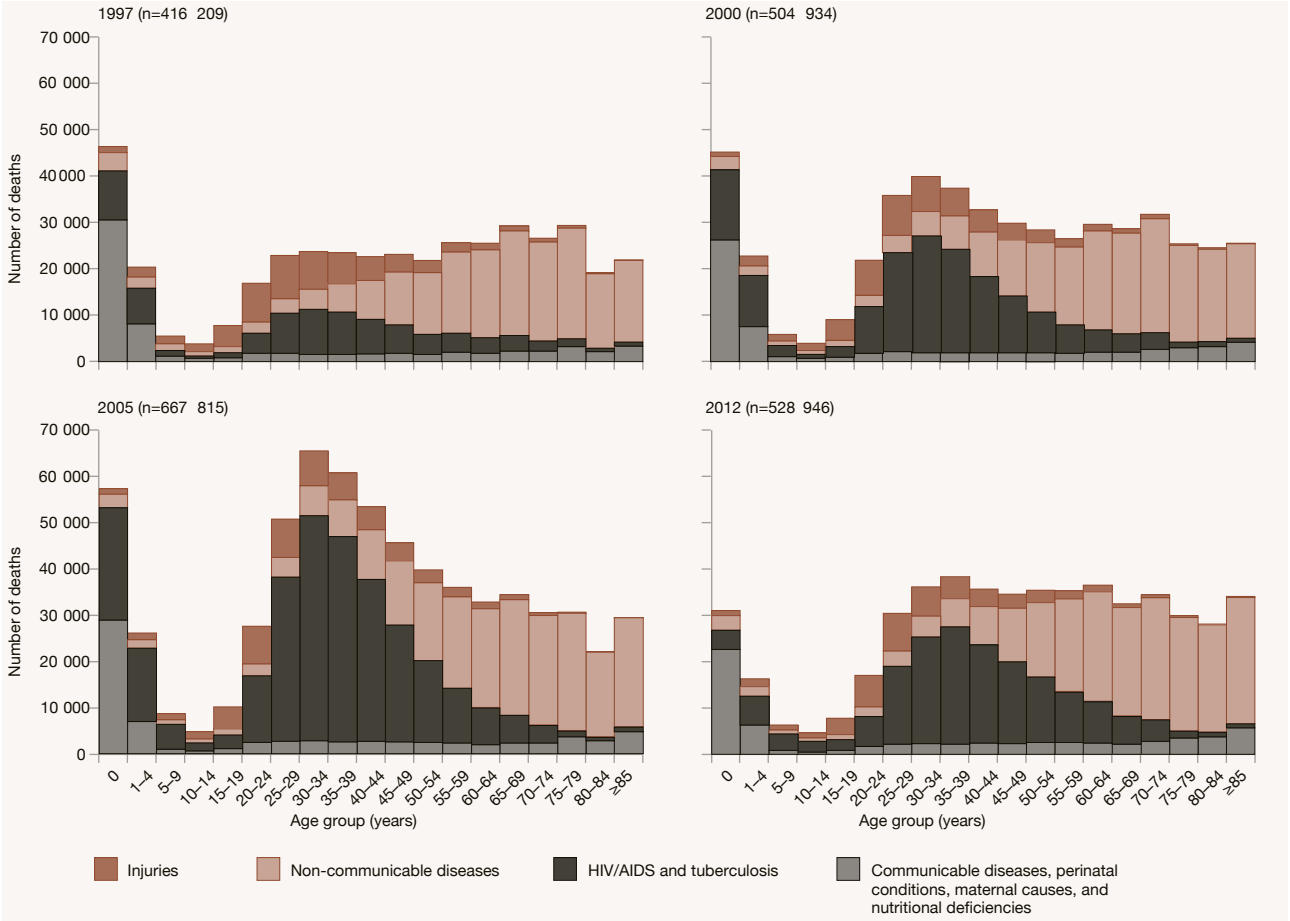
Data from South Africa's Second National Burden of Disease Study were also released in late 2016.[74] The study relied on vital registration data from Stats SA, adjusted for under-reporting. In line with expectations, especially informed by HIV treatment trends, the study showed that all-cause age-standardised death rates increased rapidly from 1997, but declined from a peak in 2006 (Figure 4). In 2012, nonetheless, HIV/AIDS was still the single cause estimated to have caused the most deaths (29.1%), followed by cerebrovascular disease (7.5%) and lower respiratory infections (4.9%). Very importantly, the locally-developed estimates were substantially different from those published by the IHME GBD studies. This was particularly true of estimated deaths from HIV/AIDS and interpersonal violence. Possible reasons for such differences were identified. The Second National Burden of Disease Study also highlighted problems with provincial-level estimates, and particularly that the "low age-standardised death rates for Limpopo are unexpected and difficult to explain". The accompanying editorial in the *Lancet* drew specific attention to the increase in age-standardised death rates from diabetes and renal disease that was recorded between 1997 and 2012, as well as the substantial deaths from non-communicable diseases in those aged 40–44 years.[75] Figure 5 shows the number of deaths by broad cause group and age group for South Africa for the years 1997, 2000, 2005, and 2012. Provincial reports from the Second National Burden of Disease Study were also released in 2016.[76–85]

Figure 4: Number of deaths and age-standardised death rates by broad cause group for South Africa, 1997–2012



Source: Pillay-van Wyk et al., 2016.[74]

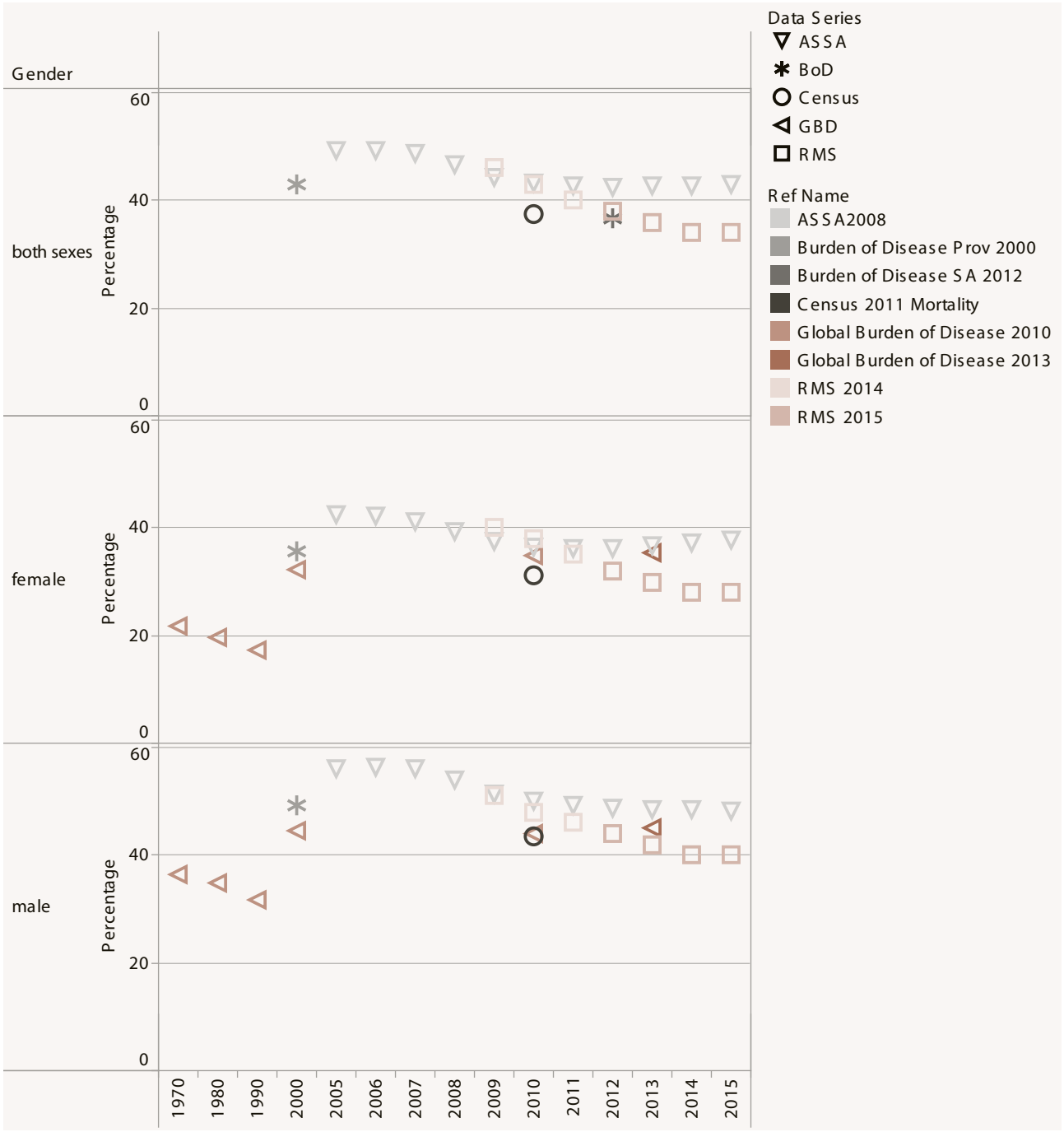
Figure 5: Number of deaths by broad cause group and age group for South Africa, 1997, 2000, 2005 and 2012



Source: Pillay-van Wyk et al., 2016.[74]

In December 2016, the Medical Research Council released their fifth Rapid Mortality Surveillance (RMS) report.[82] Although this report showed a gratifying increase in average life expectancy in South Africa, which had increased by nine years since 2005, to now exceed 63 years (60.3 years for males and 66.4 years for females) in 2015, it also raised the possibility that the decline in reported deaths reflected a decline in the completeness of death recording in the vital registration system or some other failures in the system. These possibilities will need to be carefully monitored going forward. Extending the RMS analysis to sub-national (provincial) level will be possible, once the MRC team is provided with the vital registration data from 2000 onwards, consistently grouped by the 2011 boundaries. The MRC also released the Western Cape mortality profile for 2009–2013, based on death notification forms submitted to the Department of Home Affairs and the Forensic Pathology Services.[86] This showed that, among men, interpersonal violence remained the leading cause of premature mortality in 2013, whereas among women, it was HIV/AIDS. Figure 6 shows the adult mortality estimates including the 20-year period in which the *Review* has been published, showing not only the temporal trends, but also the variability in estimates from different sources. In particular, the difference between the ASSA2008 projections and more recent estimates is striking.

Figure 6: Trends in adult mortality (45q15 – probability of dying between 15–60 years of age) by source, South Africa



Note: Time scale not linear; showing years with available data (projected or measured).

Source: Compiled from multiple sources.

Table 7: Mortality indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Adult mortality (45q15 – probability of dying between 15–60 years of age)	1990	female GBD										17.2	a
		male GBD										31.8	a
	2000	both sexes BoD	38.6	42.6	39.3	48.7	39.9	47.5	34.2	42.0	30.8	42.9	b
		female BoD	32.2	35.9	32.7	42.8	33.1	41.3	27.5	35.2	24.1	35.7	b
		female GBD										32.3	a
		male BoD	45.0	49.3	46.0	54.6	46.7	53.8	40.9	48.8	37.5	49.4	b
		male GBD										44.5	a
	2005	both sexes BoD										50.3	c
	2010	both sexes BoD	52.2	53.7	33.9	52.8	37.7	47.4	43.9	44.5	26.6	42.6	c
		both sexes Census										37.4	d
		both sexes RMS										43.0	e
		female Census										31.2	d
		female GBD										35.0	a
		female RMS										38.0	e
		male Census										43.6	d
		male GBD										44.1	a
		male RMS										48.0	e
	2015	both sexes RMS										34.0	f
		female RMS										28.0	f
		male RMS										40.0	f
Healthy life expectancy (HALE)	2000	World Health Report										43.0	g
	2005	female GBD										46.2	h
		male GBD										45.2	h
	2015	female GBD										54.6	h
		male GBD										51.1	h
Life expectancy at birth	1996	both sexes	60.4	52.8	59.6	53.0	60.1	53.5	55.6	53.3	60.8	57.0	i
		both sexes rural										58.0	i
		both sexes urban										56.2	i
	2000	both sexes BoD	56.2	55.1	58.0	51.6	57.1	53.1	60.5	55.9	63.4	55.2	b
		female BoD	59.0	57.9	61.0	53.8	60.1	55.5	63.9	58.8	67.0	58.5	b
		male BoD	53.3	52.4	55.1	49.4	54.3	50.7	57.2	53.1	59.8	52.4	b
	2005	both sexes BoD										53.9	c
		both sexes mid-year										53.5	j
		female GBD										53.6	h
		female mid-year										54.7	j
		male GBD										51.7	h
		male mid-year										52.1	j
	2010	both sexes BoD	53.8	53.4	63.2	52.9	63.6	56.6	59.3	58.0	68.0	58.8	c
		both sexes Census										57.9	d
		both sexes mid-year										60.0	j
		both sexes RMS										58.5	e
		female Census										60.6	d
		female mid-year										61.5	j
		female RMS										61.2	e
		male Census										55.2	d
		male mid-year										58.3	j
		male RMS										56.0	e
	2015	2011–2016 female mid-year	57.8	54.7	64.3	58.4	60.5	57.2	57.8	56.1	66.0		j
		2011–2016 male mid-year	55.3	53.0	61.7	57.0	57.3	55.8	57.9	53.5	63.7		j
		both sexes mid-year										62.5	j
		both sexes RMS										63.4	f
		female GBD										64.0	h
		female mid-year										64.3	j
		female RMS										66.4	f
		male GBD										58.6	h
		male mid-year										60.6	j
		male RMS										60.3	f
	2016	both sexes mid-year										62.4	k
		female mid-year										65.1	k
		male mid-year										59.7	k

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Global Burden of Disease 2010.[87]
b Burden of Disease Prov 2000.[88]
c Burden of Disease SA 2010.[89]
d Census 2011 Mortality.[22]
e RMS 2014.[90]
f RMS 2015.[82]
g World Health Report 2002.[91]
h GBD 2015 DALY HALE.[92]
i Stats SA HDI 2001.[63]
j Stats SA MYE 2015.[26]
k Stats SA MYE 2016.[16]

Disability

Context	New data on the prevalence of disability have been provided by the Stats SA Community Survey 2016, the largest intercensal survey conducted in South Africa.
New data sources	Nationally, new data have been reported in: • Stats SA General Household Survey 2015 • Stats SA Community Survey 2016 Internationally, reports of interest include: • Global Burden of Disease 2015
Key issues and trends	Data from the Global Burden of Disease 2015 study have underlined the relevance of non-communicable diseases as the underlying causes of chronic morbidity and disability, especially in countries with ageing populations. Although HIV still dominates the South African burden in this regard, the burden attributable to diabetes is higher than would be expected given the level of socio-demographic development.

The term 'disability' is used quite differently in epidemiology, in the form of the measure "disability-adjusted life years". Where healthy life expectancy (HALE) is a summary measure of population health, "weighting years lived with a measure of functional health loss experienced before death", the gap between population health and maximum lifespan in full health is provided by disability-adjusted life-years (DALYs), representing the "sum of years of life lost (YLLs) due to premature mortality and years lived with disability (YLDs)".[93]

In 2016, the Global Burden of Disease 2015 collaboration published global, regional, and national DALY estimates for 315 diseases and injuries, as well as HALE estimates for the period 1990–2015.[93] In addition to the trends over time in each geographical area, the GBD 2015 collaborators also assessed whether the observed trends differed from what would have been expected on the basis of changes in Socio-demographic Index (SDI). The SDI is a composite measure, derived from measures of income per capita, average completed years of schooling, and the total fertility rate. Globally, total DALYs remained 'largely unchanged' between 1990 and 2015, but gains in neonatal, maternal, and nutritional diseases were compensated for by increased DALYs due to non-communicable diseases. As South Africa's population ages, it can also expect, and is already seeing, an increased burden from NCDs in relative terms (% of total DALYS) with no reduction in absolute DALYs per 100 000 population.

The GBD 2015 project also produced global, regional, and national estimates of incidence, prevalence, and years lived with disability for 301 diseases and injuries, for the period 1990 to 2015.[94] The global conclusion was that ageing of the world's population "is increasing the number of people living with sequelae of diseases and injuries". In most countries, in 2015, lower back and neck pain was the leading cause of disability. The leading ten causes of years lived with disability (YLDs) in South Africa in 2015 (with the ratio of observed YLDs to YLDs expected on the basis of SDI in parentheses) were:

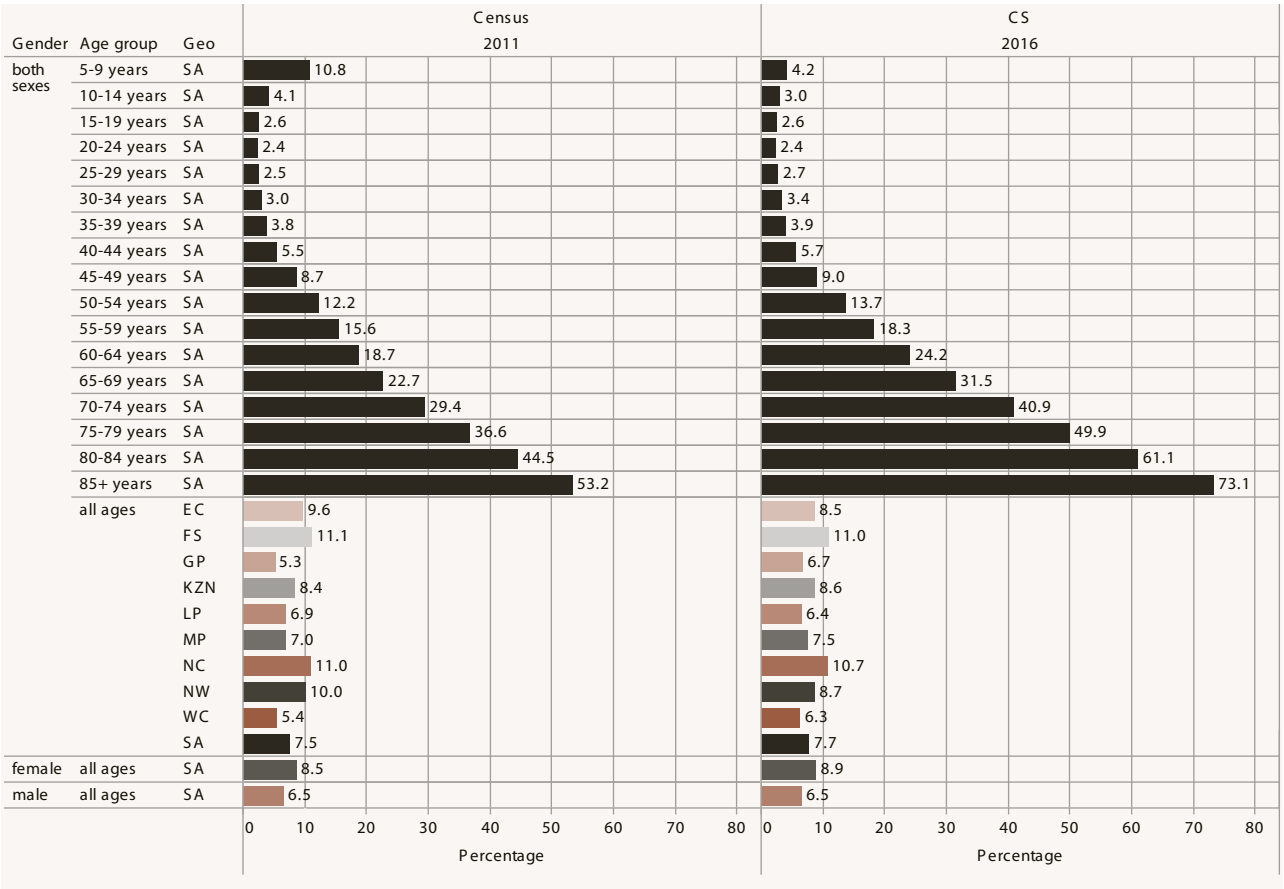
- HIV (165.51)
- back and neck pain (1.04)
- sense organ disorders (1.12)
- depression (1.04)
- diabetes (1.65)
- skin conditions (0.95)
- iron deficiency (1.01)
- migraine (0.78)
- asthma (1.27)
- anxiety (0.81).

Although the causes of YLDs are dominated by HIV, the greater than expected burden attributable to diabetes requires attention.

Data from the WHO Study on global AGEing and adult health (SAGE) conducted in China, Ghana, India, Mexico, the Russian Federation and South Africa in 2007–2010 have been used to explore the trends and determinants of disability-free life expectancies (DFLEs), and in particular, evidence for inequalities between men and women.[95] The data showed that, although women had a higher life expectancy, they had worse health conditions compared with men. The contribution of NCDs to morbidity and disability (as opposed to mortality) is difficult to measure, without access to a range of data. It has been suggested that these should include local "data on rates of NCD-related disability, statistics on functional status, rehabilitation needs, and the coverage and utilization of relevant health services".[96] The primary goals of NCD care are to preserve functional status, minimise symptoms, and prolong and enhance the quality of life. Information systems therefore need to track the inputs of NCD care as well as the outcomes that are achieved, including such aspects as engagement in physical activity and social participation.

Two new sources of local data were provided by the Stats SA General Household Survey 2015[40] and the Community Survey 2016.[21] The General Household Survey showed that 5.1% of South Africans aged 5 years and older were classified as disabled in 2015, with the highest prevalence encountered in the North West (7.4%), the Northern Cape (7.1%) and the Eastern Cape (6.8%). The national prevalence of disability reported by the intercensal Community Survey 2016 was 7.7%, compared with 7.5% in Census 2011 (Figure 7). The Department of Social Development released a White Paper on the Rights of Persons with Disability.[97] Pillar 9 of the White Paper deals with monitoring and evaluation. Included in the plan is the use of the Disability Inequality Index (DII), described as "an index for measurement of inequality between persons with disabilities and persons without disabilities with a gender dimension". The DII is to be calculated and reviewed annually. Detail on exactly how this will be done, and who will be responsible for the analysis, is however scanty.

Figure 7: Disability prevalence by age group, sex and province, 2011 and 2016



Source: Census 2011 and CS 2016, as quoted in Community Survey 2016.[21]

Table 8: Disability indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Cataract surgery rate	2010	2010/11 DHIS	784.4	899.5	213.5	319.5	717.5	604.1	259.0	468.8	1 094.0	547.6	a
	2011	2011/12 DHIS	1 002.1	821.3	555.6	633.6	765.3	629.4	416.7	363.9	1 209.7	729.5	a
	2015	2015/16 DHIS	864.0	748.0	891.0	512.0	613.0	625.0	830.0	458.0	1 225.0	764.0	a
Prevalence of disability	1996	Census	7.3	9.8	6.2	6.0	6.0	7.6	5.6	8.3	3.7	6.5	b
	2001	Census	5.8	6.8	3.8	5.0	5.1	5.8	5.7	5.8	4.1	5.0	c
	2012	GHS	6.0	7.6	3.5	5.0	5.0	5.4	7.1	7.2	4.6	5.1	d
		SANHANES WHODAS score	2.6	3.1	2.0	3.1	3.2	3.9	3.0	2.4	1.4	2.5	e
	2015	both sexes 5+ years GHS	6.8	6.3	3.9	5.4	4.4	4.5	7.1	7.4	4.6	5.1	f
		female 5+ years GHS	6.7	7.4	4.2	6.0	4.7	4.9	7.6	7.9	4.5	5.5	f
		male 5+ years GHS	6.9	5.1	3.6	4.7	4.0	4.0	6.7	6.8	4.7	4.7	f
	2016	both sexes all ages CS	8.5	11.0	6.7	8.6	6.4	7.5	10.7	8.7	6.3	7.7	g
		female all ages CS										8.9	g
		male all ages CS										6.5	g
Prevalence of hearing disability	1996	Census	1.1	1.3	0.8	0.9	1.1	1.2	0.8	1.6	0.5	1.0	b
	2001	Census	0.8	1.0	0.4	0.7	0.8	0.9	0.7	0.7	0.6	0.7	c
	2012	15+ years SANHANES	10.8	14.3	7.0	13.6	10.5	10.3	4.0	7.2	9.0	9.5	h
	2016	both sexes all ages CS										3.8	g
Prevalence of physical disability	1996	Census	1.9	1.6	1.0	1.6	1.5	1.1	1.2	1.8	0.9	1.4	b
	2001	Census	1.5	1.3	1.0	1.3	1.0	1.3	1.6	1.4	1.2	1.2	c
	2016	both sexes all ages CS										5.4	g
Prevalence of sight disability	1996	Census	2.6	5.2	2.9	2.2	2.3	3.6	2.3	3.4	3.8	2.7	b
	2001	Census	1.3	2.2	1.0	1.2	1.3	1.6	1.5	1.7	0.8	1.3	c
	2016	both sexes all ages CS										10.3	g

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DHIS.[34]
b Census 1996.[20]
c Census 2001.[44]
d Stats SA GHS 2012.[98] This analysis only includes the percentage of persons aged 5 years and older with a disability. This is because children under five years are often mistakenly categorised as being unable to walk, remember, communicate or care for themselves when it is due to their level of development rather than any innate disabilities they might have.
e SANHANES–1.[99] The WHO–Disability Assessment Scale (DAS) score provides an indication of the overall level of self-reported disability in the 30 days preceding the interview at the time the survey was conducted. It is expected that the level of disability will increase with age. In SANHANES–1, a very low level of disability was reported at all ages, including the middle and older age group although the results show a trend of increasing disability with age.
f Stats SA GHS 2015.[40]
g Community Survey 2016.[21]
h SANHANES–1.[99] Self-reported prevalence of wearing a hearing aid.

Table 9: Disability indicators by population group

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Prevalence of disability	1996	Census	7.5	3.6	4.1	3.3	4.4	a
	2001	Census	5.2	4.2	3.7	4.5		b
	2016	both sexes all ages CS	7.6	7.5	8.4	9.2		c

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Census 1996.[20]
b Census 2001.[27]
c Community Survey 2016.[21]

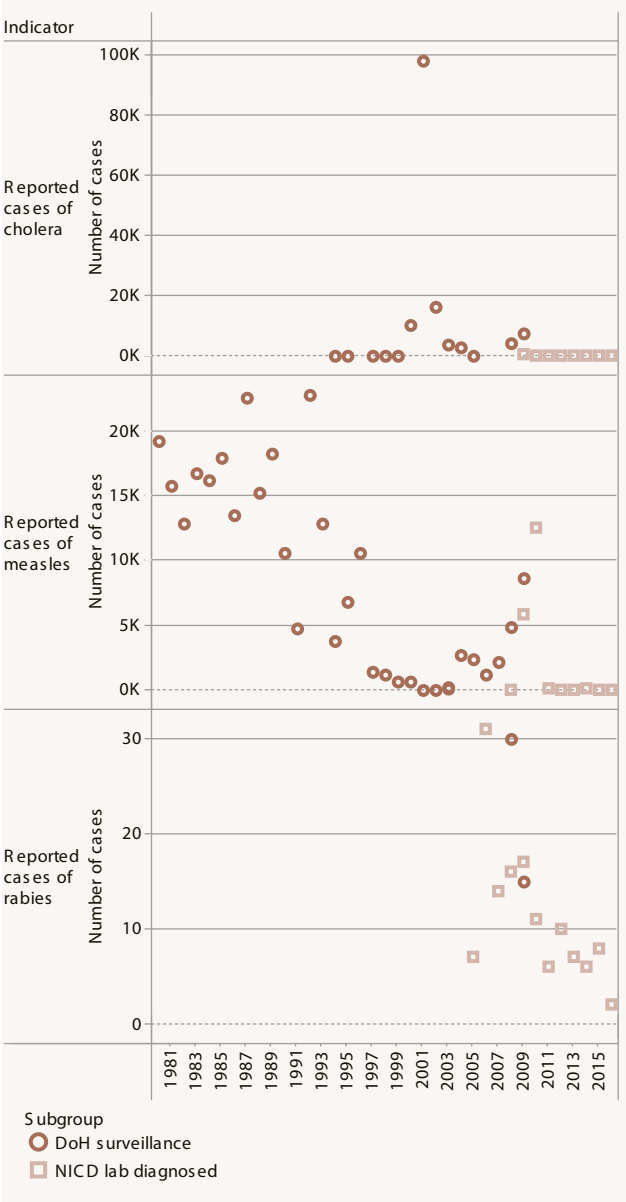
Infectious diseases

Context	The Cape Town Global Action Plan for Sustainable Development Data emphasised how tracking progress towards the achievement of the Sustainable Development Goals demanded access to "quality, accessible, timely and reliable disaggregated data", but in particular highlighted the need for data that would ensure that "no one is left behind". This demand has particular relevance for infectious diseases, where obtaining a complete picture of the national situation remains challenging. Work is underway to link the NHLS corporate data warehouse (CDW) and TIER.Net, using the unique identifier relied upon by the Health Patient Registration System (HPRS).
New data sources	Nationally, new data have been reported in the: • Surveillance data, surveillance bulletins and other reports issued by NICD
Key issues and trends	A National Surveillance Strategy 2015–2020 is under development by the National Department of Health and the National Institute for Communicable Diseases. However, no details have yet been made public, and no updated notifiable disease data have been released by the NDoH in the past year.

Globally, attention to neglected tropical diseases (NTDs) has been included in the 2030 Agenda, and thus in the targets set for the Sustainable Development Goals (SDGs). It might be anticipated that NTDs would have limited relevance for South Africa. Nonetheless, a recent review of progress in this regard has highlighted a number of conditions which are still locally prevalent, such as rabies, schistosomiasis and soil-transmitted helminthiases.[100] The review also points out that "NTDs are tracers of equity in progress toward other SDGs and targets, including universal health coverage (target 3.8), access to safe water (target 6.1), and sanitation (target 6.2)". The Global Burden of Disease Study 2010 estimated about 150 000 deaths per year from NTDs, but this excluded deaths from rabies, snakebite, cancers associated with trematode infections and neurological NTD conditions such as neurocysticercosis-related epilepsy. Including these causes would inflate the estimate to about 350 000 deaths per year. Locally, a bilharzia and helminth prevalence survey has been conducted in two provinces, but not yet reported.

Under the strategic area of "innovation and modernization of national statistical systems", the Cape Town Global Action Plan for Sustainable Development Data listed a number of key actions.[9] One of these was to "strengthen … access to data, including enhanced data sharing across the national statistical system". Another called for the development of "a mechanism for the use of data from alternative and innovative sources within official statistics". This is of particular relevance to infectious disease monitoring as, once more, the *Review* has to note that no updated notifiable disease data have been issued by the National Department of Health. Although it appears that the National Health Laboratory Service (NHLS), and in particular the National Institute for Communicable Diseases (NICD), is filling the gap to some extent, exactly how or when this will transition to the proposed National Public Health Institute of South Africa (NAPHISA) is unclear. A pilot disease surveillance system is in development between the Department of Health and the NICD. The linkages being forged between the NHLS Corporate Data Warehouse (CDW) and private sector systems, such as Netcare's Bluebird system, are also to be welcomed and should be closely followed.[6] Such linkages will ensure that, in any new national surveillance system, no-one is left behind. Recent reports from the NICD include the GERMS-SA 2015 report of laboratory surveillance of opportunistic infections associated with HIV, epidemic-prone diseases, vaccine-preventable diseases and hospital infections.[101] In 2015, these data were contributed by 222 clinical microbiology laboratories, serving an estimated population of 54.9 million. The January 2017 issue of the NICD's Communicable Diseases Communiqué included data on rabies for January to December 2016.[102] Only two cases of human

Figure 8: Trends in case notifications and laboratory confirmed cases of cholera, measles and rabies, South Africa, 1980 to 2016



Source: Compiled from multiple reports of the National Department of Health (NDoH) and National Institute for Communicable Diseases (NICD).

rabies were laboratory-confirmed in South Africa in 2016, one each from KwaZulu-Natal and the Free State. The Communiqué noted that this is the lowest annual incidence in South Africa in thirty years, and cautioned that under-diagnosis and missed cases could not be ruled out. Improved management of animal bites and improved control of canine rabies might also be responsible for the reduced number of human cases, but canine rabies is still endemic, particularly in KwaZulu-Natal, Mpumalanga, Limpopo and the eastern parts of the Free State. Figure 8 shows the national trends in case notifications and laboratory-confirmed cases of cholera, measles and rabies, between 1980 and 2016, as reported to the National Department of Health and NICD.

As noted in the previous issue of the *Review*, global attention to the problem of schistosomiasis continues apace, including attention to the possible links between female genital schistosomiasis and HIV acquisition risk.[103,104] In particular, the need for careful monitoring of the impact of mass drug administration campaigns has been identified.

Table 10: Selected infectious disease indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Reported cases of cholera	1995	DoH surveillance	0	0	1	1	0	0	0	0	0	2	a
	2000	DoH surveillance	0	1	0	10 161	0	0	0	4	0	10 166	a
	2001	DoH surveillance	9	1	65	97 059	793	125	0	6	1	98 059	a
	2002	DoH surveillance	2 352	0	24	13 536	465	4	0	12	1	16 394	a
	2003	DoH surveillance	3 142	2	4	560	0	159	0	0	1	3 866	a
	2004	DoH surveillance										2 780	a
	2005	DoH surveillance										0	a
	2008	DoH surveillance										4 343	a
	2009	DoH surveillance	2	0	47	0	618	6 855	0	28	4	7 554	a
		NICD lab diagnosed			37		449	61		19	4	570	b
	2010	NICD lab diagnosed			1							1	b
	2016	NICD lab diagnosed	0	0	0	0	0	0	0	0	0	0	c
Reported cases of measles	1980	DoH surveillance										19 193	a
	1990	DoH surveillance										10 628	a
	1995	DoH surveillance										6 833	a
	2000	DoH surveillance										646	a
	2005	DoH surveillance										2 334	a
	2009	DoH surveillance	314	198	4 359	2 215	282	218	87	563	447	8 683	a
		NICD lab diagnosed	80	165	4 114	423	220	131	65	453	209	5 860	b
	2010	NICD lab diagnosed	1 309	674	1 617	3 837	290	1 844	374	758	1 796	12 499	b
	2016	NICD lab diagnosed	0	0	8	3	0	2	0	1	3	17	c
Reported cases of rabies	2005	NICD lab diagnosed										7	d
	2009	DoH surveillance	7	0	0	4	2	2	0	0	0	15	a
		NICD lab diagnosed	8	0	0	5	2	2	0	0	0	17	b
	2010	NICD lab diagnosed	2	0	1	3	3	1	1	0	0	11	b
	2016	NICD lab diagnosed	0	1	0	1	0	0	0	0	0	2	c
Syphilis prevalence rate (antenatal)	1997	Antenatal Survey										11.2	e
	2000	Antenatal Survey	3.3	4.8	9.6	2.6	4.2	3.7	5.1	3.6	5.2	4.9	f
	2006	Antenatal Survey	2.6	2.5	2.3	1.0	0.6	1.1	6.9	1.8	1.9	1.8	g
		DHIS	12.9	4.2	4.0	4.9	2.2	3.3	6.7	11.9	8.5	4.6	h
	2011	Antenatal Survey	1.8	1.9	2.0	0.4	0.7	4.1	3.8	1.7	1.6	1.6	i
	2014	2013–2014 female 16+ years SAHMS			16.2	4.6					19.9		j

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DoH Notification System.[105]
b NICD surveillance.[106] Communicable Diseases Surveillance Bulletin Mar 2011.
c NICD surveillance.[106] Personal communication with NICD, Jan 2017.
d DoH Notification System.[105] Epi Comments Apr–Jun 2009. Quoting NICD.
e Antenatal Survey 2008.[107]
f DoH Notification System.[105] Quoting data from annual antenatal surveys but updated by NDoH in 2002 due to errors in previously published figures.
g Antenatal Survey 2006.[108]
h DHIS.[34]
i Antenatal Survey 2011.[109]
j SAHMS 2013–14.[110] Prevalence in sex workers (not specifically antenatal clients as per indicator definition).

Malaria

Context	South Africa has set a national target to eliminate malaria by 2018. As the country approaches that target, strengthened surveillance will be critical. It will also be important to ensure that vulnerable groups are assured of equitable access to both preventive and curative interventions.
New data sources	Nationally, new data have been reported in the: • National Department of Health malaria surveillance data • National Institute for Infectious Diseases (NICD) reports Internationally, reports of interest include: • WHO World Malaria Report 2016
Key issues and trends	Although corroborating data from vital registration systems have not been accessed, the high proportion of malaria deaths reported from Gauteng, a non-endemic province, have again focused attention on the issue of imported malaria, and the risks to migrant workers who return to neighbouring countries over holiday periods.

The Global Technical Strategy for Malaria 2016–2030 aims to reduce malaria incidence and mortality rates globally by at least 90%, to eliminate malaria from at least 35 countries and to prevent re-establishment in all countries that are malaria free. Target 3.3 of the Sustainable Development Goals (SDGs) is interpreted as incorporating these targets. Progress was reported in the World Malaria Report 2016.[111] A reduction in the number of people infected with malaria parasites in sub-Saharan Africa, from about 131 million in 2010 to about 114 million in 2015, was reported. This is still the majority of the estimated 212 million global cases of malaria in 2015. Nonetheless, the global incidence rate is estimated to have decreased by 41% between 2000 and 2015. The global estimate of mortality due to malaria in 2015 was 429 000 deaths, the majority in sub-Saharan Africa and due to *Plasmodium falciparum*, and the majority (303 000 deaths) in children aged under 5 years. Globally, malaria mortality rates have declined by 62% between 2000 and 2015. In this time period, 17 countries eliminated malaria and six of these were certified as malaria free by WHO. By combining data from the Malaria Atlas Project and the Global Burden of Disease Study, a fine mapping of malaria mortality between 1990 and 2015 has been achieved.[112] These data showed a 57% decrease in malaria mortality rate between 2000 and 2015, but also identified settings in which high mortality was associated with low coverage of treatment and prevention programmes.

South Africa is reported to have set a national target to eliminate malaria by 2018.[113] WHO noted, however, that South Africa's "relatively high number of malaria cases are geographically concentrated along the border with Zimbabwe, Swaziland and Mozambique" and predicted that the country "has the potential to eliminate malaria by 2020". Strengthened surveillance is critical as countries approach elimination, as is equitable access to preventive and curative interventions. The WHO notes in particular that, as countries approach elimination "a high proportion of cases are found among vulnerable populations living in remote areas" and that specific attention must be given to access for all at-risk groups, regardless of legal status. In South Africa, this should include migrant workers who return to neighbouring countries over holiday periods. A meta-analysis of studies on imported malaria cases in non-endemic countries emphasised the role of historical and language links and travel ties.[114] These factors need to be understood if the malaria case load and mortality reported from provinces such as Gauteng are to be addressed. Of 40 reported malaria deaths in 2016, 17 occurred in Gauteng.

A seasonal update on malaria surveillance issued by the NICD in the January 2017 Communicable Diseases Communiqué noted that the majority of cases in the malaria-endemic provinces (Mpumalanga, KwaZulu-Natal and Limpopo) were locally acquired, but also that "incidence ... is likely to increase further during the coming months owing to increased summer rainfall and high numbers of travellers returning from endemic regions".[102] National trends in malaria indicators between 1971 and 2016 are depicted

Figure 9: Trends in malaria indicators for South Africa, 1971 to 2016

Source: Compiled from NDoH malaria surveillance data, Stats SA Causes of death unit records and the Global Burden of Disease Study as reported by Murray et al. 2014.[115]

in Figure 9, contrasting the various sources, and in particular the marked difference between notified cases and those captured by vital registration systems.

Table 11: Malaria indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Case fatality rate: malaria	1999	DoH surveillance				0.8	1.1	0.6				0.8	a
	2010	DoH surveillance	0.0	0.0	1.1	1.3	0.9	1.1	8.3	2.1	0.0	1.1	a
	2015	DoH surveillance	4.2	2.4	1.7	1.0	1.5	0.5	5.6	1.8	2.4	1.2	a
	2016	DoH surveillance	0.0	0.0	1.4	1.2	0.7	0.3	0.0	0.0	0.8	0.7	a
Malaria mortality rate (per 100 000 population)	2013	DoH surveillance	0.0	0.1	0.2	0.1	0.4	0.9	0.0	0.1	0.0	0.2	a
		vital registration	0.1	0.3	0.5	0.3	1.1	1.1	0.0	0.6	0.1	0.5	b
	2014	DoH surveillance	0.0	0.0	0.2	0.1	1.6	0.8	0.1	0.0	0.1	0.3	a
		vital registration	0.2	0.4	0.8	0.3	2.7	1.4	0.1	0.2	0.1	0.7	c
	2015	DoH surveillance	0.0	0.0	0.2	0.1	1.4	0.4	0.1	0.0	0.0	0.2	a
	2016	DoH surveillance	0.0	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.1	a
Reported cases of malaria	1995	DoH surveillance										8 750	a
	2000	DoH surveillance				41 786	9 487	12 390				64 622	a
	2005	DoH surveillance				1 220	3 458	3 077				7 755	a
	2010	DoH surveillance	9	34	960	380	4 215	2 195	12	186	75	8 066	a
	2013	DoH surveillance	30	72	1 761	575	2 408	3 796	20	102	87	8 851	a
		GBD										5 629	d
		female GBD										2 874	d
		male GBD										2 755	d
	2015	DoH surveillance	24	41	1 524	606	5 352	3 494	18	55	124	11 238	a
	2016	DoH surveillance	28	25	1 248	488	1 361	2 403	6	92	118	5 769	a
Reported cases of malaria (per 100 000)	1998	DoH surveillance	0.1	0.9	2.0	153.0	65.0	200.0	0.9	5.6	0.7	160.0	e
	2005	DoH surveillance				12.6	61.4	95.6				16.5	e
	2010	DoH surveillance	0.1	1.2	8.0	3.7	79.1	55.2	1.0	5.3	1.3	15.8	e
	2015	DoH surveillance	0.3	1.5	11.5	5.5	93.5	81.6	1.5	1.5	2.0	20.4	e
	2016	DoH surveillance	0.4	0.9	9.2	4.4	23.4	55.5	0.5	2.4	1.9	10.3	e
Reported deaths from malaria	1995	DoH surveillance										44	a
	2000	DoH surveillance				340	68	46				459	a
		vital registration	75	29	89	319	324	154	4	27	7	1 028	f
	2005	DoH surveillance				17	31	16				64	a
		vital registration	28	14	133	54	295	81	2	23	6	644	g
	2010	DoH surveillance			11	5	40	26	1	4		87	a
		vital registration	3	5	73	28	96	43	1	12	6	276	h
	2013	DoH surveillance	3	2	24	13	24	36		3	1	106	a
		GBD										374	d
		vital registration	4	8	67	31	58	46		22	7	247	i
		WMR										105	j
		female GBD										128	d
		male GBD										245	d
	2014	DoH surveillance			28	8	91	33	1		4	165	a
		vital registration	11	10	100	30	152	59	1	9	9	387	k
		WMR										174	j
	2015	DoH surveillance	1	1	26	6	79	18	1	1	3	136	a
		WMR										110	j
	2016	DoH surveillance			17	6	9	7			1	40	a

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DoH Malaria Statistics.[116] Totals for South Africa may include cases/deaths where no province was recorded.

b Stats SA Causes of death 2013.[30] Calculated from Stats SA Causes of Death online database using ICD–10 codes B50–B54 as underlying cause of death and population from Stats SA mid-year estimates. Includes deaths not recorded by province.

c Stats SA Causes of death 2014.[117] Calculated from Stats SA Causes of Death online database using ICD–10 codes B50–B54 as underlying cause of death and population from Stats SA mid-year estimates. Includes deaths not recorded by province.

d Murray et al. 2014.[118] Modelled estimate as part of the Global Burden of Disease Study 2013.

e DoH Malaria Statistics.[116] Calculated from reported cases of malaria and Stats SA mid-year population estimates for the relevant year.

f Stats SA Causes of death. Calculated from Stats SA Causes of Death online database using ICD–10 codes B50–B54 as underlying cause of death. Includes deaths not recorded by province.

g Stats SA Causes of death 2005.[119] Calculated from Stats SA Causes of Death database using ICD–10 codes B50–B54 as underlying cause of death. Includes deaths occurring outside of SA.

h Stats SA Causes of death 2010.[120] Calculated from Stats SA Causes of Death online database using ICD–10 codes B50–B54 as underlying cause of death. Includes 9 deaths not recorded by province.

i Stats SA Causes of death 2013.[30] Calculated from Stats SA Causes of Death online database using ICD–10 codes B50–B54 as underlying cause of death. Includes 6 deaths not recorded by province.

j World Malaria Report 2016.[111]

k Stats SA Causes of death 2014.[117] Calculated from Stats SA Causes of Death online database using ICD–10 codes B50–B54 as underlying cause of death.

Tuberculosis

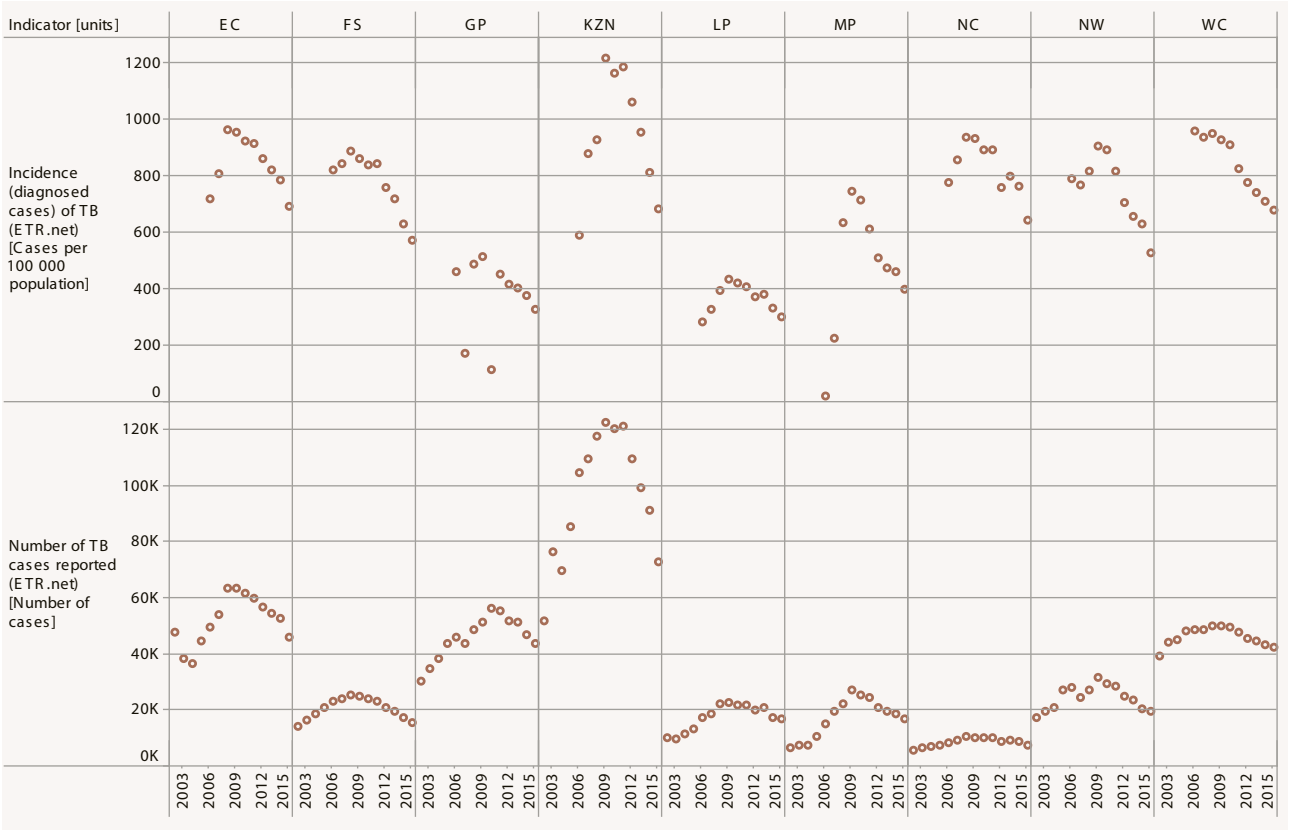
Context	Tuberculosis remains a key target for both the Sustainable Development Goals and for the specific WHO End TB Strategy 2016–2020. The emphasis, though, has shifted from prevalent cases to incident cases, in order to reflect the 90-90-90 targets. The draft National Strategic Plan on HIV, TB, STIs (2017–2022) has been aligned with these targets.
New data sources	Nationally, new data have been reported in the: • South African Tuberculosis Drug Resistance Survey 2012–2014 • National programme data, as captured in ETR.net (drug-susceptible TB), EDRWeb (drug-resistant TB) and National Health Laboratory Service • Stats SA Causes of death 2015 Internationally, reports of interest include: • WHO Global Tuberculosis Report 2016
Key issues and trends	South Africa has been included in all three of the country lists that will be used by WHO to track progress with respect to the End TB Strategy 2016–2020: the 30 high TB burden countries, the 30 high TB/HIV burden countries, and the 30 high MDR-TB burden countries.

The WHO Global Tuberculosis Report 2016 estimated 10.4 million incident tuberculosis TB cases worldwide, of which 1.0 million were children.[46] South Africa features in all three of the country lists that will be used by WHO to track progress in 2016–2020: the 30 high TB burden countries, the 30 high TB/HIV burden countries, and the 30 high MDR-TB burden countries. Just six countries (India, Indonesia, China, Nigeria, Pakistan and South Africa) accounted for 60% of all incident cases. Although only 6.1 million incident cases were notified to national authorities in 2015, there was a marked increase in notifications from India. India, China and the Russian Federation accounted for 45% of the combined total of 580 000 incident drug-resistant cases (480 000 of which were multidrug-resistant TB (MDR-TB). Globally, only 125 000 drug-resistant cases accessed treatment. In 2015, 55% of notified TB patients had an HIV test result recorded, and 78% of HIV-TB co-infected patients accessed antiretroviral therapy (ART). TB was responsible for an estimated 1.4 million deaths in 2015, with an additional 0.4 million deaths resulting from TB disease among people living with HIV. Although there was a 22% decrease in TB deaths between 2000 and 2015, TB remained one of the top 10 global causes of death. The 2016 Global Tuberculosis Report was the first of the SDG era, and was re-arranged accordingly. The Report also reflected the targets set by the End TB Strategy, which has replaced the Stop TB Strategy (2006–2015). The End TB Strategy aims at a 90% reduction in TB incidence and a 95% reduction in TB deaths by 2035, compared with the 2015 baseline. One of the issues highlighted in the End TB Strategy is the need to control latent TB infection (LTBI). A new modelling exercise has estimated the global burden of LTBI in 2014 at approximately 1.7 billion people (23.0% of the global population; 95% uncertainty interval [UI]: 20.4% – 26.4%), of which about 80% resided in the WHO South-East Asia, Western Pacific, and Africa regions.[121] The Global Tuberculosis Report 2016 noted that South Africa accounted for 45% of all people living with HIV who received TB preventive treatment for LTBI in 2015.

A 'zero draft' of South Africa's National Strategic Plan on HIV, TB, STIs (2017–2022) was released for comment in September 2016.[122] Among the strategies outlined is the use of hotspot mapping for HIV, TB and sexually-transmitted infections (STIs) in identified districts, in order to inform high-impact interventions in these priority areas. The End TB Strategy has set the targets of reaching 90% of all people who need TB treatment, including 90% of people in key populations, and achieving at least 90% treatment success. The targets had been articulated somewhat differently by the South African National Department of Health, as screening 90% of vulnerable groups, diagnosing and starting 90% on treatment, and then achieving at least 90% treatment success. However, alignment with the End TB targets is now evident in the draft National Strategic Plan.

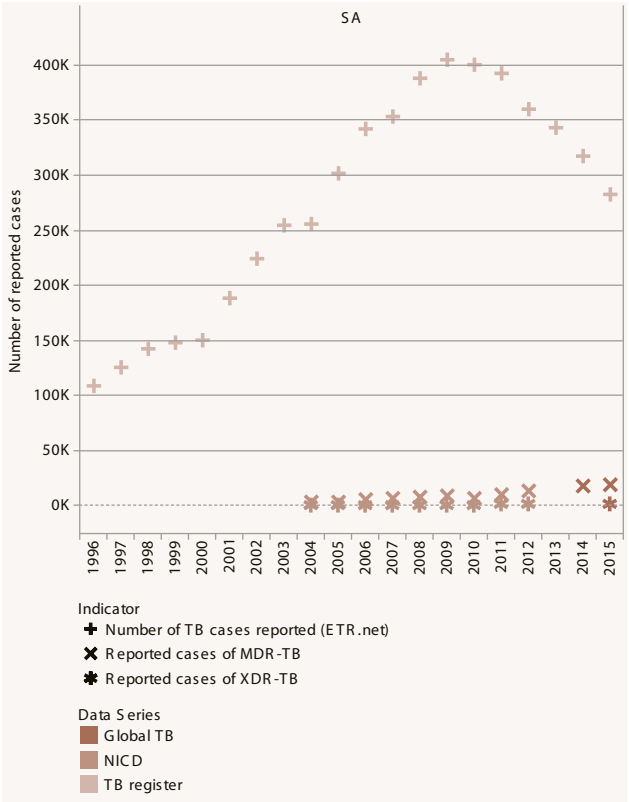
The results of the South African Tuberculosis Drug Resistance Survey 2012–2014 were released in 2016.[123] Nationally, the prevalence of MDR-TB was 2.8%; (95% CI: 2.0%–3.6%). Prevalence was lower in new cases (2.1%; 95% CI: 1.5%–2.7%) than in retreatment cases (4.6%; 95% CI: 3.2%–6.0%). The highest overall prevalence was recorded in Mpumalanga (5.1%; 95% CI: 3.7%–7.0%). Overall prevalence was therefore not different from that recorded in the 2001–2002 survey (2.9%; 95% CI: 2.4%–3.5%). However, there was a marked increase in any rifampicin resistance (including mono-resistance) in new cases, from 1.8% (95% CI: 1.3%–2.3%) in 2001–2002 to 3.4% (95% CI: 2.5%–4.3%) in 2012–2014. For the first time, the survey measured resistance to second-line drugs among MDR-TB cases. Resistance to ethionamide (44.7%; 95% CI: 25.9%–63.6%) and pyrazinamide (59.1%; 95% CI: 49.0%–69.1%) was higher than that for fluoroquinolones and injectable agents (both 13%; 95% CI: 5%–21%). Of MDR-TB cases, 4.9% (95% CI: 1.0%–8.8%) were identified as extensively-drug resistant (XDR-TB). The high levels of resistance to second-line agents among MDR-TB cases underlines the risk of transmission of such strains. A prospective cohort study in KwaZulu-Natal showed that the majority of XDR-TB cases were probably due to transmission rather than development of resistance in the particular patient due to inadequate treatment of MDR-TB.[124] Although focused on drug-susceptible cases, a retrospective cohort study conducted in public sector primary healthcare clinics in Johannesburg underscored the problem with missing laboratory results, including smears, cultures and drug sensitivity tests, which would hamper the ability to identify and manage both non-adherence and resistant cases.[125] This study also highlighted the challenges of integrating HIV and TB care. Of the 495 patients in the cohort, only 137 (27.7%) were known to be living with HIV and on ART. A further 116 (23.4%) were known to be co-infected, but not on ART, and 101 (20.4%) were known to be co-infected but ART status was unknown. Overall, 394 (79.6%) achieved treatment success. Low uptake of HIV testing (35%) was demonstrated in a cohort of TB contacts approached through household contact tracing.[126]

Figure 10: Trends in incidence and number of cases based diagnosed cases in ETR.net by province, 2002 to 2015



Source: NDoH TB Directorate (ETR.net).

Figure 11: Trends in number of reported cases of drug-susceptible TB, MDR and XDR-TB, for South Africa 1996 to 2015

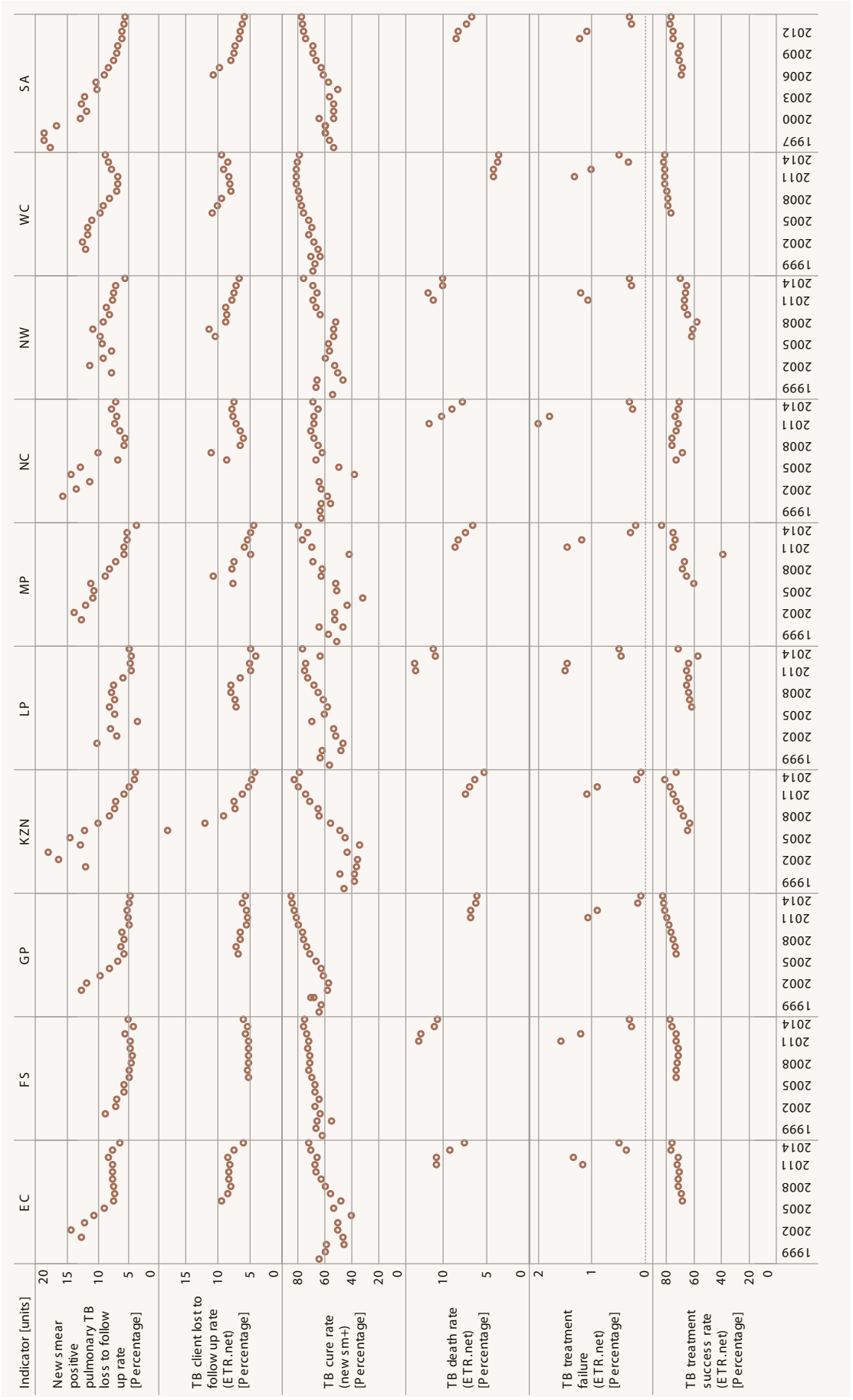


Source: NDoH TB Directorate,[132] MDR Overview 2014,[133] Global TB Report 2015[129] and Global TB Report 2016.[46]

Trends in incidence and the number of TB cases diagnosed and reported by the National Department of Health's electronic TB register (ETR.net), for the period 2002 to 2015, are shown in Figure 10. Figure 11 shows the trends in the number of reported cases of drug-susceptible TB, MDR- and XDR-TB, nationally, between 1996 and 2015. Figure 12 shows the trends in TB treatment outcomes in drug-susceptible TB by province, between 1996 and 2014, based on ETR.net data.

In keeping with the SDG requirement for inter-sectoral approaches, which recognise the impact of the social determinants of health, any interventions aimed at ending TB would need to consider social circumstances. Not surprisingly, social protection spending has been shown to be inversely associated with TB prevalence, incidence and mortality.[127] Policy interventions can also draw on the lessons learned from large-scale household surveys, such as the South African National Health and Nutrition Examination Survey (SANHANES).[128] Data from SANHANES–1 showed that race, sex, completion of high school, being in employment, having a diagnosis of the disease in ones' life-time and learning about tuberculosis from television, brochures, health workers, and teachers were significant predictors of respondents' knowledge about TB.

Figure 12: Trends in selected TB treatment outcomes in drug-susceptible TB by province, 1996 to 2014



Source: NDoH TB Directorate (ETR.net).

Table 12: TB programme management and other indicators

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Case detection rate (all forms)	1990	Global TB										70.0	a
	1995	Global TB										59.0	a
	2000	Global TB										58.0	a
	2005	Global TB										60.0	a
	2010	Global TB										73.0	a
	2015	Global TB										64.0	b
HIV prevalence in TB incident cases	1990	Global TB										4.4	a
	1995	Global TB										40.0	a
	2000	Global TB										57.0	a
	2005	Global TB										60.0	a
	2010	Global TB										60.0	a
	2014	2012–2014 18+ years	55.6	70.3	74.6	69.2	63.6	76.8	51.7	68.0	47.4	63.2	c
		Global TB										61.0	a
	2015	Global TB										57.0	b
Tuberculosis death rate per 100 000 (in HIV-positive people)	1990	Global TB										1.0	a
	1995	Global TB										13.0	a
	2000	Global TB										102.0	a
	2005	Global TB										197.0	a
	2010	Global TB										163.0	a
	2015	Global TB										133.0	b
Tuberculosis mortality rate per 100 000	1990	Global TB										78.0	d
	1995	Global TB										116.0	d
	2000	Global TB										183.0	d
	2005	Global TB										249.0	d
		vital registration	176.4	199.9	118.4	235.6	78.4	183.9	186.0	162.3	84.2	157.6	e
	2010	vital registration	156.5	182.6	77.4	179.7	78.9	140.9	123.1	143.3	62.9	123.4	f
	2012	both sexes all ages BoD age-standardised	134.0	61.0		67.0	48.0	52.0	84.0	40.0	31.0	55.0	g
		female all ages BoD age-standardised	88.0	33.0		35.0	22.0	24.0	58.0			33.0	g
		male all ages BoD age-standardised	200.0	99.0		115.0	88.0	89.0	117.0	62.0	44.0	84.0	g
		vital registration	108.7	120.1	61.7	129.2	77.3	108.2	107.5	105.7	51.7	92.6	h
	2014	vital registration	86.5	98.8	49.4	81.2	61.9	80.4	88.2	84.0	39.9	68.9	i
	2015	vital registration	85.0	75.0	41.0	67.0	54.0	63.0	90.0	74.0	43.0	60.0	j
Tuberculosis mortality rate per 100 000 (excluding HIV)	1990	Global TB										47.0	a
	1995	Global TB										47.0	a
	2000	Global TB										68.0	a
	2005	Global TB										75.0	a
	2010	Global TB										59.0	a
	2015	Global TB										46.0	b

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Global TB Report 2015. [129]

b Global TB Report 2016.[46]

c MDR Survey 2012–2014.[123]

d Global TB database.[130] Downloaded 2010–09–15.

e Stats SA Causes of death 2005.[119] Calculated from 73 903 deaths due to TB (ICD10 A15–A19) and Stats SA mid-year population estimates for the relevant year. No adjustment has been made for under-reporting of death notification. The rate for South Africa includes deaths that are not allocated to a specific province and will therefore be higher than the average provincial value. Based on the recorded province of death.

f Stats SA Causes of death 2010.[120] Calculated from 61 800 deaths due to TB (ICD10 A15–A19), plus 856 due to ICD10 U51 (MDR) and 171 due to ICD10 U52 (XDR TB) and Stats SA mid-year population estimates for the relevant year. No adjustment has been made for under-reporting or ill-defined causes. The rate for South Africa includes deaths that are not allocated to a specific province and will therefore be higher than the average provincial value. Based on the recorded province of death.

g Burden of Disease SA 2012.[85] TB not in top 10 leading causes of death for some provinces.

h Stats SA Causes of death 2012.[131] Calculated from deaths due to TB (ICD10 A15–A19), plus ICD10 U51 (MDR) and ICD10 U52 (XDR TB) and Stats SA mid-year population estimates for the relevant year. No adjustment has been made for under-reporting or ill-defined causes. The rate for South Africa includes deaths that are not allocated to a specific province and will therefore be higher than the average provincial value. Based on the recorded province of death.

i Stats SA Causes of death 2014.[117] Includes 779 deaths due to MDR TB and 77 deaths due to XDR TB. Calculated from deaths due to TB (ICD10 A15–A19), plus ICD10 U51 (MDR) and ICD10 U52 (XDR TB) and Stats SA mid-year population estimates for the relevant year. No adjustment has been made for under-reporting or ill-defined causes. The rate for South Africa includes deaths that are not allocated to a specific province and will therefore be higher than the average provincial value. Based on the recorded province of death.

j Stats SA Causes of death 2015.[31] Includes 1115 deaths due to MDR TB and 162 deaths due to XDR TB. Calculated from deaths due to TB (ICD10 A15–A19), plus ICD10 U51 (MDR) and ICD10 U52 (XDR TB) and Stats SA mid-year population estimates for the relevant year. No adjustment has been made for under-reporting or ill-defined causes. The rate for South Africa includes deaths that are not allocated to a specific province and will therefore be higher than the average provincial value. Based on the recorded province of death.

Table 13: TB case-finding indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Incidence (diagnosed cases) of TB – new PTB sm+	2002	TB register	228.1	274.3	188.9	203.4	91.9	130.0	339.4	260.3	430.1	218.7	a
	2005	TB register	255.5	322.0	233.8	299.8	121.6	172.4	395.4	350.9	399.2	267.5	a
	2010	TB register	341.1	320.0	46.5	276.9	185.0	298.6	293.2	310.5	284.4	232.8	a
	2015	TB register	246.4	139.8	74.2	141.7	76.2	119.7	146.8	127.4	195.1	134.8	a
Incidence (diagnosed cases) of TB (ETR.net)	2006	TB register	720.5	819.6	462.3	591.7	284.1	22.7	778.2	791.6	958.8	577.7	a
	2010	TB register	922.3	837.2	113.6	1 161.8	419.8	715.5	892.2	894.4	909.5	718.4	a
	2015	TB register	691.7	574.8	329.9	685.2	300.7	401.6	644.6	528.4	681.4	519.8	a
Incidence of TB (all types) (per 100 000)	1990	Global TB										313.0	b
	1995	Global TB										302.0	b
	2000	Global TB										585.0	b
	2005	Global TB										932.0	b
	2010	Global TB										948.0	b
	2015	Global TB										834.0	c
MDR-TB started on treatment	2007		932	158	497	788	71	148	145	156	439	3 334	d
	2010		927	167	607	1 788	119	298	230	143	1 034	5 313	d
	2015	Global TB										12 527	c
Number of TB cases reported (ETR.net)	1996	TB register										109 328	a
	2002	TB register	48 130	14 221	30 515	52 016	10 098	6 536	5 642	17 612	39 650	224 420	a
	2005	TB register	44 909	20 915	43 990	85 507	13 366	10 746	7 633	27 208	48 193	302 467	a
	2010	TB register	62 029	24 395	56 501	120 421	22 138	25 683	10 252	29 789	49 840	401 048	a
	2015	TB register	46 294	15 883	43 772	73 240	17 000	17 011	7 621	19 565	42 559	282 945	a
Prevalence of multidrug resistance among new TB cases	2001		1.0	1.8	1.4	1.7	2.4	2.6		2.2	0.9		e
	2014	2012–2014 18+ years new cases	1.7	1.8	2.7	1.8	1.4	4.2	1.3	1.9	2.0	2.1	f
Reported cases of MDR-TB	2004	lab diagnosed	379	116	537	583	59	162	168	130	1 085	3 219	d
	2005	lab diagnosed	545	151	676	1 024	40	134	155	203	1 192	4 120	d
	2010	lab diagnosed	1 782	267	934	2 032	126	312	353	158	1 422	7 386	d
	2014	Global TB lab diagnosed										18 734	b
	2015	Global TB lab diagnosed										19 613	c
Reported cases of XDR-TB	2004	lab diagnosed	3	1	5	59			4	1	12	85	d
	2005	lab diagnosed	18	6	14	227	2		10	5	16	298	d
	2010	lab diagnosed	320	7	37	201	6	5	39	14	112	741	d
	2015	Global TB lab diagnosed										1 024	c
Smear positivity (% of PTB cases which are new Sm+)	1996	TB register										45.0	a
	2002	TB register	39.1	67.4	65.6	43.5	73.9	69.6	61.0	64.0	62.2	54.1	a
	2005	TB register	46.9	54.6	62.3	39.2	61.0	57.2	50.6	56.6	43.6	48.7	a
	2010	TB register	42.3	46.8	48.1	27.8	52.8	41.0	35.6	39.8	35.3	38.3	a
	2015	TB register	40.0	29.0	27.0	25.0	30.0	33.0	28.0	28.0	43.0	32.0	a
TB Rifampicin resistance confirmed client rate	2011	2011/12 NHLS Xpert	7.6	5.8	6.1	7.9	7.5	7.9	6.6	8.0	4.7	7.1	g
	2014	2012–2014 18+ years new cases	2.7	3.5	3.6	3.5	3.4	6.0	2.0	3.1	2.9	3.4	f
		2014/15 NHLS Xpert	6.0	5.6	5.7	8.3	4.9	8.6	5.0	5.2	5.2	6.4	g
	2015	2015 NHLS Xpert	5.7	5.5	5.9	7.8	5.2	7.8	5.3	4.8	5.0	6.1	h
XDR-TB started on treatment	2007		171	7	45	170	2	0	11	4	64	474	d
	2010		224	5	30	235	3	6	37	14	61	615	d
	2015	Global TB										730	c

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DoH TB.[132] Based on analysis of patient-level records in ETR.net as received from NDoH.
b Global TB Report 2015.[129]
c Global TB Report 2016.[46]
d MDR Overview 2014.[133]
e MDR TB 2004.[134]
f MDR Survey 2012–2014.[123]
g DHB 2014/15.[135] Percentage of positive TB tests that are RIF resistant (based only on tests done using GeneXpert technology).
h DHB 2015/16.[136] Percentage of positive TB tests that are RIF resistant (based only on tests done using GeneXpert technology).

Table 14: TB case-holding indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
TB cure rate (new sm+)	1996	TB register										54.0	a
	2000	TB register	46.3	54.9	68.1	38.1	48.7	46.7	56.2	47.2	63.4	53.8	a
	2005	TB register	53.7	67.5	66.7	45.2	60.8	51.8	50.1	57.6	71.9	57.6	a
	2010	TB register	67.0	72.7	79.9	71.1	72.6	42.1	70.7	66.4	81.3	69.2	a
	2014	TB register	72.2	75.2	85.1	78.7	76.8	79.8	69.4	76.4	78.7	77.4	a
New smear positive pulmonary TB loss to follow up rate	1996	TB register										18.0	a
	2000	TB register										13.0	a
	2005	TB register	9.0	5.9	6.9	14.7	7.4	10.8	13.1	9.5	11.1	10.4	a
	2010	TB register	7.7	4.8	4.9	7.2	5.9	5.9	6.5	8.8	6.8	6.8	a
	2014	TB register	6.5	5.2	4.8	4.0	4.9	3.8	7.3	5.7	8.8	5.6	a
TB client lost to follow up rate (ETR.net)	2006	TB register	9.6	5.4	7.0	18.0	7.3	7.8	8.7	10.5	11.0	10.9	a
	2010	TB register	8.4	5.4	5.7	7.6	6.6	5.1	6.7	8.9	8.2	7.4	a
	2014	TB register	6.1	6.1	5.8	4.4	5.0	4.5	7.6	6.8	9.5	6.0	a
TB death rate (ETR.net)	2011	TB register	10.8	12.8	6.9	7.5	13.2	8.6	11.7	11.2	4.2	8.6	a
	2014	TB register	7.6	10.7	6.2	5.4	11.2	6.6	7.8	10.1	3.6	6.7	a
TB MDR treatment success rate (EDRWeb)	2013		33.9	41.7	41.1	57.3	53.0	45.2	39.0	60.2	43.5	47.2	b
TB treatment failure (ETR.net)	2011	TB register	1.2	1.6	1.1	1.1	1.5	1.5	2.0	1.1	1.3	1.2	a
	2014	TB register	0.5	0.3	0.1	0.1	0.5	0.2	0.3	0.3	0.5	0.3	a
TB treatment success rate (ETR.net)	2006	TB register	69.3	73.6	73.5	65.5	62.2	61.0	73.5	62.5	77.1	70.0	a
	2010	TB register	71.3	72.0	78.6	73.7	64.5	39.2	73.5	67.2	81.6	70.8	a
	2014	TB register	76.2	78.0	83.4	73.8	71.8	84.0	71.2	70.2	81.8	77.2	a

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DoH TB.[132] Based on analysis of patient-level records in ETR.Net as received from NDoH.

b DoH TB. [132] Based on analysis of patient-level records in EDRWeb as received from NDoH, reported in the DHB 2015/16.

Context	The quantity of available data of the HIV epidemic, both globally and nationally, continues to increase. However, no new antenatal prevalence data have been released since the results of the October 2013 survey were published in January 2016.
New data sources	Nationally, new data have been reported in the: • National Health Laboratory Service data • National Strategic Plan on HIV, STIs and TB 2017–2022 (zero draft) • SANAC NSP Report 2016 • National Burden of Disease Study 1997–2012 • Electronic TB Register (ETR.net) – HIV/TB indicators Internationally, reports of interest include: • UNAIDS Global AIDS Update 2016 • UNAIDS Prevention Gap Report 2016 • UNICEF For Every Child End AIDS Seventh Stocktaking Report 2016 • Global Burden of Disease Study 2015
Key issues and trends	The UNAIDS 90-90-90 targets pose considerable challenges for routine data systems, but have now been incorporated in the draft National Strategic Plan on HIV, TB and STIs 2017–2022. The WHO consolidated strategic information guidelines for HIV in the health sector list 10 key measures that should be tracked in every country. While the data necessary to track some of these are increasingly available from routine sources, others are more difficult, or rely on periodic surveys. Key populations pose particular challenges in the South African context.

The World Health Organization has produced consolidated strategic information guidelines for HIV in the health sector, which list 10 key measures: the number of people living with HIV; domestic funding; coverage of prevention services; number of diagnosed people; HIV care coverage; treatment coverage; treatment retention; viral suppression; AIDS deaths; and new infections.[137] These measures would enable estimates of progress against the 90-90-90 targets, which have been incorporated in the 'zero draft' of the South African National Strategic Plan on HIV, TB and STIs (2017–2022).[122] The most recent UNAIDS update showed that there was a total of 36.7 million people globally living with HIV in 2015, with 2.1 million new HIV infections in that year.[138] Of the prevalent cases, 17.0 million were accessing antiretroviral therapy (ART). The number of AIDS deaths in 2015 was estimated at 1.1 million, down from 1.5 million in 2010. UNAIDS pointed out that the reduction in deaths since 2010 has been greater among adult women (33%) than among adult men (15% decrease), most probably reflecting higher treatment coverage (52% versus 41%). There is renewed focus on key populations, such as sex workers, people who inject drugs, transgender people, prisoners and gay men and other men who have sex with men. UNAIDS reported that more than 20% of new infections in sub-Saharan Africa were in key populations. An example of a response to this reality is the South African National Sex Worker HIV Plan 2016 – 2019.[139] Local data also confirm the high incidence in key populations. For example, the Mpumalanga Men's Study conducted in Gert Sibande district showed an incidence of 12.5/100 person years (95% CI: 8.1 to 19.2) among men who have sex with men (MSM).[140] Data from four HIV prevention trials in women in Durban showed that 71% of observed incident HIV infections were associated with younger age, being unmarried and not cohabiting with a stable/regular partner, and being diagnosed with at least one STI.[141] People who inject drugs (PWID) are at higher risk of HIV-hepatitis C co-infection.[142] It was estimated that, globally, there were 2.2 million HIV–HCV co-infections, of which 1.4 million were in PWID. Even without considering the costs of treating co-infections, the financial resources required to implement a test-and-treat approach in sub-Saharan African countries will exceed local capacity.[143]

The Global Burden of Disease Study 2015 has published global, regional, and national incidence, prevalence, and mortality estimates for HIV, for the period 1980–2015.[144] As expected, the GBD estimates vary somewhat from those issued by UNAIDS. GBD 2015 estimated HIV incidence at about 2·6 million per year (range 2·5–2·8 million), and prevalence at 38·8 million (95% UI 37·6–40·4 million) in 2015. HIV-related mortality was estimated at 1·2 million deaths (1·1–1·3 million) in 2015. It was pointed out that the differences between UNAIDS and GBD estimates were greatest in middle-income and high-income countries, "where GBD estimates are based on data from vital registration systems and UNAIDS estimates are based on prevalence in high-risk groups and estimates of the fraction of the population in these groups".

UNAIDS has also pointed out that the number of new HIV infections among adults has remained static since 2010.[145] There are many elements to the 'prevention gap', including incomplete access to pre-exposure prophylaxis, male medical circumcision, and harm reduction interventions aimed at people who inject drugs. Globally, it is estimated that 37–39% of men are circumcised.[146] The estimate for South Africa reported by this study was 44.7%. Data from the first two waves of the National Income Dynamics Study showed that the proportion of adults ever tested for HIV increased from 43.7% to 65.2% between 2010/11 and 2012.[147] However, the data identified persistent problems with reaching men and those less educated. The National HIV Testing Services Policy 2016 identified specific strategies to reach key populations such as MSM, female sex workers, long-distance truck drivers, PWID and prisoners.[148] The policy states that "all healthcare providers should support clients who have self-tested and provide them with counselling as needed after confirmation of diagnosis".

UNICEF's Seventh Stocktaking Report 2016 has emphasised that children under 4 years of age living with HIV are at the highest risk of AIDS-related death of any age group.[149] Only half of the 1.8 million children (aged 0–14 years) living with HIV globally were receiving ART in 2015. As those infected at birth or soon afterwards age, particularly if successfully treated, so the prevalence amongst adolescents is increasing. This is compounded by new infections in the 15–19 year-old group. An estimated 150 000 children (aged 0–14 years) were newly infected with HIV globally in 2015, of which the majority (85%) were in sub-Saharan Africa. UNICEF also emphasised that the majority of new infections in children now occur during breastfeeding. The *District Health Barometer* 2015/16 showed that the national HIV polymerase chain reaction (PCR) testing coverage rate at birth was 67.5%, based on NHLS PCR data and the calculated number of HIV-exposed births.[150] Coverage rates were highest in KwaZulu-Natal (82.7%) and lowest in the Eastern Cape (48.9%). Importantly, the results obtained reflect differences in approach. While 0.74% of PCR tests within the first six days were positive in KwaZulu-Natal, the figure in the Western Cape was 2.4%. However, while KwaZulu-Natal implemented routine birth testing, the Western Cape performed targeted birth testing among high-risk cases during 2015/16, and only implemented routine birth testing in April 2016. These data emphasise how important context and detailed background information can be when interpreting what appear, at first glance, to be consistently gathered indicator data.

While data are collected in the private sector, they are poorly integrated into national HIV indicators. The Council for Medical Schemes Annual Report 2015/16 recorded a total of 24 456 unique beneficiaries on ART with suppressed viral loads (<1000 copies/mL) in 2015.[41] Overall, 30.7 per 1 000 beneficiaries were enrolled on an HIV disease management programme, but it was not clear how many of these were accessing ART. While 13 963 beneficiaries accessed ART for occupational post-exposure prophylaxis purposes, 60 accessed ART after sexual assault. A comparison of treatment outcomes achieved in a cohort of treatment-naïve patients showed that by 12 months post-ART initiation, patients treated at a private clinic in Johannesburg were less likely to have a detectable viral load than those treated at a public sector clinic (adjusted relative risk 0.65; 95% CI 0.49–0.88).[151] However, private sector patients had initiated treatment at higher CD4 counts and with less extensive disease.

Accurate data from vital registration systems would greatly improve monitoring of the outcomes of HIV across the entire population. Individual cause of death data for South Africa for 1997 to 2010 were re-examined, combining the local burden of disease list and 19 other sources identified as potential cause misattributions.[152] Over the entire period, the total number of AIDS deaths was estimated at 2.8 million, which was lower than the model estimates from either UNAIDS or the Global Burden of Disease Study. Importantly, it was estimated that 93% of AIDS deaths were misattributed. Data from longitudinal surveillance systems, such as that maintained at Hlabisa by the Africa Health Research Institute, continue to provide insights into the local epidemic. Data from Hlabisa, for instance, based on 5 205 individuals with HIV who were followed up for 24 031 person-years, showed that of those living, 82% knew their HIV status, 45% were linked to care, 39% were eligible for ART, 35% initiated ART, and 33% were virally suppressed.[153] During the period of surveillance, the eligibility criteria for ART changed a number of times. Modelling exercises, using the Thembisa model, have been used to simulate the impact of different HIV interventions in South Africa.[154] Based on this modelling exercise, adult HIV incidence is expected to decline from 1.4% in 2011–2012 to 0.29% by 2035 (95% CI: 0.10–0.62%). The most important determinants of this decline were the rate of viral suppression after initiating ART, the level of condom use in non-marital relationships, the introduction of intensified risk-reduction counselling for HIV-positive adults, uptake of medical male circumcision, and the introduction of the test-and-treat approach. Details of Thembisa-based provincial models of the HIV epidemic were released by the Centre for Infectious Disease Epidemiology and Research in August 2016.[155] Modelled estimates of progress towards meeting the 90-90-90 targets in each of the provinces have also been reported (Figure 13).

Figure 13: Progress towards the UNAIDS 90-90-90 targets in 2015 by province

Source: Johnson et al. 2016, Modelling the impact of HIV in South Africa's provinces.[155]

Table 15: HIV prevalence and incidence indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
HIV incidence	1990	15–49 years THEMBISA										0.3	a
		female 15–49 years THEMBISA										0.4	a
		male 15–49 years THEMBISA										0.2	a
	2000	15–49 years THEMBISA										2.2	a
	2005	15–49 years SABSSM										2.0	b
		15–49 years THEMBISA										2.0	a
		both sexes all ages SABSSM original	1.7	3.4	3.1	3.8	2.4	4.2	0.5	2.3	0.9	2.7	c
	2008	15–49 years SABSSM										1.3	d
	2010	15–49 years THEMBISA										1.6	a
	2012	15–49 years SABSSM										1.7	e
		15–49 years Spectrum										1.5	f
		15–49 years THEMBISA										1.5	a
		all ages ASSA	0.8	0.7	0.5	1.0	0.5	0.9	0.4	0.8	0.3	0.7	g
		female 15–49 years THEMBISA										1.9	a
		male 15–49 years THEMBISA										1.1	a
	2016	both sexes 15–24 years										1.2	h
		both sexes 15–49 years										1.3	h

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
HIV prevalence (age 15–49)	2002	15–49 years SABSSM	10.2	19.4	20.3	15.7	11.5	21.0	9.6	14.4	13.2	15.6	i
	2005	15–49 years SABSSM	15.5	19.2	15.8	21.9	11.0	23.1	9.0	18.0	3.2	16.2	j
	2008	15–49 years SABSSM	15.2	18.5	15.2	25.8	13.7	23.1	9.0	17.7	5.3	16.9	j
	2012	15–49 years ASSA	17.0	18.5	16.8	22.9	11.3	19.5	10.4	18.8	8.0	17.0	g
		15–49 years mid-year										15.8	k
		15–49 years SABSSM	19.9	20.4	17.8	27.9	13.9	21.8	11.9	20.3	7.8	18.8	e
		15–49 years Spectrum										17.9	l
	2015	15–49 years ASSA	17.3	18.4	16.4	22.8	11.5	19.5	10.4	18.6	8.0	17.0	g
		15–49 years mid-year										16.6	m
	2016	15–49 years mid-year										18.9	n
HIV prevalence (antenatal)	1990	Antenatal Survey	0.4	0.6	0.7	1.6	0.3	0.4	0.2	1.1	0.1	0.7	o
	1995	Antenatal Survey	6.0	11.0	12.0	18.2	4.9	16.2	5.3	8.3	1.7	10.4	o
	2000	Antenatal Survey	20.2	27.9	29.4	36.2	13.2	29.7	11.2	22.9	8.7	24.5	p
	2005	Antenatal Survey	29.5	30.3	32.4	39.1	21.5	34.8	18.5	31.8		30.2	q
		Antenatal Survey									15.7		r
	2010	Antenatal Survey	29.9	30.6	30.4	39.5	21.9	35.1	18.4	29.6	18.5	30.2	s
	2013	Antenatal Survey	31.4	29.8	28.6	40.1	20.3	37.5	17.5	28.2	18.7	29.7	t
HIV prevalence (total population)	1995	both sexes	2.4	4.4	4.8	7.3	1.9	6.5	2.1	3.3	0.7	4.5	u
	1999	both sexes	8.6	13.3	11.7	17.8	7.1	15.8	6.0	12.0	4.3	12.9	u
	2002	both sexes 2–14 years SABSSM	3.4	4.7	5.0	3.9	4.7	3.7	3.8	4.3	7.1	5.6	e
		both sexes 15–24 years SABSSM	9.2	8.7	11.6	7.2	5.6	11.7	11.8	8.3	11.2	9.3	e
		both sexes 25+ years SABSSM	8.1	22.0	18.1	14.9	14.0	21.0	10.6	17.8	11.2	15.5	e
		female SABSSM										12.8	e
		male SABSSM										9.5	e
	2005	both sexes 2–14 years SABSSM	1.2	2.3	2.9	7.9	4.7	5.4	0.6	1.4	0.3	3.3	e
		both sexes 15–24 years SABSSM	11.7	10.3	9.0	16.1	7.4	10.1	6.4	6.6	2.3	10.3	e
		both sexes 25+ years SABSSM	13.8	19.7	14.9	20.5	11.4	24.4	8.0	18.9	2.7	15.6	e
		female SABSSM										13.3	v
		male SABSSM										8.2	v
	2008	both sexes 2–14 years SABSSM	2.1	4.1	2.2	2.8	2.5	3.8	2.3	3.2	1.1	2.5	e
		both sexes 15–24 years SABSSM	6.6	3.8	10.1	15.3	3.9	13.5	3.9	6.3	3.0	8.7	e
		both sexes 25+ years SABSSM	15.6	20.4	14.4	23.5	16.7	24.5	8.6	17.7	5.4	16.8	e
	2012	both sexes 2–14 years SABSSM	1.3	1.7	2.1	4.4	2.8	1.7	1.2	2.2	0.7	2.4	e
		both sexes 15–24 years SABSSM	6.2	4.5	5.8	12.0	3.1	10.0	4.1	8.2	4.4	7.1	e
		both sexes 25+ years SABSSM	22.0	23.7	18.8	30.1	16.3	23.6	12.5	21.1	6.8	19.9	e
		both sexes 50+ years SABSSM	8.5	13.9	6.9	9.8	7.3	10.1	6.1	9.2	1.8	7.6	e
		both sexes all ages SABSSM										12.2	e
		both sexes ASSA	10.8	12.1	11.2	15.1	7.1	12.7	6.8	12.5	5.2	11.1	g
		both sexes mid-year										9.9	k
		female SABSSM										14.4	e
		male SABSSM										9.9	e
	2013	both sexes ASSA	11.0	12.1	11.2	15.2	7.3	12.8	6.9	12.5	5.2	11.2	g
		both sexes mid-year										10.0	k
	2015	both sexes ASSA	11.4	12.3	11.1	15.4	7.5	13.0	7.0	12.6	5.2	11.3	g
		both sexes mid-year										11.2	m
	2016	both sexes mid-year										12.7	n

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a THEMBISA 1.0.[156]

b Rehle et al. 2010.[157] For 2002–2005.

c HIV Household Survey 2005.[158] Population 2 years and older. Since the publication of the survey adjustment procedures for the HIV incidence calculation have been reviewed and new estimates were published in S Afr Med J. 2007;97(3):194–9.

d Rehle et al. 2010.[157] For 2005–2008.

e HIV Household Survey 2012.[159]

f SANAC NSP Report 2014.[160] Mid-2011 to mid-2012.
g ASSA2008.[161]
h SANAC NSP Report 2016.[162]
i HIV Household Survey 2002.[163]
j HIV Household Survey 2008.[164]
k Stats SA MYE 2013.[165]
l Antenatal Survey 2012.[166]
m Stats SA MYE 2015.[26]
n Stats SA MYE 2016.[16]
o Antenatal Survey 2002.[167]
p Antenatal Survey 2000.[168]
q Antenatal Survey 2005.[169]
r Antenatal Survey 2005 WC.[170]
s Antenatal Survey 2010.[171]
t Antenatal Survey 2013.[172]
u SA Uncertain Demographics.[173]
v HIV Household Survey 2005.[158]

Table 16: Other HIV and AIDS indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Antiretroviral coverage	2001	15+ years										1.0	a
		all ages THEMBISA										0.4	b
	2005	15+ years										10.0	a
		all ages THEMBISA										4.4	b
	2008	15+ years	32.4	25.8	43.5	39.4	32.2	31.2	61.1	35.4	71.7	40.2	a
		all ages THEMBISA										18.7	b
	2010	0–14 years Global Report										36.0	c
		all ages Global Report										55.0	c
		all ages THEMBISA										35.7	b
	2015	both sexes 15+ years										48.0	d
		both sexes 15+ years THEMBISA	56.0	59.0	52.0	62.0	56.0	58.0	73.0	51.0	56.0		e
		both sexes all ages GBD										51.0	f
		female 15+ years										53.0	d
		female Pregnant women living with HIV										95.0	d
		male 15+ years										40.0	d
Antiretroviral treatment exposure	2012	all ages SABSSM										31.2	g
		female all ages SABSSM										34.7	g
		male all ages SABSSM										25.7	g
HIV testing coverage	2010	NiDS										43.7	h
	2012	NiDS										65.2	h
HIV testing coverage (including ANC)	2013	2013/14 DHIS	30.5	31.8	15.5	37.5	37.0	27.8	24.1	33.4	9.1	26.1	i
	2014	2014/15 DHIS	36.0	26.2	23.3	39.0	40.8	30.0	29.5	35.2	31.9	32.1	i
	2015	2015/16 DHIS	37.3	31.6	32.6	36.0	39.1	32.4	30.3	29.7	35.3	34.5	i
HIV viral load suppression	2015	both sexes 15+ years THEMBISA	75.0	81.0	81.0	85.0	70.0	70.0	78.0	86.0	86.0		e
	2016											81.0	j
Male circumcision (% of men who are circumcised)	2002	15+ years SABSSM										38.2	k
	2003	SADHS	43.8	70.7	25.2	26.8	47.5	36.3	34.1	32.8	67.5	44.7	l
	2008	0–2 years SABSSM										4.3	m
		15–18 years SABSSM										21.7	m
		15+ years SABSSM										40.6	k
	2012	15+ years SABSSM	74.0	36.0	48.2	23.2	72.6	49.9	20.3	36.7	41.0	46.4	k
		NCS										48.1	n

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Number of patients receiving ART	2004	0–14 years										4 200	o
		female 15+ years										25 600	o
		male 15+ years										17 700	o
		NGO programmes										3 900	o
		private sector										34 100	o
		public sector										9 600	o
		total	5 300	2 200	13 800	12 800	2 000	3 300	400	2 700	5 000	47 500	o
	2005	0–14 years										9 800	o
		female 15+ years										63 600	o
		male 15+ years										37 500	o
		NGO programmes										6 400	o
		private sector										43 800	o
		public sector										60 600	o
		total	12 600	4 900	30 800	30 300	4 800	5 800	1 500	8 800	11 400	110 900	o
	2010	0–14 years										113 000	o
		all ages THEMBISA										1 247 000	p
		female 15+ years										777 000	o
		male 15+ years										396 000	o
		NGO programmes										60 000	o
		private sector										154 000	o
		public sector										1 073 000	o
		total	137 000	66 000	280 000	409 000	101 000	96 000	16 000	96 000	85 000	1 287 000	o
	2015	0–14 years										174 891	d
		15+ years										3 209 270	d
		female Pregnant women										257 456	d
		March 0–14 years DHIS	18 280	9 968	30 219	54 192	12 655	15 118	3 133	11 883	7 913	163 361	i
		March 15+ years DHIS	301 782	158 909	700 357	897 270	219 851	269 866	39 921	179 729	172 856	2 940 541	i
		March all ages DHIS	320 062	168 877	730 576	951 462	232 506	284 984	43 054	191 612	180 769	3 103 902	i
		med schemes										311 534	q
	2016											3 700 000	j
People living with HIV	2005	ASSA	614 858	338 725	1 073 169	1 411 302	327 816	398 949	45 497	463 453	208 213	4 814 291	r
	2010	all ages										6 400 000	j
		ASSA	695 707	348 832	1 207 378	1 550 955	394 221	472 882	74 963	427 023	266 180	5 467 182	r
		Spectrum										5 500 000	s
	2015	0–14 years										240 000	j
		15+ years										6 700 000	j
		all ages										7 000 000	j
		all ages GBD										8 409 550	f
		ASSA	796 634	366 895	1 229 068	1 680 200	461 927	520 480	82 723	451 339	289 915	5 967 061	r
		female Pregnant women										250 000	j
Percentage of deaths due to AIDS	2001	mid-year										40.5	t
	2005	ASSA	33.1	44.7	46.2	48.9	31.3	48.9	20.2	47.2	15.8	40.1	r
		mid-year										47.7	u
	2010	ASSA	26.5	35.0	36.8	38.0	22.5	38.8	18.0	38.7	13.7	31.7	r
		both sexes all ages BoD										35.0	v
		mid-year										34.6	u
	2012	ASSA	26.3	32.1	35.6	37.7	24.7	36.5	20.1	36.5	15.9	31.5	r
		both sexes 0–4 years BoD	21.6	12.0	14.6	25.4	25.1	24.9	20.0	21.4	12.4	20.1	w
		both sexes 5–14 years BoD	42.4	40.8	42.8	66.6	36.4	46.7	28.8	34.1	22.8	50.7	w
		both sexes 15–44 years BoD	43.4	51.3	49.0	59.3	50.4	59.6	46.4	61.4	34.1	51.9	w
		both sexes 45–59 years BoD	26.0	37.2	37.6	35.6	38.1	38.7	30.8	43.0	19.0	34.1	w
		both sexes 60+ years BoD	6.4	12.2	9.4	6.5	8.6	10.3	8.9	11.4	3.6	7.9	w
		both sexes all ages BoD	23.5	30.8	29.1	33.7	28.8	34.6	26.3	35.6	14.9	29.1	w
		female all ages BoD	24.9	31.7	30.0	34.2	31.1	36.6	27.2	37.3	15.1	30.1	w
		male all ages BoD	22.2	30.0	28.3	33.3	26.4	32.8	25.4	34.0	14.7	28.0	w
		mid-year										33.5	u
	2016	mid-year										27.9	x

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Percentage of people living with HIV (PLHIV) who know their status	2015	both sexes 15+ years THEMBISA	85.0	86.0	82.0	88.0	86.0	84.0	85.0	88.0	83.0		e
Percentage of TB cases with known HIV status (ETR.net)	2008	TB register	43.0	38.3	49.1	38.1	37.5	39.8	57.5	0.0	74.1	43.3	y
	2010	TB register	68.8	71.8	72.7	71.9	72.2	73.5	73.4	65.0	89.8	73.5	y
	2015	TB register	95.3	93.0	95.9	94.2	95.4	93.6	93.2	93.7	96.1	94.8	y
TB/HIV co-infected client on ART rate (ETR.Net)	2011	TB register	27.1	49.8	34.1	17.5	31.4	23.1	34.7	29.4	42.6	28.0	y
	2015	TB register	95.7	84.5	84.9	82.2	79.9	90.6	86.6	82.3	75.7	84.5	y

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Adam & Johnson 2009.[174] Estimates of number on ART from public sector programme reports, plus private sector and NGOs = 568 000 (adults + children). Estimated unmet need from Markov model of HIV progression = 760 000 adults. Adults include those 15 years and older.
b THEMBISA 1.0.[156]
c Universal Access 2011.[175]
d UNAIDS Prevention Gap 2016.[145]
e Johnson et al. 2016.[155]
f GBD 2015 HIV.[144]
g HIV Household Survey 2012.[159]
h Maughan-Brown et al. 2015.[176] Proportion of adults having ever received an HIV test. Analysis of the National Income Dynamics Study (NiDS).
i DHIS.[34]
j SANAC NSP Report 2016.[162]
k HIV Household Survey 2012.[159] Self-reported circumcision.
l SADHS 2003.[177]
m HIV Children 2008.[178]
n NCS 2012.[179] Survey sampled men aged 16–55. Among the 5 471 890 men who said they were not circumcised: Almost a million said they definitely intended to get circumcised in the next 12 months. Of those that say they will definitely get circumcised, 80.5% (803 690) intend to have a medical circumcision.
o Johnson 2012.[180] Totals reflect ART enrolment over the 12 months up to the middle of the year. Includes public and private sector estimates.
p SANAC NSP Report 2014.[160] Source provides comparison from variety of sources.
q Medical Schemes 2015–16.[41] Calculated from given number of beneficiaries diagnosed and treated (33.1 per 1 000).
r ASSA2008.[161]
s Antenatal Survey 2011.[181] Modelled from antenatal HIV survey using the Epidemic Projection Package.
t Stats SA MYE 2011.[182]
u Stats SA MYE 2013.[165]
v Burden of Disease SA 2010.[89]
w Burden of Disease SA 2012.[85]
x Stats SA MYE 2016.[16]
y DoH TB.[132] As presented in the *District Health Barometer*.

Table 17: Indicators related to prevention-of-mother-to-child transmission (PMTCT) by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Antenatal client initiated on ART	2013	Oct 2012 – May 2013 all ages	86.1	93.0	93.2	91.0	83.4	83.4	89.0	88.3	95.9	90.3	a
Antenatal client initiated on ART rate	2013	2013/14 DHIS	79.0	80.8	63.1	85.4	78.6	74.2	80.3	79.2	68.5	76.3	b
	2015	2015/16 DHIS	93.9	86.8	92.4	97.6	92.8	95.9	92.2	86.9	77.5	93.0	b
Antenatal client tested for HIV	2013	Oct 2012 – May 2013 all ages PMTCT survey	91.5	94.6	97.3	95.4	95.1	94.3	95.3	97.3	97.0	95.5	c
	2014	2013–2014 female 16+ years SAHMS			97.8	98.4					97.4		d
HIV PCR birth testing coverage	2015	NHLS	48.9	56.7	71.3	82.7	61.1	60.6	61.6	69.1	51.6	67.5	e
Percentage PCR tests positive within 6 days	2015	NHLS	1.4	1.1	1.1	0.7	1.7	1.1	1.3	1.2	2.4	1.1	e
Targeted birth PCR test positive rate	2015	DHIS	1.2	3.6	1.0	0.7	1.6	2.3	2.3	1.2	4.4	1.2	f

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a PMTCT Survey 2012–13.[183] Among self-reported HIV-positive mothers 54.8% received maternal ART during or before pregnancy and 35.5% received maternal and infant ARV prophylaxis.
b DHIS.[34]
c PMTCT Survey 2012–13.[183]
d SAHMS 2013–14.[110] Participants was offered HIV test.
e DHB 2015/16.[136]
f DHIS.[34] Western Cape figures not comparable since they performed targeted birth testing on neonates at high risk of transmission.

Table 18: HIV indicators by population group

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Antiretroviral treatment exposure	2012	all ages SABSSM	30.9					a
HIV incidence	2005	both sexes all ages SABSSM adjusted	1.8				0.2	b
		both sexes all ages SABSSM original	3.4	0.3	0.5	0.3		c
	2012	2+ years SABSSM	1.3					d
HIV prevalence (age 15–49)	2002	15–49 years SABSSM	18.4	6.6	1.8	6.2		e
	2012	15–49 years SABSSM	22.7	4.6	1.0	0.6		d
HIV prevalence (antenatal)	2010	Antenatal Survey	32.5	7.0	7.1	3.0		f
	2011	Antenatal Survey	31.4	7.6	8.8	1.1		f
	2012	Antenatal Survey	31.7	7.5	4.6	2.2		f
	2013	15–49 years Antenatal Survey	32.0	6.8	8.9	2.2		g
HIV prevalence (total population)	2002	both sexes >2 years SABSSM	12.9	6.1	1.6	6.2		a
	2003	both sexes 15–24 years	11.8	3.8	0.9	2.0		h
	2005	both sexes >2 years SABSSM	13.3	1.9	1.6	0.6		c
	2008	both sexes >2 years SABSSM	13.6	1.7	0.3	0.3		i
		both sexes HEAIDS students	5.6	0.8	0.3	0.3		j
	2012	both sexes 15–24 years SABSSM	8.4	1.1	0.8	0.3		d
		both sexes 50+ years SABSSM	11.0	2.1	0.6	0.0		d
		both sexes all ages SABSSM	15.0	3.1	0.8	0.3		d
HIV testing coverage	2010	female NiDS	48.5					k
		male NiDS	34.1					k
	2012	female NiDS	72.2					k
		male NiDS	57.0					k
Male circumcision (% of men who are circumcised)	2003	SADHS	50.4	15.8	18.8	21.7		l
	2008	male HEAIDS	53.0	42.0	48.0	59.0		j
	2012	15+ years SABSSM	52.4	26.4	33.5	23.3		d

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a HIV Household Survey 2012.[159]
b Rehle et al. 2007.[184]
c HIV Household Survey 2005.[158]
d HIV Household Survey 2012.[159]
e HIV Household Survey 2002.[163]
f Antenatal Survey 2012.[166]
g Antenatal Survey 2013.[172]
h HIV Youth 2003.[185]
i HIV Household Survey 2008.[164]
j HEAIDS 2008–9.[186]
k Maughan-Brown et al. 2016.[147]
l SADHS 2003.[177]

Reproductive health

Contraception, sexual behaviour, sexually transmitted infections and termination of pregnancy

Context	Enhanced access to modern methods of contraception is key to achieving a number of the Sustainable Development Goals (SDGs)
New data sources	Nationally, new data have been reported in the: • District Health Information System (DHIS) • National Income Dynamics Study (NiDS) Wave 4 • Stats SA General Household Survey 2015 • Stats SA Community Survey 2016 • Amnesty International. Barriers to Safe and Legal Abortion in South Africa 2017 Internationally, reports of interest include: • United Nations Trends in Contraceptive Use 2015
Key issues and trends	Equitable access to safe termination of pregnancy (abortion) services in South Africa is still constrained, 20 years after the passage of the Choice on Termination of Pregnancy Act, 1996. Like in many countries, the majority of South African women using modern contraceptives have access to only one method, usually an injectable progestogen.

One of the higher-scoring elements included in the Global Burden of Disease health-related SDG index for South Africa was the "proportion of women of reproductive age (15–49 years) who have their need for family planning satisfied with modern methods".[14] Globally, 64% of married or in-union women of reproductive age were using some form of contraception in 2015.[187] July 2016 represented the mid-point of the FP2020 period, four years after the 2012 London Summit.[188] At this point, 300 million women were using modern methods of contraception across the FP2020 focus countries, but this was still short of the trajectory needed to increase the number of such users by 120 million between 2012 and 2020. It has been estimated that meeting 90% of the unmet need for contraception would reduce global births by almost 28 million.[189] This number of avoided pregnancies would also avert 7 000 maternal deaths, 440 000 neonatal deaths, 473 000 child deaths, and 564 000 stillbirths. The 'zero draft' of the National Strategic Plan for HIV, TB and STIs (2017–2022) emphasises access to emergency contraception and termination of pregnancy, but also the need for accessible and comprehensive sexual and reproductive health services.[122]

Adolescent pregnancy is an emotive subject in South Africa. Globally, an estimated 780 000 births occurred in 2016 to mothers younger than 15 years.[190] A Southern Africa Labour and Development Research Unit report noted that the available data pointed to little change in the age at first birth over many decades, despite falling overall fertility in South Africa.[191] As the authors summarised the evidence: teenage mothers only start to use contraception after a first birth. By geo-linking several sets of data (the loveLife Project Monitoring Database, District Health Information System facility data, National Income Dynamics Study (NiDS) data and Census 2001 data), the study showed that, among women who gave birth by 2012, access to a National Adolescent Friendly Clinic Initiative (NAFCI) clinic delayed childbearing by approximately 1.2 years on average. By contrast, routine data from the DHIS have shown a decline in proportion of deliveries that are to women less than 18 years of age.[150]

In early 2017, Amnesty International released a report entitled "Barriers to Safe and Legal Abortion in South Africa".[192] Data provided by the Department of Health showed that only 264 out of 505 designated health facilities were providing first and second trimester termination of pregnancy services. The authors concluded that by "failing to regulate the practice of conscientious objection, and to ensure access to safe abortion information and services", South Africa had failed to fulfil its obligations. These obligations were recently emphasised by the Africa Leaders' Declaration on Safe, Legal Abortion as a Human Right.[e] The Declaration called for increased budget allocation for national sexual and reproductive health programmes, "while rejecting policies and funding that undermine efforts to combat unsafe abortion". Globally, abortion rates have declined since 1990 in developed countries but not in the developing countries.[193] In developed countries, the abortion rate declined from 46 per 1 000 women aged 15–44 years to 19 between 1990–94 and 2010–14, but only from 39 to 37 in developing countries. The total number of abortions was estimated to be 56.3 million per year in the 2010–14 period.

The latest revision to the National Indicator Data Set (NIDS) to be implemented in April 2017 has dropped the indicator 'STI treated new episode incidence' and retained only 'Male urethritis syndrome incidence' in the category 'STI surveillance'.

e https://www.dailymaverick.co.za/opinionista/2017-01-31-sexual-and-reproductive-rights-should-always-be-fought-for/

Table 19: Contraception and sexual behaviour indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Age of first sex under 15 years (% having first had sex at age 14 or younger)	2002	female 15–24 years SABSSM										5.3	a
		male 15–24 years SABSSM										13.1	a
	2003	15–24 years										8.0	b
	2005	15–24 years SABSSM	6.7	7.8	10.2	4.5	10.1	10.1	4.6	12.7	10.4	8.4	a
	2008	15–24 years SABSSM	7.8	9.6	7.8	4.9	11.2	15.0	7.3	8.5	9.3	8.5	a
		NYRBS	14.3	11.0	12.5	13.7	11.1	11.9	15.6	10.2	13.2	12.6	c
	2009	female 16–24 years NCS										5.0	d
		male 16–24 years NCS										14.0	d
	2011	NYRBS	11.7	13.7	16.2	11.4	9.7	11.8	10.9	10.1	10.9	12.0	e
	2012	15–24 years SABSSM	16.8	10.3	9.5	7.6	11.8	7.7	10.1	9.8	14.2	10.7	f
		female 15–24 years SABSSM										5.0	f
		male 15–24 years SABSSM										16.7	f
	2014	2013–2014 female 16+ years SAHMS			6.0	10.2					16.6		g
		<16 years HEAIDS MSM										24.4	h
Cervical cancer screening coverage	2000	DHIS			14.8		0.1	3.2			28.2	6.8	i
	2005	DHIS	0.8	28.5	29.7	20.9	20.4	13.0	26.9	4.0	37.0	21.0	i
	2010	DHIS	36.2	38.1	51.4	58.2	55.9	60.2	37.9	48.4	65.8	52.2	i
	2015	DHIS	57.4	58.1	45.1	72.7	50.1	66.7	34.8	66.1	54.0	56.6	i
Condom use at last sex	1998	female 15–24 years SADHS										16.6	j
	2002	15+ years SABSSM	31.5	35.1	31.6	26.7	27.6	24.2	16.9	26.6	21.3	27.3	a
	2005	15+ years SABSSM	35.8	30.7	37.7	36.3	44.7	36.1	19.1	37.3	22.5	35.4	a
	2008	15+ years SABSSM	47.9	47.4	42.1	47.4	52.6	51.7	30.3	48.0	34.8	45.1	f
		NYRBS	27.1	34.9	35.3	27.3	26.4	32.0	31.6	36.8	38.5	30.7	k
	2011	NYRBS	28.7	35.8	35.0	30.7	30.7	30.9	41.9	42.6	36.2	32.9	l
	2012	15+ years SABSSM	37.9	40.7	35.7	39.6	39.3	39.4	26.9	40.8	24.3	36.2	f
		female 15–24 years SABSSM										49.8	f
		male 15–24 years SABSSM										67.5	f
		NCS overall										60.0	m
	2014	2013–2014 female 16+ years SAHMS			69.5	81.7					49.8		n
		HEAIDS MSM										63.4	o
Couple year protection rate	2000	DHIS	32.1	29.5	18.8	18.7	32.7	24.2	25.5	30.7	30.1	25.3	i
	2005	DHIS	27.5	31.1	23.7	22.9	35.1	23.1	30.6	28.9	39.7	28.0	i
	2010	DHIS	30.4	32.4	26.3	24.2	32.7	33.0	36.0	26.3	58.8	31.6	i
	2015	DHIS	53.5	57.4	42.1	52.1	50.4	38.7	38.3	35.1	58.6	48.2	i
Ever had sex	2002	NYRBS	43.6	47.0	47.0	37.1	42.4	40.7	45.4	35.2	37.8	41.1	p
	2005	15–24 years SABSSM										57.9	q
	2008	NYRBS	41.4	36.9	36.7	37.5	35.6	36.4	32.9	39.4	36.6	37.5	k
	2011	NYRBS	37.1	42.3	36.2	33.7	31.7	42.5	37.3	36.3	39.8	36.3	r
		female NYRBS										28.6	r
		male NYRBS										44.4	r
	2014	HEAIDS MSM										85.0	o
HIV knowledge: correct knowledge about prevention and rejection of major misconceptions	2005	15+ years SABSSM	44.3	33.3	38.1	49.0	51.3	27.9	28.9	22.5	37.8	40.2	a
	2008	15+ years SABSSM	36.0	41.3	32.8	29.5	14.0	18.2	32.1	18.5	34.1	29.0	a
	2012	15+ years SABSSM	25.6	34.7	31.7	24.4	19.3	21.9	28.0	20.8	29.5	26.8	f
		female 15+ years SABSSM										27.3	f
		male 15+ years SABSSM										26.2	f
	2014	2013–2014 female 16+ years SAHMS			32.8	50.8					30.6		g
Male condom distribution coverage	2000	DHIS	6.9	5.2	0.1	6.3	8.3	6.2	3.4	5.1	4.9	4.6	i
	2005	DHIS	10.4	7.0	5.6	7.5	12.4	7.1	5.2	6.2	19.7	9.1	i
	2010	DHIS	14.5	9.9	8.3	8.2	13.6	20.2	9.5	8.3	45.8	14.8	i
	2015	DHIS	54.0	54.0	37.9	54.6	51.2	33.0	20.6	23.8	49.9	44.4	i
Male condoms distributed (thousands)	2002		18 085	35 116	56 645	15 978	18 095	11 802	1 142	18 415	14 294	189 572	s
	2010		69 186	29 853	87 075	72 020	52 116	51 289	15 002	44 492	71 165	492 198	t
	2015	DHIS	111 703	52 544	197 852	184 746	90 557	47 628	8 513	32 185	114 146	839 875	i

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Teenage pregnancy	1998	SADHS ever pregnant	18.2	12.6	9.5	16.7	20.0	25.2	18.0	13.4	16.4	16.4	j
		SADHS mothers	14.8	8.4	8.9	13.8	14.9	18.8	15.2	11.0	13.7	13.2	j
	2002	NYRBS	12.5	15.9	13.3	21.8	29.8	27.1	9.3	17.1	12.0	19.1	p
	2008	female 15–19 years NiDS	13.9	18.9	10.4	19.9	11.2	16.7	13.9	10.1	17.1	14.6	u
		NYRBS ever pregnant	30.9	20.3	19.4	25.8	28.6	24.5	24.2	17.9	15.3	24.4	v
		NYRBS mothers	24.0	17.8	16.0	26.0	30.1	23.2	22.6	11.8	9.1	21.9	v
	2010	female 15–19 years NiDS	11.7	7.7	6.5	13.6	10.6	21.2	16.6	15.7	10.4	11.7	w
	2011	ever pregnant										19.2	x
		NYRBS ever pregnant	18.0	15.7	17.2	32.8	26.4	18.8	24.8	22.4	17.6	22.2	y
		NYRBS mothers	15.4	13.3	11.9	28.2	23.1	15.4	18.4	16.9	13.5	18.3	y
	2012	female 15–19 years NiDS	14.5	7.4	12.0	14.1	10.5	15.2	16.2	10.1	6.7	12.4	z
	2013	14–19 years GHS										5.6	aa
		15–19 years GHS	9.0	8.5	6.5	7.0	9.6	9.1	10.3	10.1	8.1	8.0	aa
	2014	female 14–19 years GHS										5.3	ab
	2015	female 15–19 years NiDS	15.8	9.4	11.6	21.5	11.7	14.7	17.5	12.4	5.5	14.4	ac
	2016	female 15–19 years CS	5.3	2.8	1.7	4.2	4.1	3.8	3.7	3.3	2.3	3.3	ad

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a HIV Household Survey 2008.[164] There is a discrepancy between the graph and table in the source for age group, so this value may be incorrect.
b Kaiser HIV Awareness.[106] Of those who are sexually active.
c NYRBS 2008.[194] Learners in grades 8–11. Of those who have ever had sex.
d NCS 2009.[195] Downloaded 2011–05–26.
e NYRBS 2011.[196] Defined in survey as 'Always used condom during sex' (of those that ever had sex)
f HIV Household Survey 2012.[159]
g SAHMS 2013–14.[110]
h HEAIDS 2014.[197] Among students not identified as MSM – those who report first having had sex at age younger than 13 years.
i DHIS.[34] 2013/14 financial year.
j SADHS 1998.[198] Note that by age 19, the survey found that 35% of all teenagers have been pregnant or have had a child.
k NYRBS 2008.[194] Learners in grades 8–11.
l NYRBS 2011.[196] Of those who ever had sex.
m NCS 2012.[179]
n SAHMS 2013–14.[110] Condom use at last sex with client.
o HEAIDS 2014.[197] 'Ever had sex' was defined in survey as 'Have you ever had sexual intercourse?' Students were mostly in the age range of 17 to 26 years, though some were slightly older.
p NYRBS 2002.[130] Of those learners who had ever had sex
q HIV Household Survey 2005.[158]
r NYRBS 2011.[196]
s LMIS.[199] Logistics Management Information System.
t AHS 2012.[200] Target 1 billion. Funding for the procurement of an additional 500 million condoms to meet the demand generated by the HCT campaign was received late in December 2010 (DoH Annual Report 2010/11).
u NiDS Wave 1 v5.2.[201]
v NYRBS 2008.[194]
w NiDS Wave 2 v2.2.[202] Based on answering 'Yes' to the survey question 'Ever given birth?'
x McHunu et al. 2013.[203]
y NYRBS 2011.[196] Of those who have ever had sex.
z NiDS Wave 3 v1.2.[204] Based on answering 'Yes' to the survey question 'Ever given birth?'
aa Stats SA GHS 2014.[45] Survey asked females whether they were pregnant during the 12 months before the survey (different to the usual definition of ever having been pregnant while aged 15–19).
ab Stats SA GHS 2015.[40]
ac NiDS Wave 4 v1.1.[205]
ad Community Survey 2016.[21]

Table 20: STI indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
STI treated new episode incidence (per 1 000)	2000	DHIS	69.5	66.7	57.5	101.6	95.6	82.7	41.1	71.2	39.5	72.1	a
	2002	DHIS	49.9	51.3	53.9	82.8	82.7	58.4	37.5	60.3	33.9	59.6	a
		STI baseline	66.0	65.0	29.0	87.0	106.0	79.0	50.0	72.0	46.0	65.0	b
	2005	DHIS	54.1	41.4	36.5	71.5	65.0	59.8	35.6	50.8	28.4	50.4	a
	2010	DHIS	43.7	30.5	33.6	64.6	38.3	36.1	23.1	30.1	17.4	39.4	a
	2015	DHIS	37.5	22.0	20.0	57.4	21.2	25.9	15.3	16.3	19.2	29.2	a

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DHIS.[34]
b STI HIV Baseline Survey.[206]

Table 21: Termination of pregnancy indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
ToP rate	2005	DHIS	3.7	8.0	0.7	2.9	7.1	1.5	3.3	4.1	2.1	3.4	a
	2008	DHIS	5.6	9.0	6.6	1.8	6.0	3.5	4.4	6.7	12.6	5.7	a
		NYRBS	5.3	4.2	6.7	2.4	7.7	8.1	15.4	5.8	8.1	6.0	b
	2011	DHIS	7.2	7.8	8.3	2.3	6.3	3.3	4.1	8.3	8.8	6.1	a
		NYRBS	6.5	6.1	7.2	5.2	9.1	4.7	2.7	7.8	4.8	6.3	c
	2015	DHIS	8.2	10.8	6.4	4.8	6.9	1.8	5.1	8.1	16.4	7.2	a
ToPs (Terminations of Pregnancy)	1997		2 670	2 527	13 497	1 259	570	1 489	429	218	3 796	26 455	d
	2000		3 264	6 919	15 172	11 592	1 962	3 697	583	2 286	6 697	52 172	d
	2005		10 034	8 890	33 727	12 706	4 357	1 346	1 305	2 336	15 149	89 850	e
	2010	DHIS	8 980	5 595	20 955	5 040	8 342	2 680	1 241	6 444	12 271	71 548	f
	2015	DHIS	12 782	5 621	14 750	12 381	9 864	1 806	1 362	6 666	18 988	84 220	f

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DHIS.[34] ToPs as % of all expected pregnancies in catchment population.
b NYRBS 2008.[194] Learners in grades 8–11. Of those who have ever had sex.
c NYRBS 2011.[196] Learners in grades 8–11. Of those who have ever had sex.
d RRA Barometer Aug 2001.[58] Total calculated from sum of monthly provincial totals and differs from total given in publication which is for years of implementation running from Feb-Jan. Note that provincial and national figures also differ from figures released by the National Department of Health.
e NDoH.
f DHIS.[34]

Table 22: Reproductive health indicators by population group

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Age of first sex under 15 years (% having first had sex at age 14 or younger)	2003	15–24 years	9.0	5.0	5.0	4.0		a
	2008	NYRBS	12.8	13.1	5.2	8.4	16.1	b
	2011	NYRBS	12.2	11.0	4.6	9.4	13.2	c
	2012	15–24 years SABSSM	11.1	9.3	4.9	7.5		d
Condom use at last sex	2005	female 15+ years SABSSM	38.1	12.6	10.1	15.2		e
		male 15+ years SABSSM	43.6	22.3	34.5	16.7		e
	2008	NYRBS	30.0	30.7	50.5	43.9	12.9	b
	2011	NYRBS	32.4	40.8	44.5	36.2	37.2	f
	2012	15+ years SABSSM	41.9	18.4	14.4	14.7		d
Ever had sex	2002	NYRBS	43.6	35.7	25.4	25.9		g
	2003	15–24 years	71.0	58.0	43.0	43.0		a
	2005	15–24 years SABSSM	60.6	52.3	32.4	38.3		e
	2008	NYRBS	39.3	32.0	17.1	22.8	39.4	b
	2011	NYRBS	37.3	34.2	23.0	25.9	36.2	h
HIV knowledge: correct knowledge about prevention and rejection of major misconceptions	2012	15+ years SABSSM	23.6	30.3	41.4	43.3		d
Teenage pregnancy	1998	SADHS ever pregnant	17.8	19.3	4.3	2.2		i
	2002	NYRBS	20.8	10.7	27.1	5.8		g
	2008	female 15–19 years NiDS	15.1	19.5	0.0	2.4		j
		NYRBS ever pregnant	24.4	28.7	12.1	8.2	54.8	k
	2010	female 15–19 years NiDS	12.6	10.3	0.0	3.6		l
	2011	NYRBS ever pregnant	22.6	28.2	16.0	8.8	5.5	m
	2012	female 15–19 years NiDS	12.9	10.2	0.0	9.8		n
	2013	15–19 years GHS	8.5	7.9	7.0	3.6		o
ToP rate	2008	NYRBS	5.1	14.6	6.3	8.1	13.6	k
	2011	NYRBS	5.8	12.7	11.8	3.9	0.0	m

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a HIV Youth 2003.[185]
b NYRBS 2008.[194] Learners in grades 8–11.
c NYRBS 2011.[196] Defined in survey as 'Age of initiation < 14 years'.
d HIV Household Survey 2012.[159]
e HIV Household Survey 2005.[158]
f NYRBS 2011.[196] Defined in survey as 'Always used condom during sex' (of those that ever had sex).
g NYRBS 2002.[130]
h NYRBS 2011.[196]
i SADHS 1998.[198]
j NiDS Wave 1 v5.2.[201]

k NYRBS 2008.[194] Learners in grades 8–11. Of those who have ever had sex.
l NiDS Wave 2 v2.2.[202] Based on answering 'Yes' to the survey question 'Ever given birth?'
m NYRBS 2011.[196] Learners in grades 8–11. Of those who have ever had sex.
n NiDS Wave 3 v1.2.[204] Based on answering 'Yes' to the survey question 'Ever given birth?'
o Stats SA GHS 2014.[45] Survey asked females whether they were pregnant during the 12 months before the survey (different to the usual definition of ever having been pregnant while aged 15–19).

Maternal and neonatal health

Context	Sustainable Development Goal (SDG) Target 3.1 is to reduce the global maternal mortality ratio to less than 70 per 100 000 live births by 2030.
New data sources	Nationally, new data have been reported in the: • Rapid Mortality Surveillance Report 2015 • Stats SA Perinatal Deaths 2014 • Council for Medical Schemes Annual Report 2015/16 • Saving Mothers 2014 Report (NCCEMD) • District Health Information System (DHIS) Internationally, reports of interest include: • Lancet Series on Maternal Health 2016 • Global Burden of Disease 2015
Key issues and trends	South Africa can be portrayed as providing ""too little, too late care among the most vulnerable, and too much, too soon care among the wealthy and those in private care". This is evident from survey and routine data, but remarkably difficult to address. The National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD) has estimated that 57.3% of maternal deaths are considered to be potentially preventable.

In September 2016, The Lancet Series on Maternal Health was published, with the evocative strapline: "Every woman, every newborn, everywhere has the right to good quality care".[207] The Series authors noted that maternal deaths had fallen by 44% since 1990, at a global level, but that "in sub-Saharan Africa, a woman's lifetime risk of dying in pregnancy or childbirth remains an appalling 1 in 36 compared with 1 in 4 900 in high-income countries". The 2030 target, stated in Sustainable Development Goal (SDG) Target 3.1 requires a 68% reduction from the current (2015) global figure of 216 deaths from maternal causes per 100 000 live births. This statement from the Lancet Series pithily summarises the situation in South Africa: "too little, too late care among the most vulnerable, and too much, too soon care among the wealthy and those in private care". The Series also highlighted the limitations of current metrics, such as skilled birth attendant coverage, which fail to measure the complexities of service provision.[208]

Also in 2016, the Global Burden of Disease Study 2015 released global, regional, and national estimates of maternal mortality for the period 1990–2015.[209] While noting that only 10 countries had achieved MDG 5, the GBD estimates showed that 122 of 195 countries had already met SDG 3.1. The concerning fact was that 24 countries still had a maternal mortality ratio greater than 400 per 100 000 live births in 2015. The GBD estimates of the maternal mortality ratio for South Africa showed little change over the period under review, from 153.8 in 1990, to 151.5 in 2000 and 157.9 in 2015. However, previous estimates released by the Institute for Health Metrics and Evaluation (IHME) and World Health Organization (WHO) have varied widely (Figure 14).

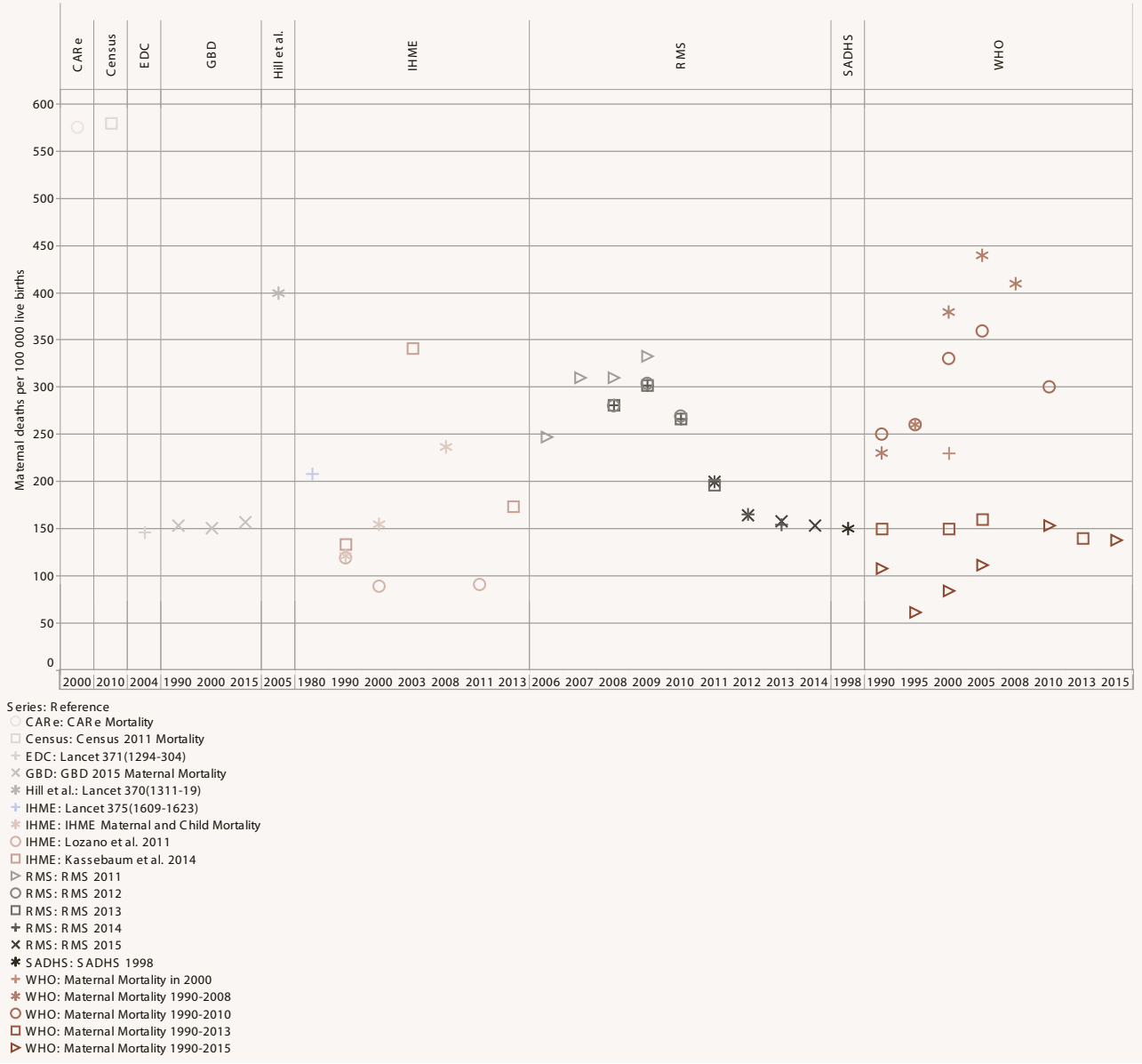
The December 2016 MRC Rapid Mortality Surveillance Report (for 2015) stated, as before, that "estimates of the neonatal mortality rate (NMR) and the maternal mortality ratio (MMR) cannot … be obtained from this source.[82] Based on Stats SA cause of death data, and updated estimates of the number of births the report restated the maternal mortality ratios for 2012 (165 per 100 000 live births), 2013 (158) and 2014 (154). The most recent Saving Mothers report from the National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD) is for 2014.[210] The report noted that the institutional maternal mortality ratio (iMMR) had, compared with the previous time period, decreased in KwaZulu-Natal, Limpopo, Mpumalanga, the Northern Cape and Western Cape, but had remained constant in the Eastern Cape, and increased in the Free State and North West. No finding would be reported for Gauteng, as the data were incomplete. As before, the report noted that non-pregnancy related infections were the most common cause of maternal deaths, dominated by tuberculosis. Nonetheless, 57.3% of maternal deaths were considered to be potentially preventable.

Practical recommendations to address maternal deaths from bleeding associated with Caesarean delivery, of which 71% are possibly or probably avoidable, have been offered.[211] An accompanying editorial pointed to the need to improve access to effective contraception, and in particular to the copper intrauterine contraceptive device (IUCD).[212] Fawcus et al. point to the major disparities between the public (where the Caesarean delivery rate is 23%, but "the majority of CSs are performed for medical indications only, and most are done in district hospitals with limited human resources, skills and other essential resources") and private sectors (where the rate is over 67%, and many are without medical indications, but are "done in well-resourced facilities by skilled surgeons"). The increasing proportion of Caesarean section deliveries in district hospitals is depicted in Figure 16. The Council for Medical Schemes report 2015/16 noted that, in 2015, 667.46 Caesarean deliveries were performed per 1 000 female beneficiaries in 2015.[41]

Estimates of neonatal mortality rate provided in the Rapid Mortality Surveillance report have remained static at around 12 per 1 000 live births between 2012 and 2015.[82] There are considerable challenges in deriving these estimates directly from any of the key sources such as vital registration, the national population register or the DHIS.

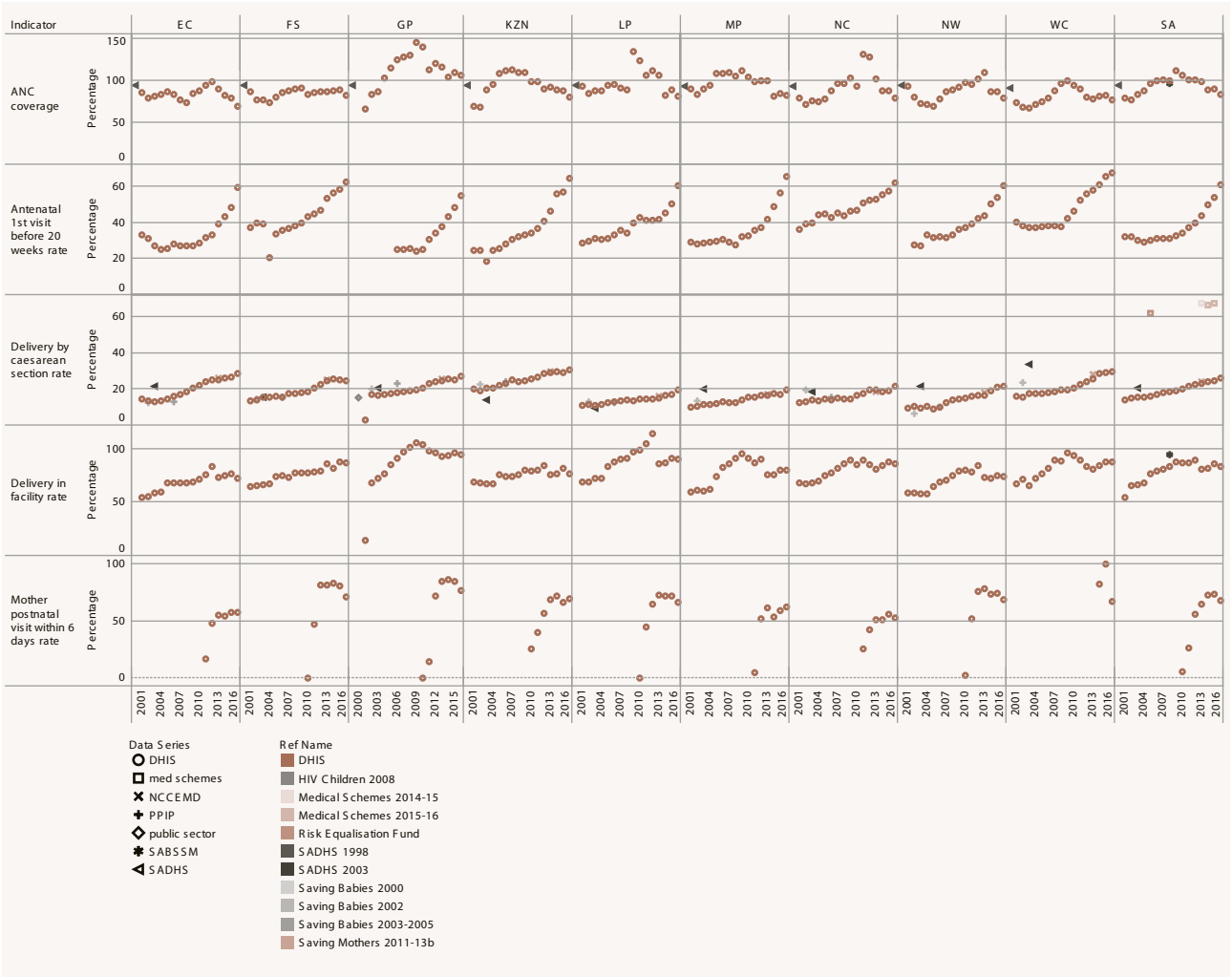
In October 2016, Stats SA released the report on perinatal deaths for 2014, as derived from the civil registration system.[213] A total of 21 908 perinatal deaths were reported in 2014, of which 14 413 (11.8 per 1 000 total births) were stillbirths and 7 485 (6.2 per 1 000 live births) were early neonatal deaths.

Figure 14: Trends in estimates of the Maternal Mortality Ratio by source for South Africa



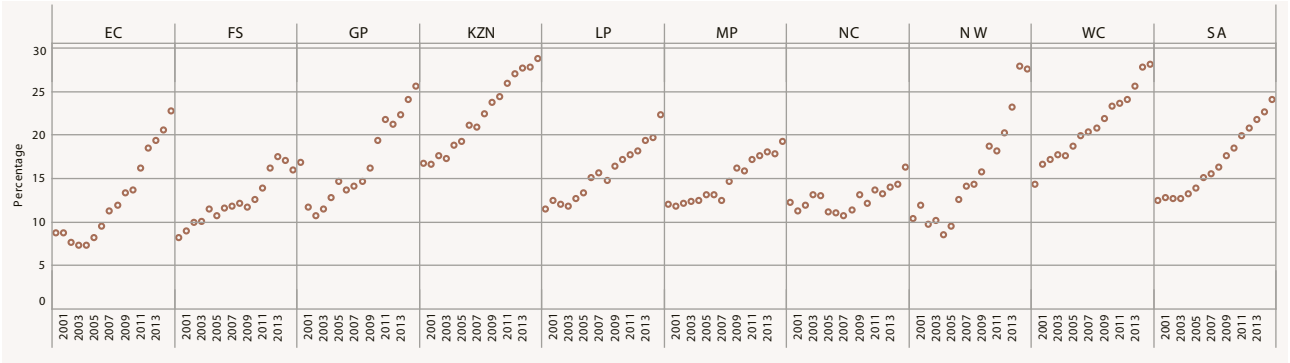
Source: Compiled from multiple sources.

Figure 15: Trends in maternal health service delivery indicators by province, 1998 and 2000/01 to 2015/16



Source: Compiled from multiple sources.

Figure 16: Trends in Caesarean section rate in district hospitals by province, 2000/01 to 2015/16



Source: DHIS.[34]

Table 23: Maternal and neonatal health indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
ANC coverage	1998	SADHS	94.7	94.8	94.8	94.4	94.1	94.0	93.3	94.1	91.7	94.2	a
	2000	DHIS	86.2	87.5	66.1	69.2	93.9	89.8	79.2	93.5	74.3	79.3	b
	2005	DHIS	83.8	86.2	125.1	111.8	96.2	109.2	87.6	78.4	79.1	100.2	b
	2008	SABSSM										97.1	c
	2010	DHIS	94.6	85.6	112.9	99.1	106.3	98.9	131.3	95.9	89.9	100.7	b
	2015	DHIS	69.5	82.6	106.0	80.4	81.8	82.2	79.3	79.0	77.2	84.0	b
Antenatal 1st visit before 20 weeks rate	2000	DHIS	33.3	37.3		25.0	28.7	29.1	36.3		40.3	32.3	d
	2005	DHIS	28.1	36.0	25.4	28.4	33.4	31.0	43.0	32.4	38.6	31.5	d
	2010	DHIS	31.7	45.2	30.6	36.9	41.6	36.0	51.0	39.6	52.7	37.6	d
	2015	DHIS	59.7	62.9	54.9	64.8	60.7	65.9	62.4	60.7	67.7	61.2	d
Delivery by caesarean section rate	2000	DHIS	14.4	13.7	3.2	20.1	10.9	10.0	12.5	9.5	16.3	14.1	d
	2005	DHIS	16.4	15.6	18.3	23.3	12.9	13.0	14.0	10.2	18.4	17.2	d
		med schemes										61.9	e
	2010	DHIS	24.3	20.8	23.0	26.9	14.6	15.8	17.6	16.1	22.9	21.6	d
	2015	DHIS	28.7	25.0	27.5	30.7	19.6	19.6	21.6	21.5	29.7	26.2	d
		med schemes										67.5	f
Delivery in facility rate	2000	DHIS	54.7	64.5	14.2	69.0	69.2	59.4	68.1	58.9	67.2	54.7	d
	2005	DHIS	68.6	75.0	91.6	74.6	87.9	83.1	77.5	69.3	82.0	79.4	d
	2008	2008/09 DHIS	69.2	78.1	106.1	80.6	97.1	95.5	90.1	79.1	96.9	87.7	d
		SABSSM										94.9	c
	2010	DHIS	75.8	78.2	98.5	80.6	104.6	86.8	90.1	78.3	89.9	87.4	d
	2015	DHIS	72.9	87.3	94.9	77.0	90.8	79.9	86.5	74.4	87.6	83.5	d
Inpatient early neonatal death rate	2001	DHIS	14.0	7.9	0.3	12.6	12.9	11.6	13.2	12.2	5.9	9.3	d
	2005	DHIS	15.4	8.8	8.9	8.8	10.9	9.2	8.7	11.9	6.5	9.9	d
	2010	DHIS	13.2	12.4	9.6	9.0	10.7	9.2	12.0	12.8	4.9	10.0	d
	2015	DHIS	12.8	10.6	9.5	10.8	12.6	9.3	14.3	9.8	7.3	10.5	d
Live birth under 2500g in facility rate	2002	PPIP	15.0	18.7	19.2	18.2	13.8	14.1	22.0	14.4	17.6		g
	2005	DHIS	12.6	11.8	13.0	10.9	9.2	5.6	17.3	13.6	3.0	10.5	d
	2010	DHIS	12.6	14.5	13.0	12.0	10.0	9.8	20.0	14.5	16.0	12.7	d
	2015	DHIS	14.0	12.4	13.9	11.9	10.3	12.2	19.4	14.1	14.5	13.0	d
Maternal mortality in facility ratio	2010	DHIS	147.9	237.2	93.8	196.9	142.1	161.1	90.7	204.6		138.5	d
	2011	DHIS	114.9	199.1	123.3	192.2	184.6	135.0	147.7	189.7	28.6	144.9	d
	2015	DHIS	135.2	130.2	107.6	121.1	140.2	125.3	112.5	148.1	69.6	119.1	d
Maternal mortality ratio institutional	1998	NCCEMD	45.9	230.4	102.0	100.1	25.8	111.9	97.0	101.4	47.3		h
	2000	NCCEMD	100.7	219.7	117.1	117.3	82.2	200.3	174.4	179.9	62.4		h
	2005	NCCEMD	140.1	353.8	136.0	152.6	150.5	114.5	291.4	174.2	67.7		h
	2010	NCCEMD	199.5	254.2	148.6	211.5	162.8	213.9	248.2	239.6	92.0	182.8	i
	2014	NCCEMD	174.2	194.4	149.8	127.8	153.3	119.5	120.7	180.1	66.5	140.9	j
Maternal mortality ratio (MMR)	1980	female IHME										208.0	k
	1990	female IHME										134.0	l
		female WHO										108.0	m
		GBD										153.8	n
	1998	female SADHS										150.0	a
	2000	female CARe										575.0	o
		female IHME										89.3	p
		female WHO										85.0	m
		GBD										151.5	n
	2005	female Hill et al.										400.0	q
		female WHO										112.0	m
	2006	female RMS										248.0	r
	2008	female RMS										281.0	s
	2010	female Census										580.0	t
		female RMS										267.0	s
		female WHO										154.0	m
	2014	female RMS										154.0	u
	2015	female WHO										138.0	m
		GBD										157.9	n
Mother postnatal visit within 6 days rate	2009	DHIS		0.1	0.0	25.7	0.3			2.9		5.6	d
	2010	DHIS	17.1	47.4	14.4	40.6	45.3	4.8	25.6	52.3		26.3	d
	2015	DHIS	58.2	71.2	76.9	69.8	66.8	62.6	53.0	69.4	67.8	68.5	d

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Neonatal mortality in facility rate	2000	DHIS	13.8	3.9	1.1	12.8	12.5	12.9	13.6	17.7	6.9	11.4	d
	2005	DHIS	16.1	14.2	9.0	11.1	11.6	9.8	9.3	16.1	6.5	11.3	d
	2010	DHIS	15.1	16.0	11.4	10.4	12.0	10.1	13.5	15.4	5.5	11.6	d
	2015	DHIS	12.1	12.8	12.7	10.9	13.4	9.0	14.5	9.1	8.0	11.3	d
Neonatal mortality rate (NNMR) (deaths <28 days old per 1 000 live births)	1990	IHME										18.0	v
		Inter-agency group										20.0	w
	1995	Inter-agency group										19.4	x
	1998	SADHS	24.7	9.9	17.8	23.2	18.3	23.6	20.5	20.0	4.0	19.8	a
		vital registration adjusted										18.6	y
	2000	both sexes RMS										15.9	r
		IHME										14.0	v
		Inter-agency group										18.7	x
		vital registration adjusted										15.6	y
	2005	both sexes RMS										14.0	r
		Inter-agency group										17.8	x
		vital registration adjusted										13.8	y
	2010	both sexes RMS										13.0	s
		Inter-agency group										16.0	x
		PPIP all levels	17.0			13.5				13.0	8.5		z
	2015	both sexes GBD										18.2	aa
		both sexes RMS										12.0	u
		Inter-agency group										11.0	w
Number of maternal deaths	1990	GBD										1 558.0	n
		IHME										1 403.0	l
		WHO										1 200.0	m
	1995	WHO										670.0	m
	1998	NCCEMD	56.0	94.0	131.0	188.0	27.0	66.0	22.0	58.0	34.0	676.0	ab
	2000	GBD										1 611.0	n
		IHME										1 718.0	v
												982.0	p
		NCCEMD	120.0	96.0	171.0	238.0	88.0	128.0	29.0	115.0	50.0	1 035.0	ac
		WHO										930.0	m
	2005	NCCEMD	149.0	150.0	222.0	268.0	181.0	74.0	53.0	105.0	81.0	1 263.0	h
		WHO										1 300.0	m
	2010	DHIS	172.0	112.0	185.0	365.0	172.0	113.0	19.0	111.0		1 249.0	d
		NCCEMD	232.0	120.0	293.0	385.0	198.0	150.0	52.0	134.0	82.0	1 646.0	ad
		WHO										1 700.0	m
	2014	DHIS	174.0	100.0	236.0	252.0	211.0	90.0	57.0	97.0	53.0	1 270.0	d
		NCCEMD	205.0	88.0	311.0	255.0	195.0	93.0	27.0	104.0	65.0	1 343.0	j
	2015	DHIS	145.0	55.0	218.0	223.0	169.0	91.0	24.0	83.0	66.0	1 074.0	d
		GBD										1 754.0	n
		WHO										1 500.0	m
Perinatal mortality rate (stillbirths plus deaths <8 days old per 1 000 total births)	1998	Stats SA P0309.4 registered										17.0	ae
	2000	DHIS	43.9	37.6	10.4	40.2	33.8	41.3	41.9	42.6	30.4	37.3	d
		Stats SA P0309.4 registered										20.0	ae
	2005	DHIS	43.3	39.4	30.3	35.1	31.1	32.2	31.0	35.3	25.2	33.6	d
		Stats SA P0309.4 registered										20.9	af
	2010	DHIS	35.3	42.8	29.7	31.6	32.3	33.3	39.0	37.6	25.6	32.4	d
		PPIP all levels	37.6	72.9		35.5	37.9			40.5	31.1		z
		Stats SA P0309.4 registered										20.4	af
	2014	DHIS	26.9	33.1	29.4	27.0	31.5	24.5	37.1	26.2	20.9	27.7	d
		Stats SA P0309.4 registered										17.9	af
	2015	DHIS	26.6	34.9	28.9	26.6	31.2	26.1	35.0	25.1	23.0	27.7	d
PM (proportion of deaths among women of reproductive age that are due to maternal causes)	1990	WHO										4.5	m
	1995	WHO										2.0	m
	2000	WHO										1.2	m
	2005	WHO										0.9	m
	2010	WHO										1.5	m
	2015	WHO										1.7	m

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Stillbirth in facility rate	2001	2001/02 DHIS	33.0	34.7	28.5	27.4	21.3	25.5	30.4	28.6	21.2	27.3	d
	2005	2005/06 DHIS	28.4	30.9	21.6	26.6	20.5	23.2	22.4	23.7	18.8	23.9	d
	2010	2010/11 DHIS	22.4	30.9	20.3	22.8	21.9	24.3	27.3	25.2	20.8	22.7	d
	2015	2015/16 DHIS	21.6	27.1	19.5	22.3	20.3	21.8	24.3	22.5	17.5	21.1	d
Stillbirth rate (per 1 000 total births)	1998	Stats SA P0309.4 registered										8.0	ae
	2000	Stats SA P0309.4 registered										13.0	ae
	2005	Stats SA P0309.4 registered										12.2	af
	2010	PPIP all levels	24.2	47.2	20.3		23.3			28.0	22.9		z
		Stats SA P0309.4 registered										12.8	af
	2013	PPIP all levels										23.1	ag
		Stats SA P0309.4 registered										12.4	af
	2014	Stats SA P0309.4 registered										11.8	af
	2015	both sexes GBD										12.5	aa

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SADHS 1998.[198]
b DHIS.[34] Values over 100% are due to underestimation of the population-based denominator.
c HIV Children 2008.[164]
d DHIS.[34]
e Risk Equalisation Fund.[214] Data from the REF Study 2005. Based on data obtained from 4 administrators (Discovery Health, Medscheme, Old Mutual Healthcare and Metropolitan Health Group) who provide services for about 4.2 million lives. Related article published: Rothberg AD, McLeod H. Private Sector Caesareans in Perspective. S Afr Med J, 2005; 95: 257–60."
f Medical Schemes 2015–16.[41]
g Saving Babies 2002.[215]
h Saving Mothers 2005–7.[216]
i Saving Mothers 2012.[217]
j Saving Mothers 2014.[210]
k Lancet 375(1609–1623).[199]
l Kassebaum et al. 2014.[218]
m Maternal Mortality 1990–2015.[219]
n GBD 2015 Maternal Mortality.[209]
o CARe Mortality.[220] The maternal mortality rate appears to be implausibly high at 575 per 100 000 births, however, this is only 6.5% of all deaths in the 15–49 age range which is well within the range of estimates from other sub-Saharan countries. On the other hand the high number could in part be attributable to the fact that a third of these deaths had age imputed, presumably on the basis of the cause of death, which might not have been universally correctly captured.
p Lozano et al. 2011.[221]
q Lancet 370(1311–19).[222]
r RMS 2011.[223]
s RMS 2014.[90]
t Census 2011 Mortality.[22]
u RMS 2015.[82]
v IHME Maternal and Child Mortality.[224]
w Child Mortality 2015 IGME.[225]
x Child Mortality 2013 IGME.[226]
y U5MR 2012.[227]
z NaPeMMCo 2010–11.[228]
aa GBD 2015 Child Health.[229]
ab Saving Mothers 2000.[230]
ac Saving Mothers 2001.[231]
ad Saving Mothers 2008–10.[232]
ae Perinatal deaths 2011–13.[233]
af Perinatal deaths 2014.[213]
ag NaPeMMCo 2010–13.[234]

Child health

Context	As the 2030 Agenda for Sustainable Development is unpacked and implemented, so the need for a more prominent focus on adolescent health has become apparent. Equally, the issue of early childhood development is receiving increased attention, though sensitive indicators of quality and coverage are difficult to find.
New data sources	Nationally, new data have been reported in the: • South African Child Gauge 2016 • Rapid Mortality Surveillance Report 2015 • District Health Information System (DHIS) • Stats SA Community Survey 2016 • Stats SA Causes of death 2014 and 2015 Internationally, reports and data sources of interest include: • Lancet Commission on Adolescent Health and Wellbeing • Global Burden of Disease Study 2015
Key issues and trends	As before, the need for a national, WHO-approved EPI coverage survey is clear, both to academics and health service office-bearers.

Any division by age group risks dividing what should be considered to be linked or logically grouped. For example, the Lancet Commission on Adolescent Health and Well-being noted that the WHO definition included those aged 10–19 years as adolescents, but those aged 15–24 years as youth, and those aged 10–24 years as young people.[235] For the *Review*, neonatal health issues have been covered with maternal health, whereas child and adolescent health, including issues of immunisation, are considered here.

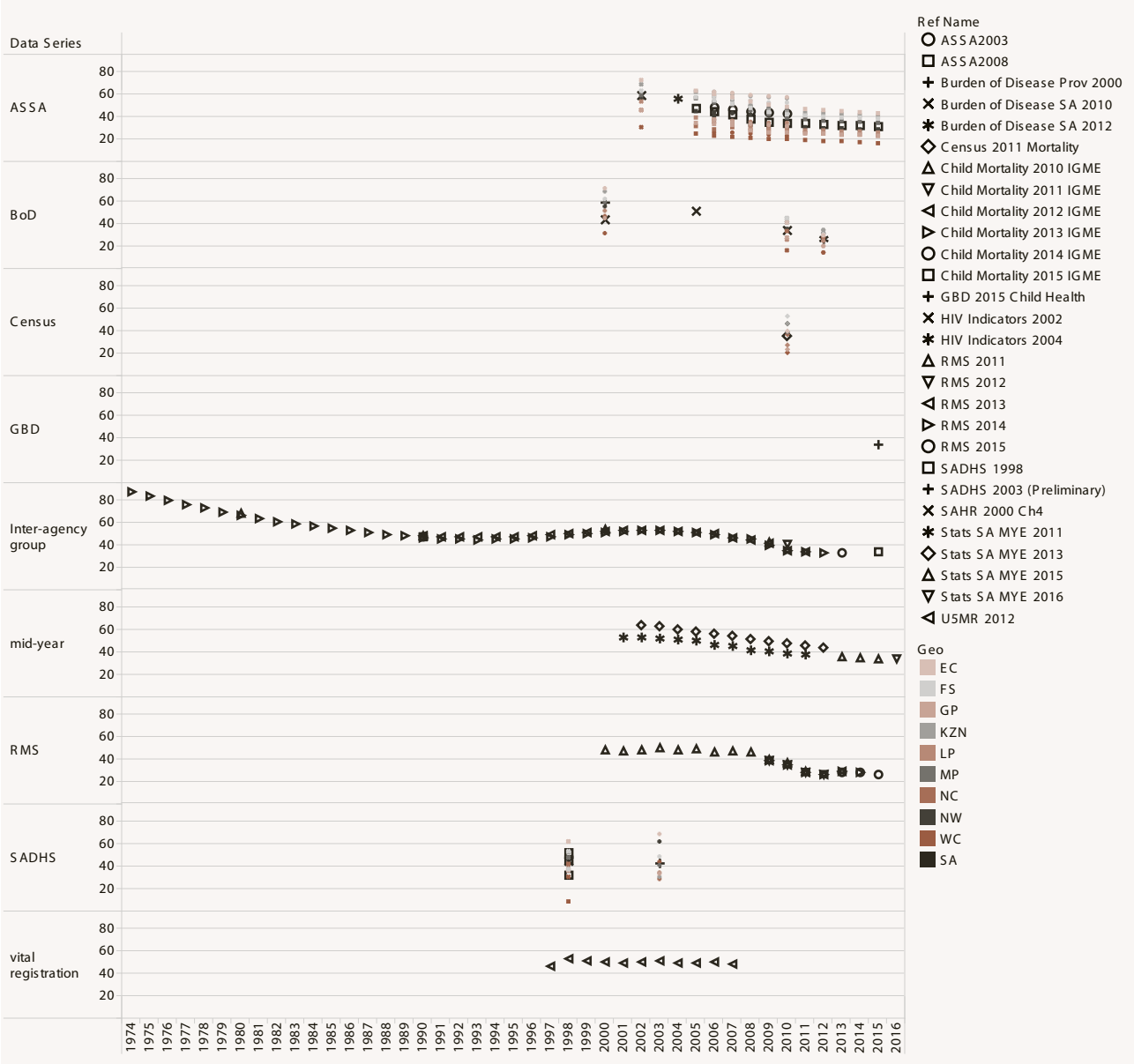
UNICEF's State of the World's Children 2016 is entitled "A fair chance for every child".[236] The report calls for more "equity-focused policy, planning and public spending". An equity focus demands information about who is being 'left behind' and why. Child mortality is falling faster than neonatal mortality, at a global level. Neonatal deaths accounted for 45% of all under-5 deaths in 2000. Of the 5.9 million under-5 deaths in 2015, the most important causes were still communicable diseases, such as pneumonia, diarrhoea, malaria, meningitis, tetanus, measles, sepsis and AIDS. In 2015, almost half of all under-5 deaths occurred in just five countries: the Democratic Republic of the Congo, Ethiopia, India, Nigeria and Pakistan. The key message of the Lancet Commission on Adolescent Health and Well-being is that this age group has been neglected, but is also a key target for the sort of multisectoral and intersectoral action that is needed to advance the 2030 Agenda for Sustainable Development.[237] The Global Burden of Disease 2013 study has provided estimates of the burden of diseases, injuries, and risk factors for young people's health for the period 1990–2013.[238] For those aged 10–14 years, the leading causes of death in 2013 were HIV/AIDS, road injuries, and drowning. In the older age groups, 15–19 years and 20–24 years, the leading cause of death was transport injuries. These age groups are generally neglected in terms of routine data collection, which would allow for finely disaggregated analyses. For example, data on mental health risk in the 10–14-year-old group are lacking.

UNICEF has published an analysis of the progress and disparities among children in South Africa over the past two decades, the exact period over which the *Review* has been published.[239] In 2016, there were 19.7 million children under the age of 18 in South Africa, the majority of whom (55%) were resident in cities and towns. Although noting some progress, the main message of the report is that "stark gaps in opportunity – between rich and poor households, urban and rural communities, Black African and White children – perpetuate intergenerational cycles of deprivation". A similar look back over a period of 20 years – since the inception of the Lund Committee on Child and Family Support in December 1995 – informed the South African Child Gauge 2016.[240] One of the persistent inequalities highlighted in the Child Gauge is in relation to access to Early Childhood Development (ECD). Although a high proportion (91%) of children in the pre-school age group (5–6-year-olds) were recorded as attending some sort of educational institution, representing a 37% increase since 2002, the differences in quality and care are less easily measured. A Department of Social Development audit showed that only 45% of 17 828 ECD sites met the stipulated norms and standards (were fully registered). Of the registered sites, 38% were noted as requiring urgent maintenance.[241] The global picture has been underscored by the Lancet Early Childhood Development Series, which summarised the challenge concisely: "Children's early development requires nurturing care – defined as health, nutrition, security and safety, responsive caregiving, and early learning – provided by parent and family interactions, and supported by an environment that enables these interactions".[242] Data from Africa on the three elements – nutrition, environment, and mother–child interactions – have been reviewed.[243] Not surprisingly, data on the last of these three elements is the most difficult to retrieve. Global, regional, and country level data on two risks for poor development in young children – stunting and poverty – in low- and middle-income countries between 2004 and 2010 have also been reviewed.[244] It was shown, for instance, that the prevalence of children at risk of extreme poverty had declined by more than 20% in six African countries, Angola, Botswana, Cape Verde, Congo Brazzaville, Mauritania, and South Africa. Data from South Africa have shown that even large-scale social support, in the form of the child support grant, has failed to impact on the level of stunting.[245]

Vaccination coverage has long been held up as a sensitive indicator of health systems performance, one that is exquisitely responsive to changes in financing or functioning, as well as indicative of the trust carers and parents have in the health system. Full immunisation coverage (defined by WHO as the percentage of one-year-olds who have received one dose of BCG vaccine, three doses of polio vaccine, three doses of DTP, and one dose of measles vaccine), for instance, is a suggested indicators to track progress on achieving the SDG goal of universal health coverage. WHO's 2016 report is

entitled "State of Inequality: Childhood immunization", and noted that the median level of full immunisation coverage across countries was 68%, with a quarter of countries reporting coverage of less than 50%.[246] The local Expanded Programme on Immunization (EPI) faces considerable challenges, not least a lack of reliable data from a WHO-approved national EPI coverage survey.[247] An attempt to synthesize the available reliable published data on the prevalence, incidence and severity of diarrhoea in children aged under five years in South Africa has exposed the lack of reliable data.[248]

Figure 17: Trends in infant mortality rate for South Africa by source, 1974 to 2016



Source: Compiled from multiple sources.

Table 24: Child health indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Child under 5 years diarrhoea with dehydration incidence	2009	DHIS	15.0	9.9	10.9	41.8	14.9	10.7	16.2	13.4	30.3	21.1	a
	2012	DHIS	9.8	10.6	9.4	14.2	11.3	7.5	12.1	6.8	16.3	11.2	a
	2015	DHIS	10.5	15.8	8.1	10.4	11.2	7.9	8.5	6.4	18.8	10.6	a
Child under 5 years pneumonia incidence	2002	DHIS	98.0	154.0	108.0	523.0	268.0	187.0	226.0	495.0	127.0	241.0	a
	2005	DHIS	10.9	139.1	39.0	134.0	58.0	70.2	111.5	73.2	0.0	66.7	a
	2010	DHIS	61.6	96.1	59.3	147.8	54.6	43.7	104.3	82.8	68.7	83.6	a
	2015	DHIS	25.5	63.0	25.5	74.4	23.6	13.7	26.9	13.5	101.8	43.7	a
Child under 5 years severe acute malnutrition incidence	2000	DHIS	16.5	8.7	11.8	24.0	7.4	1.1	12.5	14.2	5.6	13.1	a
	2005	DHIS	6.9	4.1	3.1	9.9	3.9	6.4	9.0	6.9	2.4	5.9	a
	2010	DHIS	4.9	4.9	3.7	7.1	4.1	3.8	5.1	6.7	2.7	4.9	a
	2015	DHIS	4.6	9.0	3.0	5.3	5.6	2.7	4.1	5.6	2.6	4.5	a
Children living far from their usual health facility	2002	both sexes <18 years GHS	52.7	25.2	16.9	48.2	41.5	34.8	27.9	40.5	10.8	36.4	b
	2005	both sexes <18 years GHS	56.0	26.5	16.2	51.2	51.2	41.7	24.4	43.7	6.9	39.7	b
	2010	both sexes <18 years GHS	42.4	28.6	21.3	44.3	49.2	28.1	33.5	38.9	14.3	36.7	b
	2015	both sexes <18 years GHS	34.1	17.9	8.3	30.8	23.5	23.1	21.7	28.2	8.8	22.1	c
School Grade 1 screening coverage	2013	DHIS	17.1	21.0	32.9	9.4	22.0	14.9	13.9	20.2	0.0	17.2	a
	2014	DHIS	13.4	24.4	31.1	20.7	22.2	12.4	11.3	38.2	36.6	23.2	a
	2015	DHIS	19.0	24.8	37.8	22.1	29.5	13.3	12.9	53.0	52.1	28.9	a

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DHIS.[34]

b Children Count web site.[249] Based on Stats SA GHS for the relevant year. Children are defined as people aged 0 – 17 years.

c Stats SA GHS 2015.[40] Among children under 18 years of age.

Table 25: Orphanhood indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Number of orphans	2005	ASSA maternal/double	193 327	81 210	194 202	343 656	109 202	106 365	14 268	95 359	67 231	1 160 525	a
		GHS double	116 909	66 722	64 475	199 623	55 274	37 395	7 514	60 723	17 718	626 362	b
		GHS maternal	118 254	38 867	40 746	137 379	66 404	39 558	9 720	41 373	20 686	512 987	b
		GHS paternal	561 361	161 261	195 376	527 641	307 974	170 440	26 925	171 914	98 264	2 221 156	b
	2010	ASSA maternal/double	246 962	112 775	317 132	486 793	139 820	158 836	20 105	134 158	88 492	1 668 901	a
		GHS maternal/double	286 000	118 000	167 000	507 000	118 000	147 000	31 000	116 000	52 000	1 543 000	c
	2012	ASSA maternal/double	250 750	115 485	339 861	499 933	144 639	165 717	21 853	138 276	94 271	1 742 924	a
		GHS double	174 000	61 000	95 000	250 000	65 000	65 000	18 000	60 000	24 000	812 000	d
		GHS maternal	99 000	33 000	127 000	156 000	61 000	52 000	17 000	42 000	24 000	611 000	d
		SABSSM maternal/double										1 403 239	e
	2014	ASSA maternal/double	250 321	114 185	349 785	499 334	150 322	167 418	23 450	137 851	99 821	1 774 794	a
		GHS double	121 604	54 496	77 435	197 273	55 253	69 928	14 665	49 702	13 348	653 704	f
		GHS maternal	97 102	28 458	88 314	157 631	56 521	46 364	12 792	41 041	30 459	558 681	f
		GHS paternal	313 938	102 633	254 479	491 085	205 561	182 531	39 182	138 842	92 036	1 820 287	f
Orphanhood	2002	2–18 years SABSSM total										15.6	g
	2005	2–18 years SABSSM total										14.4	g
	2008	2–18 years SABSSM total										19.3	g
		GHS maternal/double	10.4	12.2	4.8	10.6	5.6	9.4	6.7	8.7	3.2	7.9	h
		GHS total	26.6	26.1	14.4	26.7	19.2	22.1	18.9	22.8	10.5	21.0	h
		SABSSM maternal/double	6.0	9.2	7.4	6.2	3.9	8.1	4.4	5.7	4.6	6.2	g
		SABSSM total										16.8	g
	2010	GHS maternal/double	10.7	11.0	5.0	11.9	5.2	10.1	7.3	9.1	2.9	8.4	c
		GHS total	25.8	23.8	14.5	27.3	19.0	21.5	17.4	20.5	9.5	22.6	c
	2012	GHS double	6.4	6.5	2.7	6.2	2.9	4.2	4.4	4.7	1.3	4.4	d
		GHS maternal	3.7	3.5	3.6	3.8	2.8	3.3	4.0	3.3	1.3	3.3	d
		SABSSM maternal/double	8.3	8.9	6.6	10.0	4.9	10.7	6.7	7.5	2.6	7.6	e
	2014	GHS double	4.6	6.0	2.2	4.8	2.5	4.6	3.6	3.9	0.7	3.5	f
		GHS maternal	3.7	3.1	2.5	3.9	2.6	3.0	3.1	3.2	1.6	3.0	f
		GHS paternal	11.9	11.3	7.2	12.1	9.4	12.0	9.6	11.0	4.9	9.9	f
	2015	GHS double	4.8	3.4	2.3	4.2	3.7	4.1	2.6	3.7	0.9	3.4	i
		GHS maternal	4.1	3.6	2.9	3.9	2.3	3.5	3.5	2.6	1.7	3.2	i
		GHS paternal	11.7	12.1	7.8	13.9	10.0	10.0	9.1	9.8	4.0	10.1	i
	2016	both sexes <18 years CS maternal										5.4	j
		both sexes <18 years CS paternal										8.3	j

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a ASSA2008.[161]
b SA Child Gauge 2006.[250] Based on GHS 2005, Statistics South Africa.
c Children Count web site.[249] Based on Stats SA GHS for the applicable year; Stats SA. Children are defined as people aged 0 – 17 years.
d SA Child Gauge 2014.[251] Based on GHS 2012; Stats SA. Children are defined as people aged 0 – 17 years. Population numbers are rounded off to the nearest thousand.
e HIV Household Survey 2012.[159]
f Stats SA GHS 2014.[45] Among children under 18 years of age.
g HIV Children 2008.[164] Among children 0–18 years of age.
h SA Child Gauge 2009/2010.[252]
i Stats SA GHS 2015.[40] Among children under 18 years of age.
j Community Survey 2016.[21]

Table 26: Child mortality and related indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Child mortality (deaths between 1–4 years per 1 000 live births)	1998	SADHS	20.5	19.0	9.3	23.6	15.7	17.3	14.3	14.0	9.0	15.4	a
	2003	SADHS	11.6	21.1	9.4	3.0	10.1	12.3	10.6	15.3	13.6	15.8	b
	2015	both sexes GBD										8.9	c
Infant mortality rate (deaths under 1 year per 1 000 live births)	1980	both sexes Inter-agency group										66.5	d
	1990	both sexes Inter-agency group										47.0	e
	1998	both sexes SADHS revised	61.2	53.0	36.3	52.1	37.2	47.3	41.8	42.0	30.0	45.0	f
		both sexes vital registration adjusted										52.7	g
	2000	both sexes BoD	70.9	61.8	44.4	68.4	51.6	58.9	46.4	55.2	31.7	59.1	h
		both sexes BoD										43.8	i
		both sexes Inter-agency group										51.4	d
		both sexes RMS										48.8	j
		both sexes vital registration adjusted										49.9	g
	2005	both sexes ASSA	62.2	57.2	34.2	61.7	38.6	55.8	31.4	44.4	24.5	47.1	k
		both sexes BoD										51.4	i
		both sexes Inter-agency group										51.0	d
		both sexes mid-year										58.0	l
		both sexes RMS										49.5	j
		both sexes vital registration adjusted										49.5	g
	2010	both sexes ASSA	47.9	41.9	25.2	44.0	28.2	38.9	26.3	30.7	19.7	34.5	k
		both sexes BoD	40.7	44.6	27.5	44.3	25.9	40.5	33.0	35.4	16.5	34.2	i
		both sexes Census	40.3	53.2	23.8	46.8	27.6	39.0	37.0	46.8	20.4	35.0	m
		both sexes Inter-agency group										35.0	d
		both sexes mid-year										47.1	l
		both sexes RMS										35.0	n
	2015	both sexes ASSA	42.8	37.8	22.9	40.3	25.8	34.3	22.9	28.0	16.5	31.3	k
		both sexes GBD										33.9	c
		both sexes Inter-agency group										34.0	e
		both sexes mid-year										34.4	o
		both sexes RMS										27.0	p
	2016	both sexes mid-year										33.7	q
Number of under-5 deaths	1990	IHME										64 200	r
		Inter-agency group										64 000	e
	1997	vital registration										32 490	s
	2000	IHME										41 200	r
		vital registration										39 279	s
	2006	vital registration										64 430	s
	2010	vital registration										48 007	s
	2015	both sexes GBD										42 540	c
		Inter-agency group										42 000	e
		vital registration										31 938	t
Post-neonatal mortality rate (deaths 28–365 days age per 1 000 live births)	1990	IHME										26.0	r
	1998	SADHS	36.5	26.9	18.5	28.9	18.9	23.6	21.3	16.8	4.4	25.6	a
	2000	IHME										16.0	r
	2003	SADHS	56.4	15.1	9.3	7.8	14.2	18.9	10.3	35.0	38.1	27.5	b
	2008	IHME										25.0	r
	2015	both sexes GBD										15.7	d

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Under 5 mortality rate (deaths under 5 years per 1 000 live births)	1970	female GBD										114.6	u
		male GBD										114.6	u
	1980	both sexes Inter-agency group										91.4	d
		female GBD										88.1	u
		male GBD										88.1	u
	1990	both sexes ASSA										66.3	k
		both sexes IHME										58.0	r
		both sexes Inter-agency group										60.0	e
		female GBD										59.6	u
		male GBD										59.6	u
	1995	both sexes ASSA										62.5	k
		both sexes Inter-agency group										59.7	d
	1998	both sexes ASSA										67.5	k
		both sexes Inter-agency group										67.5	d
		both sexes SADHS revised	80.5	72.0	45.3	74.5	52.3	63.7	55.5	56.0	39.0	61.0	f
		both sexes vital registration adjusted										73.4	g
	2000	both sexes ASSA										72.0	k
		both sexes BoD	105.0	99.0	74.6	116.4	80.7	99.8	68.1	88.5	46.3	94.7	h
		both sexes BoD										66.3	i
		both sexes IHME										37.0	r
		both sexes Inter-agency group										75.0	e
		both sexes RMS										70.5	j
		both sexes vital registration adjusted										72.5	g
		female GBD										68.8	u
		male GBD										68.8	u
	2005	both sexes ASSA	89.7	83.9	51.6	91.9	56.7	83.5	44.2	67.8	34.1	69.5	k
		both sexes BoD										77.8	i
		both sexes IHME										55.6	r
		both sexes IHME										69.0	v
		both sexes Inter-agency group										79.1	d
		both sexes mid-year										85.4	l
		both sexes RMS										72.7	j
		both sexes vital registration adjusted										74.6	g
	2010	both sexes ASSA	67.7	60.2	38.0	64.5	40.6	57.7	38.2	45.9	27.4	49.9	k
		both sexes BoD	60.1	65.8	43.2	66.0	41.6	60.0	45.3	54.5	24.9	51.8	i
		both sexes Census										44.0	m
		both sexes IHME										50.9	r
		both sexes Inter-agency group										52.9	d
		both sexes mid-year										65.2	l
		both sexes RMS										52.0	n
		female GBD										50.2	u
		male GBD										50.2	u
	2015	both sexes ASSA	59.6	53.5	33.7	57.8	36.6	49.6	32.2	40.9	23.1	44.8	k
		both sexes GBD										42.2	c
		both sexes Inter-agency group										41.0	e
		both sexes mid-year										45.1	o
		both sexes RMS										37.0	p
	2016	both sexes mid-year										44.4	q

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SADHS 1998.[198]

b SADHS 2003 (Preliminary).[253] The estimates of child mortality rates from the SADHS are considered to be implausibly low (Bradshaw D, Dorrington R. Child mortality in South Africa – we have lost touch. S Afr Med J 2007; 97(8): 582–3).

c GBD 2015 Child Health.[229]

d Child Mortality 2013 IGME.[226] Estimates generated by the UN Inter-agency Group for Child Mortality Estimation (IGME) in 2013.

e Child Mortality 2015 IGME.[225] Estimates generated by the UN Inter-agency Group for Child Mortality Estimation (IGME) in 2015.

f SAHR 2000 Ch4.[254] Comparison of the provincial estimates from different sources revealed that the SADHS 1998 estimates for three provinces required some adjustment.

g U5MR 2012.[227] Calculated by applying the completeness adjustment implied by Darikwa to vital registration data.

h Burden of Disease Prov 2000.[88]

i Burden of Disease SA 2010.[89]

j RMS 2011.[223] The U5MR and IMR in the RMS reports are calculated from VR for the period up to 2009 and from the RMS for the period 2010–2011, once the data have been adjusted for under-registration.

k ASSA2008.[161]
l Stats SA MYE 2013.[165]
m Census 2011 Mortality.[22] This value is acknowledged to be low compared with estimates from other sources.
n RMS 2012.[255]
o Stats SA MYE 2015.[26]
p RMS 2015.[82]
q Stats SA MYE 2016.[16]
r IHME Maternal and Child Mortality.[224]
s Stats SA Causes of death 2013.[30] Data have been updated with late registrations processed in 2014. Not adjusted for under-reporting – completeness of death registration for children uncertain.
t Stats SA Causes of death 2015.[31] Not adjusted for under-reporting – completeness of death registration for children uncertain.
u Global Burden of Disease 2010.[87]
v Murray et al. 2007.[256]

Table 27: Immunisation indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
BCG coverage	2000	DHIS	97.9	80.6	25.8	61.0	84.1	66.6	78.5	85.8	58.2	65.8	a
	2005	DHIS	89.8	86.2	107.1	74.3	96.4	96.1	88.5	84.2	60.2	87.4	a
	2008	DHIS	67.6	93.4	129.9	86.6	103.5	102.7	98.0	84.9	83.9	94.6	a
		SABSSM										85.5	b
	2011	DHIS	92.6	96.9	117.3	91.7	122.5	97.4	94.0	91.1	62.4	98.0	a
		UNICEF/WHO										78.0	c
	2015	2015/16 DHIS	74.7	91.1	113.7	61.5	85.0	77.7	83.8	60.0	83.5	81.8	a
		UNICEF/WHO										69.0	d
DTP3 coverage	2007	DHIS	83.8	91.4	123.1	96.3	106.4	117.2	103.4	91.3	110.3	102.3	a
	2008	DHIS	93.0	94.2	139.3	101.4	115.9	116.9	102.9	97.3	115.8	110.0	a
		SABSSM										62.6	b
	2011	DHIS	85.7	99.6	105.0	105.2	109.0	90.9	100.2	93.5	93.6	99.3	a
		UNICEF/WHO										72.0	c
	2015	DHIS										40.7	a
		UNICEF/WHO										69.0	d
Immunisation coverage of children 12–23 months	1998	SADHS	52.6	67.8	72.4	49.5	74.9	67.2	80.8	60.6	64.2	63.4	e
	2003	SADHS										54.7	f
Immunisation coverage under 1 year	2000	DHIS	68.2	70.4	66.2	72.8	77.8	65.4	66.8	71.1	82.2	71.4	a
	2005	DHIS	76.8	102.2	92.3	72.1	89.6	76.1	89.1	71.8	80.6	81.5	a
	2010	DHIS	69.2	94.3	105.3	77.8	76.9	58.3	85.8	66.5	85.0	80.8	a
	2015	DHIS	86.8	86.2	106.4	85.0	79.2	87.2	83.3	83.2	89.3	89.2	a
Measles 1st dose under 1 year coverage	2000	DHIS	75.8	72.2	67.0	71.8	80.1	67.0	69.0	72.8	84.1	73.2	a
	2005	DHIS	81.1	80.1	94.6	79.2	84.1	81.0	82.3	74.1	87.2	83.5	a
	2008	DHIS	85.7	84.9	112.3	86.2	93.0	89.6	93.3	82.0	104.9	93.2	a
		SABSSM										64.8	b
	2010	DHIS	87.9	87.6	110.9	88.4	100.1	88.6	92.0	86.8	94.2	94.5	a
	2015	DHIS	93.6	105.3	113.0	90.7	102.3	94.3	90.0	86.3	109.5	99.4	a
		UNICEF/WHO										76.0	d
Measles 2nd dose coverage	2007	DHIS	58.6	68.4	82.4	69.5	70.0	72.4	79.7	58.9	81.7	70.7	a
	2010	DHIS	78.1	75.4	91.4	76.8	91.2	74.3	82.5	73.7	78.7	81.3	a
	2015	DHIS	81.1	92.3	92.0	82.6	87.9	78.7	76.9	76.0	86.2	84.8	a
OPV 1st dose coverage	2000	DHIS	95.2	81.1	76.4	82.7	88.5	82.0	81.2	92.0	95.3	85.6	a
	2005	DHIS	94.2	96.3	107.0	96.1	107.8	104.7	94.0	99.0	103.0	100.7	a
	2010	DHIS	84.7	95.1	114.9	101.5	115.0	99.8	88.6	92.3	97.1	101.3	a
	2015	DHIS	79.2	96.3	111.7	89.1	93.4	86.6	94.8	84.2	97.8	93.5	a
PCV 3rd dose coverage	2008	DHIS	1.4					0.1		0.1		0.2	a
	2011	DHIS	70.2	95.5	96.8	87.7	81.5	75.2	87.5	71.5	81.7	83.8	a
		UNICEF/WHO										72.0	c
	2015	DHIS	90.0	95.0	107.3	88.3	89.8	88.2	85.9	84.5	92.9	92.9	a
		UNICEF/WHO										69.0	d
RV 2nd dose coverage	2008	DHIS	2.9					0.1		0.0		0.5	a
	2011	DHIS	67.3	102.1	105.2	94.2	84.3	75.4	93.5	72.9	80.9	87.3	a
		UNICEF/WHO										72.0	c
	2015	DHIS	83.3	99.3	107.9	88.6	92.9	88.2	88.8	85.4	96.2	93.2	a
		UNICEF/WHO										72.0	d

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DHIS.[34] The very low value for DTP3 coverage in 2015/16 does not reflect real changes in coverage but is due to changes in the combined antigens and thus the data elements collected.

b HIV Children 2008.[164] Based on combined analysis of examination of clinic card and recall/history.

c Immunization 2011.[257] Estimates derived by review of available data (including routine service delivery data and surveys), informed and constrained by a set of heuristics.

d Immunization 2016.[258] Estimates derived by review of available data (including routine service delivery data and surveys), informed and constrained by a set of heuristics.

e SADHS 1998.[198] Percentage with health cards seen by interviewer and percentage who have received each vaccine by the time of the survey.

f SADHS 2003.[177] Estimates for several provinces are unreliable due to small sample sizes at this level.

Nutrition

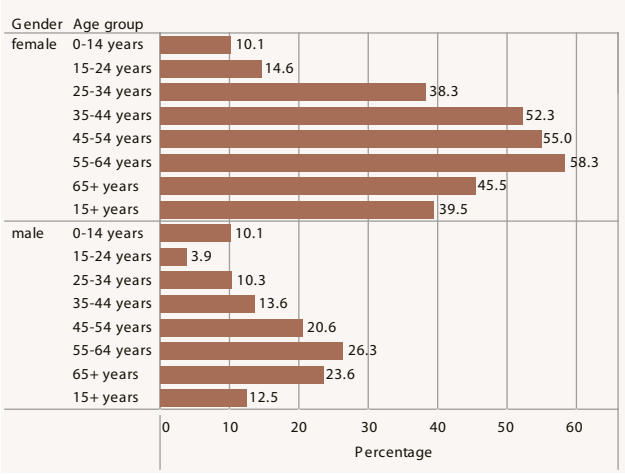
Context	Sustainable Development Goal 2 aims to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture". This demands attention to a range of issues, including poverty, climate action and life on land and below the water. South Africa has to deal with concurrent challenges of stunting and wasting in children, as well as obesity in children, adolescents and adults.
New data sources	Nationally, new data have been reported in the: • National Income Dynamics Study (NiDS) Wave 4 • District Heath Information System (DHIS) Internationally, reports of interest include: • Global Nutrition Report 2016 • Global Report on Diabetes 2016 and Risk Factor Collaboration web site (NCD-RisC) • Global BMI Mortality Collaboration report • WHO estimates of the global burden of foodborne diseases 2007–2015
Key issues and trends	Although the imposition of a new tax on sugar-sweetened beverages has been postponed, intervention of some sort is still likely. As with the policy interventions aimed at limiting salt intake, the intent is to impact positively on obesity and the incidence of non-communicable diseases.

The most recent Global Nutrition Report, issued by the International Food Policy Research Institute in 2016 is entitled "From Promise to Impact: Ending Malnutrition by 2030".[259] The report points out that at least 12 of the 17 Sustainable Development Goals list indicators have relevance for nutrition. The authors are of the opinion that "improved nutrition is the platform for progress in health, education, employment, female empowerment, and poverty and inequality reduction". The reverse is also true – progress in addressing poverty, access to clean water and sanitation, and education, will, among other interventions, be necessary if desired nutritional outcomes are to be achieved. Progress in this regard has hardly been stellar, with some measures (such as the prevalence of obesity) worsening over time. The report also points out that "data gaps are a significant roadblock to nutrition progress throughout the world". South Africa was listed as one of the 20 countries which have to deal with concurrent problems of under-5 stunting, anaemia in women of reproductive age, and adult overweight/obesity. The Global BMI Mortality Collaboration has examined the relationship between body-mass index (BMI) and all-cause mortality, using individual-participant data meta-analyses of 189 prospective studies, involving a total of 3 951 455 participants.[260] The association between both overweight and obesity with higher all-cause mortality was consistently demonstrated across all settings. The same relationship was demonstrated by a meta-analysis of 230 cohort studies.[261] BMI on its own is a poor measure of adiposity, but those who are lean throughout life have the lowest mortality.[262] The NCD Risk Factor Collaboration (NCD-RisC) has shown that global age-standardised mean BMI has increased from 21.7 kg/m^2 in 1975 to 24.2 kg/m^2 in 2014 in men.[263] The corresponding change for women was from a mean of 22.1 kg/m^2 to 24.4 kg/m^2 in women. The authors' conclusion is dire: "If post-2000 trends continue, the probability of meeting the global obesity target is virtually zero". Secondary analysis of data from the South African National Health and Nutrition Examination Survey showed that overweight and obese participants under-estimated their body size and desired to be thinner, but on the other hand, normal- and under-weight participants over-estimated their body size and desired to be fatter.[264]

Though somewhat away from the main focus of nutritional indicators, WHO's Initiative to Estimate the Global Burden of Foodborne Diseases has provided the first global estimates of the incidence, mortality, and disease burden associated with foodborne diseases between 2007 and 2015.[265] On the basis of 31 foodborne hazards (11 diarrhoeal disease agents (1 virus, 7 bacteria, 3 protozoa), 7 invasive infectious disease agents (1 virus, 5 bacteria, 1 protozoan), 10 helminths and 3 chemicals), estimates of 600 million foodborne illnesses and 420 000 deaths were reported in 2010. Of the global burden of 33 million DALYs, 40% were in children under 5.

South Africa has already intervened to reduce salt intake, a policy that has been shown to be cost-effective,[266,267] and is embarking on consultations regarding a tax on sugar-sweetened beverages (SSBs). Baseline data on salt intake were included in the WHO Study on global AGEing and adult health (WHO-SAGE) wave 2 in 2014/15 and a follow-up measure is planned in wave 3, in 2017.[268] Modelling has predicted that a 2.4 % annual growth in SSB sales, together with the effects of population growth and ageing, would result in an additional 1 287 000 obese adults (16% increase) in South Africa by 2017.[269] An industry-sponsored counter-argument has been produced, predicting less health benefits.[270] Although based on only two Eastern Cape districts, an assessment of the National School Nutrition Programme (NSNP) provided important insights.[271] The report points out that the NSNP is "the second largest state investment into alleviating the effects of childhood poverty, after the Child Support Grant". Children from schools that benefitted both from the NSNP and the Tiger Brands Foundation (TBF) nutrition programme showed lower prevalence of stunting than the national average.

Figure 18: Prevalence of obesity in South Africa by sex and age group, 2015



Source: NiDS Wave 4 v1.1.[205]

Table 28: Exclusive breastfeeding rate for South Africa

Indicator	Year	Subgroup	SA	Ref
Exclusive breastfeeding rate	1998	4–6 months SADHS	1.2	a
		<3 months SADHS	10.4	a
		<6 months SADHS	6.8	b
	2003	4–6 months SADHS	1.5	c
		<4 months SADHS	11.9	c
		<6 months SADHS	8.3	d
	2008	<6 months SABSSM	25.7	e
	2010	both sexes 4–8 weeks PMTCT survey HIV-exposed	20.4	f
		both sexes 4–8 weeks PMTCT survey HIV-unexposed	31.3	f
	2013	both sexes 4–8 weeks PMTCT survey	57.5	g
		both sexes 4–8 weeks PMTCT survey HIV-exposed	54.1	h
		both sexes 4–8 weeks PMTCT survey HIV-unexposed	59.2	f

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SADHS 1998.[198]
b SADHS 2003.[177] Quoting SADHS 1998.
c SADHS 2003 (Preliminary).[253]
d SADHS 2003.[177]
e HIV Children 2008.[164]
f PMTCT Survey 2012–13.[183]
g PMTCT Survey 2012–13.[183] Regardless of HIV exposure status.
h PMTCT Survey 2012–13.[183] A significant increase in exclusive breast-feeding was measured in ALL provinces since 2010.

Table 29: Nutrient-related nutrition indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Anaemia prevalence in children	1995		20.6	17.1	16.3	10.4	34.2	27.7	21.5	24.5	28.6	21.4	a
	2005	1–5 years NFCS	30.0	27.6	25.6	21.8	34.4	21.3	5.0	28.2	41.2	28.9	b
	2012	<5 years SANHANES										10.7	c
Anaemia prevalence in women of reproductive age	2012	female 16–35 years SANHANES	19.9	17.6	18.6	35.9		29.5		16.9	16.1	23.1	c
Iodine deficiency	1998	children <100mcg/l urban	9.2	18.9	24.9	6.4	11.7	50.5	10.8	30.2	35.0		d
		schools (comprehensive)	19.0	25.0	18.8	4.2	25.0	58.3	0.0	28.6	7.7	16.2	d
	2005	children NFCS <100mcg/l	28.8	10.8	21.3	11.7	15.8	20.3	0.0	25.2	17.7	19.2	b
Iodised salt consumption	1998	<10mg/kg	24.0	29.0	30.0	24.0	31.0	25.0	15.0	46.0	16.0	25.5	d
Iron deficiency anaemia prevalence	1995		2.4	3.9	3.8	3.5	9.1	7.0	6.5	5.0	8.2	5.0	e
	2005	1–5 years NFCS	8.4	16.1	10.4	11.3	13.8	11.6		8.7	12.0	11.3	b
	2012	<5 years SANHANES										1.9	c
Iron deficiency prevalence	1995		5.0	6.8	9.2	13.4	11.0	11.5	10.9	8.1	16.4	9.8	e
	2005	1–5 years NFCS	10.2	40.3	17.8	18.8	21.2	17.0	12.5	18.8	20.3	19.7	b
	2012	<5 years SANHANES										8.1	c
Vitamin A coverage children 12–59 months	2003	SADHS	57.7	45.8	32.3	42.3	44.6	46.6	49.4	30.2	29.6	39.4	f
	2005	NFCS	33.3	32.6	12.0	27.9	18.1	10.1	26.1	20.0	10.7	20.5	g
Vitamin A deficiency	1995		31.1	26.8	23.5	38.0	43.5	33.0	18.5	32.0	21.0	33.3	e
	2005	1–9 years NFCS	64.2	61.7	65.2	89.1	75.7	52.1	23.0	49.6	43.5	63.6	b
	2012	<5 years SANHANES										43.5	c
Vitamin A dose 12–59 months coverage	2003	DHIS	9.9	21.1	3.7	8.6	11.1	16.4	12.8	6.7	0.0	8.8	h
	2005	DHIS	14.7	29.9	20.5	19.9	20.0	19.1	22.2	18.7	11.1	18.9	h
	2010	DHIS	36.5	39.1	43.7	32.8	30.3	29.1	26.2	27.0	32.3	34.6	h
	2015	DHIS	63.7	58.7	58.8	63.8	50.0	51.4	47.0	52.4	47.3	57.0	h

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SAVACG Survey.[116]
b Food Consumption Survey 2005.[272]
c SANHANES–1.[99]
d Iodine Deficiency 2000.[273]
e SAVACG Survey.[116]
f SADHS 2003.[177] Percentage of children 6–59 months of age reported to have received vitamin A supplements in the 6 months preceding the survey.
g Food Consumption Survey 2005.[272] A further 10.1% nationally were unsure whether Vitamin A supplements were received or not.
h DHIS.[34]

Table 30: Nutrient-related risk factor indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Obesity	1995	female 18+ years NCD-RisC										26.8	a
		male 18+ years NCD-RisC										6.1	a
	1998	female 15+ years SADHS	29.7	29.2	35.6	35.4	20.1	25.8	24.8	18.9	31.2	30.1	b
		male 15+ years SADHS	10.1	8.1	10.2	10.4	6.2	7.5	7.6	5.5	13.1	9.3	b
	2003	female 15+ years SADHS	31.9	26.2	30.1	24.5	21.8	28.0	24.2	24.4	30.3	27.4	c
		male 15+ years SADHS	8.8	8.6	9.7	9.0	4.6	6.0	5.4	4.8	14.5	8.8	c
	2005	female 18+ years NCD-RisC										32.7	a
		male 18+ years NCD-RisC										9.4	a
	2008	both sexes 0–14 years NiDS	15.5	11.6	11.8	10.8	4.7	8.6	5.6	8.5	14.5	10.7	d
		both sexes 15+ years NiDS										25.2	e
		both sexes Grade 8–11 NYRBS	4.0	4.7	9.7	5.4	2.8	6.1	5.0	3.9	5.6	5.3	f
		female 0–14 years NiDS	15.4	16.2	10.9	10.0	3.3	8.6	6.7	11.7	17.3	10.7	d
		female 15+ years NiDS										35.0	e
		male 0–14 years NiDS	15.7	7.8	12.6	11.6	6.2	8.6	4.5	4.9	11.6	10.6	d
		male 15+ years NiDS										12.7	e
	2010	both sexes 0–14 years NiDS	14.4	10.2	10.7	16.1	9.1	10.0	5.2	7.9	15.8	12.5	g
		both sexes 15+ years NiDS										28.5	e
		female 0–14 years NiDS	14.2	10.2	9.7	16.4	7.5	12.2	6.6	8.9	23.6	13.0	g
		female 15+ years NiDS										38.9	e
		male 0–14 years NiDS	14.5	10.2	11.6	15.9	10.8	8.2	3.6	6.6	8.1	12.0	g
		male 15+ years NiDS										16.2	e

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
	2011	both sexes Grade 8–11 NYRBS	12.4	7.1	6.1	6.5	4.0	3.4	4.3	3.8	11.3	6.9	h
		female Grade 8–11 NYRBS										10.0	h
		male Grade 8–11 NYRBS										3.6	h
	2012	2011–2012 female 15+ years Dikgale					27.8						i
		2011–2012 male 15+ years Dikgale					10.6						i
		both sexes 0–14 years NiDS	14.7	11.0	14.4	14.2	9.9	14.0	6.2	12.4	18.8	13.7	j
		both sexes 15+ years NiDS										25.1	e
		female 0–14 years NiDS	14.6	14.3	14.8	11.6	9.9	12.7	7.4	16.2	21.6	13.9	j
		female 2–14 years SANHANES	6.7	4.7	10.0	8.5	4.3	5.5	3.5	4.3	7.2	7.1	k
		female 15+ years NiDS										36.0	e
		female 15+ years SANHANES	41.8	43.0	39.9	44.0	32.6	35.8	38.6	31.7	37.9	39.2	k
		male 0–14 years NiDS	14.8	7.3	13.9	16.7	9.8	15.1	4.8	8.2	16.1	13.6	j
		male 2–14 years SANHANES	3.7	4.1	5.3	6.1	3.3	6.1	3.9	2.7	4.1	4.7	k
		male 15+ years NiDS										12.2	e
		male 15+ years SANHANES	7.2	5.8	12.9	7.9	11.5	13.0	7.2	7.3	16.1	10.6	k
	2015	both sexes 0–14 years NiDS	12.0	9.4	8.8	11.1	5.4	8.9	6.1	5.1	10.2	9.3	l
		both sexes 15+ years NiDS	25.8	29.2	26.7	27.8	23.3	22.3	24.8	22.0	34.5	26.9	l
		female 0–14 years NiDS	13.1	7.5	11.0	12.6	6.6	9.1	4.6	4.0	9.6	10.1	l
		female 15+ years NiDS	38.9	44.1	40.0	41.7	31.9	34.5	37.2	33.9	45.4	39.5	l
		male 0–14 years NiDS	13.1	7.5	11.0	12.6	6.6	9.1	4.6	4.0	9.6	10.1	l
		male 15+ years NiDS	9.9	12.8	13.2	10.3	11.6	8.9	10.9	10.0	21.8	12.5	l
	2016	both sexes 18+ years NCD-RisC										25.6	m
		female 18+ years NCD-RisC										36.0	m
		male 18+ years NCD-RisC										14.6	m
Stunting	1994	6–71 months	28.8	28.7	11.5	15.6	34.2	20.4	22.8	24.7	11.6	22.9	n
	1999	1–9 years NFCS	20.5	29.6	20.4	18.5	23.1	26.4	29.6	24.9	14.5	21.6	o
	2003	<5 years SADHS	28.5	32.9	26.5	13.3	26.6	22.2	37.1	24.0	34.7	27.4	c
	2005	1–9 years NFCS	18.0	28.2	16.8	15.1	23.8	17.8	27.7	15.1	12.0	18.0	p
	2008	both sexes 0–14 years NiDS	25.3	18.4	14.5	17.0	19.5	13.6	21.5	12.1	14.6	17.4	d
		female 0–14 years NiDS	23.7	18.8	12.0	17.5	16.9	12.7	18.9	10.7	13.7	16.2	d
		female Grade 8–11 NYRBS										11.1	f
		both sexes Grade 8–11 NYRBS	17.5	14.7	13.2	11.7	12.8	11.3	19.4	12.3	9.7	13.1	f
		male 0–14 years NiDS	26.9	18.0	16.7	16.6	22.2	14.3	24.1	13.6	15.7	18.5	d
		male Grade 8–11 NYRBS										15.2	f
	2010	both sexes 0–14 years NiDS	26.0	21.1	17.5	25.0	26.4	17.7	19.6	17.8	19.5	22.2	g
		female 0–14 years NiDS	22.6	18.2	17.3	24.2	25.7	16.4	16.4	14.9	20.8	21.1	g
		male 0–14 years NiDS	29.4	24.0	17.6	25.7	27.3	18.7	23.0	21.4	18.1	23.3	g
	2011	female Grade 8–11 NYRBS										11.3	h
		Grade 8–11 NYRBS	19.6	14.4	7.1	12.7	10.9	12.6	19.4	12.1	14.8	12.9	h
		male Grade 8–11 NYRBS										14.7	h
	2012	0–14 years NiDS	21.8	19.6	19.8	21.6	26.4	23.4	22.0	21.3	14.3	21.2	j
		female 0–14 years NiDS	21.2	16.5	17.7	20.5	27.4	18.6	17.9	23.7	14.1	20.1	j
		female 0–14 years SANHANES	15.6	22.1	10.0	14.4	9.4	13.0	15.0	17.8	13.9	13.7	k
		male 0–14 years NiDS	22.3	23.0	22.0	22.8	25.3	27.1	26.5	18.9	14.5	22.3	j
		male 0–14 years SANHANES	21.6	19.4	11.9	13.5	13.7	23.1	22.8	23.7	17.5	16.7	k
	2015	both sexes 0–14 years NiDS	16.4	18.2	10.7	14.3	14.6	10.6	18.6	17.4	8.0	13.3	l
		female 0–14 years NiDS	14.4	14.4	8.5	12.7	12.6	9.9	16.6	15.1	7.4	11.6	l
		male 0–14 years NiDS	18.8	21.9	12.7	15.9	16.8	11.1	20.8	19.6	8.7	15.1	l
Waist-hip ratio (WHR) above cut-off	1998	female SADHS	32.8	28.5	22.2	36.7	34.2	26.8	34.2	41.3	39.6	32.0	b
		male SADHS	5.3	6.5	6.5	10.2	6.8	3.9	5.8	8.9	8.7	7.4	b
	2003	female SADHS	27.6	29.5	27.7	48.8	28.0	22.8	20.3	27.2	34.1	32.0	c
		male SADHS	4.7	3.6	9.3	7.4	4.3	3.2	3.7	3.5	6.8	6.4	c
	2012	female 15+ years SANHANES	46.1	43.1	43.3	50.0	44.7	49.6	46.7	50.9	51.5	47.1	k
		male 15+ years SANHANES	3.9	6.3	6.7	9.0	5.2	5.3	2.7	10.1	8.2	6.8	k

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Wasting	1994	6–71 months	3.2	4.5	1.2	0.7	3.8	2.5	1.7	4.5	1.3	2.6	n
	1999	1–9 years NFCS	1.8	3.4	1.2	4.3	7.5	2.8	9.6	5.7	0.9	3.7	o
	2003	<5 years SADHS	0.8	8.4	4.2	7.5	5.3	6.0	10.0	6.0	6.2	5.2	c
	2005	1–9 years NFCS	4.1	2.8	3.3	1.3	4.4	7.5	19.1	3.2	11.5	4.5	p
	2008	both sexes 0–14 years NiDS	3.4	5.0	7.1	3.4	8.2	5.3	8.9	9.5	5.4	5.6	d
		female 0–14 years NiDS	3.7	2.1	8.6	2.4	7.5	3.0	9.9	10.0	4.8	5.3	d
		female Grade 8–11 NYRBS										2.3	f
		Grade 8–11 NYRBS	4.4	4.4	4.1	1.9	6.8	3.6	10.6	7.8	3.7	4.4	f
		male 0–14 years NiDS	3.1	7.5	5.7	4.5	9.0	7.5	7.8	9.0	6.0	6.0	d
		male Grade 8–11 NYRBS										6.7	f
	2010	both sexes 0–14 years NiDS	4.7	4.9	2.7	4.0	6.6	3.4	10.5	5.3	7.0	4.6	g
		female 0–14 years NiDS	5.7	5.1	2.0	3.3	6.0	1.8	9.1	5.2	4.9	4.1	g
		male 0–14 years NiDS	3.6	4.6	3.2	4.8	7.3	4.8	12.2	5.4	9.1	5.1	g
	2011	female Grade 8–11 NYRBS										1.6	h
		Grade 8–11 NYRBS	1.6	4.6	3.6	2.2	4.9	5.3	10.8	6.0	1.3	3.5	h
		male Grade 8–11 NYRBS										5.5	h
	2012	0–14 years NiDS	4.0	3.2	7.1	4.9	3.3	8.1	9.1	5.5	5.1	5.4	j
		female 0–14 years NiDS	3.7	4.1	6.6	4.3	4.2	9.1	6.9	5.9	4.9	5.3	j
		female 0–14 years SANHANES	3.2	1.4	0.4	-	2.8	1.8	5.1	5.2	1.3	1.7	k
		male 0–14 years NiDS	4.2	2.3	7.5	5.6	2.3	7.3	11.5	5.0	5.3	5.5	j
		male 0–14 years SANHANES	1.6	1.7	3.6	2.4	6.5	2.8	18.5	8.5	2.0	3.8	k
	2015	both sexes 0–14 years NiDS	0.6	3.1	6.2	1.7	3.8	1.7	6.5	4.8	4.6	3.4	l
		female 0–14 years NiDS	0.8	1.1	4.2	2.3	3.5	1.0	6.3	4.0	6.0	3.0	l
		male 0–14 years NiDS	0.4	5.0	7.8	1.1	4.2	2.4	6.7	5.5	2.7	3.9	l

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a NCD-RisC.[274]
b SADHS 1998.[198]
c SADHS 2003.[177]
d NiDS Wave 1 v5.2.[201]
e NCD Trends 2015.[275]
f NYRBS 2008.[194]
g NiDS Wave 2 v2.2.[202]
h NYRBS 2011.[196]
i Maimela et al. 2016.[276] Data representative only of DSS site, not the entire province.
j NiDS Wave 3 v1.2.[204]
k SANHANES–1.[99]
l NiDS Wave 4 v1.1.[205]
m Global Diabetes 2016.[277]
n SAVACG Survey.[116]
o Food Consumption Survey 1999.[278]
p Food Consumption Survey 2005.[272]

Table 31: Nutrition indicators by population group

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Age-standardised mean population intake of salt (sodium chloride) per day in grams	2005		7.8			9.5		a
Anaemia prevalence in women of reproductive age	2012	female 16–35 years SANHANES	24.8	13.2				b
Obesity	1998	female 15+ years SADHS	31.2	28.5	21.3	25.5		c
		male 15+ years SADHS	7.8	9.2	9.0	20.1		c
	2003	female 15+ years SADHS	28.5	26.5	24.8	13.7		d
		male 15+ years SADHS	7.1	14.9	10.9	23.0		d
	2008	both sexes 0–14 years NiDS	10.4	15.4	3.2	10.4		e
		both sexes Grade 8–11 NYRBS	5.0	4.9	7.2	9.7	6.6	f
		female 15+ years NiDS	34.3	39.0	27.3	40.4		g
		male 15+ years NiDS	10.3	18.9	18.9	27.1		g
	2010	both sexes 0–14 years NiDS	13.2	8.5	6.1	8.9		h
		female 15+ years NiDS	38.8	37.9	27.0	45.1		g
		male 15+ years NiDS	13.6	17.6	14.8	41.3		g
	2011	both sexes Grade 8–11 NYRBS	6.7	7.1	7.3	9.0	7.6	i

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
	2012	both sexes 0–14 years NiDS	13.6	10.3	11.7	21.1		j
		female 2–14 years SANHANES	7.3	5.3				b
		female 15+ years NiDS	35.4	34.1	34.8	42.6		g
		female 15+ years SANHANES	39.9	34.9	32.4			b
		male 2–14 years SANHANES	4.8	3.8				b
		male 15+ years NiDS	9.5	14.0	14.2	34.1		g
		male 15+ years SANHANES	9.4	15.1	7.6			b
Stunting	2003	<5 years SADHS	27.0	37.4	13.1	7.0		d
	2008	0–14 years NiDS	17.9	19.7	10.8	7.3		e
		Grade 8–11 NYRBS	13.8	13.6	10.3	4.6	13.1	f
	2010	0–14 years NiDS	23.3	23.1	12.6	4.8		h
	2011	Grade 8–11 NYRBS	13.4	13.9	8.8	3.3	19.7	i
	2012	0-14 years NiDS	22.6	17.8	13.5	4.8		j
		female 0–14 years SANHANES	13.6	16.1				b
		male 0–14 years SANHANES	16.7	18.6				b
Waist-hip ratio (WHR) above cut-off	1998	female SADHS	33.3	36.2	23.2	20.4		c
		male SADHS	6.5	5.2	11.2	14.7		c
	2003	female SADHS	31.9	36.1	33.5	24.0		d
		male SADHS	5.1	8.2	22.1	6.7		d
	2012	female 15+ years SANHANES	45.7	52.9	64.8			b
		male 15+ years SANHANES	5.1	8.4	24.9			b
Wasting	2003	<5 years SADHS	5.0	7.5	9.1	2.2		d
	2008	0–14 years NiDS	5.6	5.6	11.6	4.5		e
		Grade 8–11 NYRBS	4.3	6.6	7.0	1.1	4.6	f
	2010	0–14 years NiDS	4.5	6.6	15.3	0.0		h
	2011	Grade 8–11 NYRBS	3.3	5.5	8.8	1.5	2.1	i
	2012	0–14 years NiDS	5.0	7.1	8.1	7.2		j
		female 0–14 years SANHANES	1.4	4.2				b
		male 0–14 years SANHANES	3.8	4.5				b

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Wentzel-Viljoen et al. 2013.[279]
b SANHANES–1.[99]
c SADHS 1998.[198]
d SADHS 2003.[177]
e NiDS Wave 1 v5.2.[201]
f NYRBS 2008.[194]
g NCD Trends 2015.[275]
h NiDS Wave 2 v2.2.[202]
i NYRBS 2011.[196]
j NiDS Wave 3 v1.2.[204]

Non-communicable diseases

Context	A key challenge in describing and tracking non-communicable diseases is that of multi-morbidity. Many patients with hypertension will develop another cardiovascular disease, for example, and some will also be diagnosed with diabetes mellitus. A smaller proportion, perhaps, will also have asthma, another chronic respiratory condition, or even a mental health problem.
New data sources	Nationally, new data have been reported in the: • National Cancer Registry summary statistics on histologically diagnosed cancer up to 2011 and 2012 • National Income Dynamics Study Wave 4 (2015) • Council for Medical Schemes Annual Report 2015–16 • Council for Medical Schemes Quality of Care in Medical Schemes (for financial years 2014 and 2015) Internationally, reports of interest include: • Global Burden of Disease Study 2015 • Global Report on Diabetes 2016 • NCD Risk Factor Collaboration reports • WHO Depression and Other Common Mental Disorders: Global Health Estimates 2017 • World Alzheimer Report 2016
Key issues and trends	The most important nationally-relevant source of data on NCDs will remain the longitudinal National Income Dynamics Study, wave 4 of which has now been released. The SADHS, currently in process, will validate these results and cover some additional biomarkers, while planning for the next wave of SANHANES is undertaken. While these and other surveys each fill a niche for monitoring NCDs there is an element of duplication, and harmonisation of expensive surveys should be considered.[280]

The "25-by-25" target set by the United Nations in 2011 aims to achieve a 25% reduction in the risk of premature non-communicable disease (NCD) death by 2025. As cardiovascular disease is the largest contributor to global NCD mortality, particular attention has been paid to the risk factors of cardiovascular disease, such as high blood pressure, tobacco use, diabetes mellitus, and obesity.[281] Cardiovascular diseases are responsible for half of all global NCD deaths, with 70% of these occurring in LMICs.[282]

The Global Burden of Diseases, Injuries, and Risk Factors Study 2015 (more commonly known as GBD 2015) has produced estimates of the global burden of hypertension and raised systolic blood pressure for the period 1990–2015.[283] The estimate is that the rate of raised systolic blood pressure (above 110 mmHg) has increased from 73 119 per 100 000 population to 81 373 per 100 000. Using a higher threshold of 140 mmHg or higher, the estimate is of an increase from 17 307 per 100 000 to 20 526 per 100 000. The majority of the estimated deaths associated with raised systolic blood pressure were due to ischaemic heart disease, haemorrhagic stroke and ischaemic stroke. Interestingly, this study did not report on elevated diastolic blood pressure, potentially missing younger patients with elevated risk.[284] Based on 135 population-based studies from 90 countries, and a total of 968 419 adults, a global prevalence of hypertension (defined as average systolic blood pressure ≥140 mmHg, average diastolic blood pressure ≥90 mmHg, or use of antihypertensive medication) of 31.1% of adults has been estimated.[285] Global adult prevalence was estimated to be 28.5% in high-income countries (HICs) and 31.5% in low- and middle-income countries (LMICs). The authors also pointed out that, between 2000 to 2010, the age-standardised prevalence of hypertension decreased by 2.6% in HICs, but increased by 7.7% in LMICs. A larger data set, combining data from 1 479 studies and 19·1 million adult study participants, produced global age-standardised prevalence estimates of raised blood pressure of 24.1% in men and 20.1% in women in 2015.[286] A systematic review and meta-analysis of 33 surveys (110 414 participants) conducted in Africa produced a pooled prevalence of 30%.[287] More importantly, this study showed that only 27% of survey participants were aware of their hypertensive status, only 18% of those with hypertension were receiving treatment, and only 7% had controlled blood pressure. A review of seven population-based cross-sectional studies in nine LMICs in Africa, Asia, and South America, included data for South Africa, reporting an age- and sex-standardised prevalence rate of hypertension among men and women aged 35 to 74 years of 54.9%.[288] Other local studies have shown a prevalence of hypertension of 47.5% in Durban Indians[289] and 41% in residents of the Dikgale Health and Demographic Surveillance Site, Limpopo.[290]

The Global Burden of Disease Study 2013 has provided estimates of the global burden of stroke and the risk factors of stroke in 188 countries, for the period 1990–2013, and specifically the population-attributable fraction (PAF) of stroke-related disability-adjusted life-years (DALYs) associated with potentially modifiable environmental, occupational, behavioural, physiological, and metabolic risk factors.[291] More than 90% of the stroke burden is attributable to modifiable risk factors.

Diabetes prevalence estimates for the WHO Global Report on Diabetes were provided by the NCD Risk Factor Collaboration (NCD-RisC), which has also published a pooled analysis of 751 population-based studies (4.4 million participants) since 1980.[292] Global age-standardised diabetes prevalence was estimated to have increased from 4.3% in 1980 to 9.0% in 2014 in men, and from 5.0% to 7.9% in women. This equates to a global total of 108 million adults with diabetes in 1980, but 422 million in 2014. Based on 12 nationally representative population-based surveys, the median prevalence of diabetes in sub-Saharan Africa has been estimated at 5%.[293] An accompanying editorial questioned the reliability of online survey data characterising the public health response in African countries, and called for enhanced surveillance, not only of the prevalence of diabetes and its complications over

time, but also the degree of coverage by care and prevention services.[294] Within Africa, the highest prevalence of diabetes, in raw number terms is in South Africa, where about 4 million people are estimated to be living with diabetes.[295] Local prevalence studies have reported a crude prevalence of diabetes of 12.5% in KwaZulu-Natal in 2014,[296] a treatment initiation rate of 148.7 per 1 000 000 population in KwaZulu-Natal in 2014,[297] and a prevalence of 20% in Indian residents of Phoenix, Durban.[289]

Multi-morbidity is a consistent feature of NCDs, and of particular importance with an ageing population. A survey of 4 393 attenders at 38 PHC clinics in the Eden and Overberg districts of the Western Cape in 2011 showed that, "of participants with hypertension, diabetes, respiratory disease and depression, 80%, 92%, 88% and 80%, respectively, had at least one of the other three conditions".[298] Using data from the National Income Dynamics Study, multi-morbidity prevalence was shown to have increased from 2.73% to 2.84% in adults between 2008 and 2012.[299] For example, hypertension was found to frequently coexist with diabetes. Spatial analysis of these data identified 'hot spots' of higher multi-morbidity prevalence in KwaZulu-Natal and the Eastern Cape, in areas of socioeconomic disadvantage. Based on population screening in a lower income, informal settlement in Johannesburg, 37.1% of participants could be classified as hypertensive and 8.3% had elevated random capillary glucose levels.[300] Nonetheless, it has been emphasised that there is insufficient evidence to justify population screening for diabetes and hypertension in LMIC settings.[301] WHO AFRO region has published the results of 33 STEPwise approach to non-communicable disease risk factor surveillance (STEPS) country studies and 19 global school-based student health surveys (GSHS).[302] The results showed that "most adults have at least one of the five major risk factors for NCDs: current daily smoker; eating less than five servings of fruits and vegetables per day; a low level of physical activity; being overweight; and having raised blood pressure". Managing multi-morbidity poses serious challenges for health systems that have historically been geared to provide only acute episodic care.[303] The prevalence of risk factors has been described for residents of the Dikgale Health Demographic and Surveillance System (HDSS) Site, Limpopo.[276] There is a significant number of beneficiaries with multiple chronic conditions, for instance 36.2% of ischaemic heart disease (IHD) patients are hypertensive, while 13.8% are diabetic. Effective disease management should therefore provide proper coordination of care amongst providers. Likewise, data from the Council for Medical Schemes has shown the extent of multi-morbidity.[304] For example, in this environment, 36.2% of IHD patients were also hypertensive, while 13.8% were diabetic. The Council for Medical Schemes' report on Quality of Care[304] has proposed a number of process indicators for the management of conditions on the Chronic Disease List (CDL), such as the percentage of beneficiaries receiving a particular laboratory test (e.g. serum creatinine in the case of hypertension) or examination for sequelae (e.g. fundus examination in the case of diabetes). The data for 2014 and 2015 showed low use of such tests (e.g. in 2015, only 3.4% of patients with type 2 diabetes had a fundus examination, only 3.3% of patients with hypertension had a serum creatinine determination performed).

Data from South Africa's Second Burden of Disease study were published in 2016, presenting national trends in age-standardised death rates (ASDRs) for NCDs between 1997 and 2010.[305] The study reported that 38.9% of deaths in 2010 were due to NCDs. The estimated ASDRs were 287 per 100 000 population for cardiovascular diseases, 114 for cancers, 58 for chronic respiratory conditions and 52 for diabetes mellitus. An accompanying editorial identified a number of key information needs, such as improving the completeness of death registration and the quality of cause-of-death information, supporting the national cancer register, and routine population-based surveys to monitor risk factors.[306] Access to quality, affordable healthcare services is key to NCD care. Based on data from the WHO Study on Global AGEing and Adult Health (SAGE), access to chronic care was assessed in China, Ghana, India, Mexico, the Russian Federation and South Africa. Only in South Africa, where free primary health care is guaranteed by law, did poverty not determine access.[307]

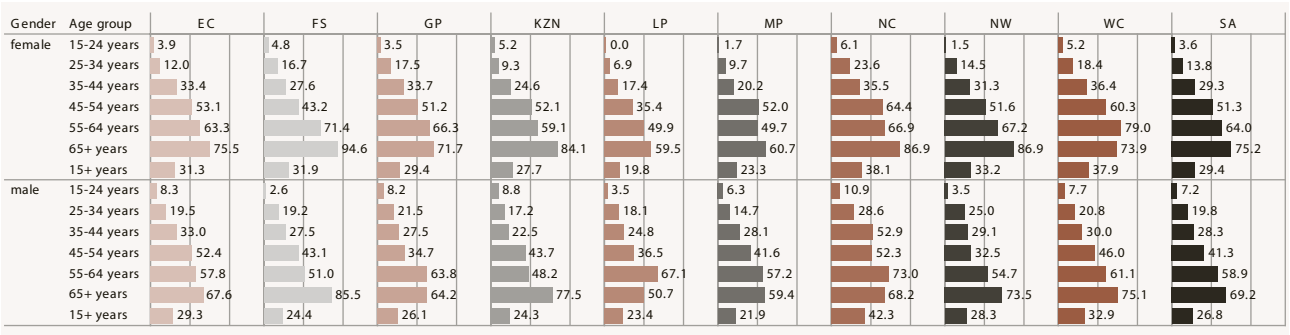
One of the major interventions in cancer prevention has been the introduction of human papillomavirus vaccination for grade 4 girls in public sector schools. Globally, an estimated 118 million women had been vaccinated, but only 1% were from low-income or lower-middle-income countries.[308] Childhood cancer incidence by race, sex and age have been reported from the South African National Cancer Registry for the period 2000–2006.[309] Globally, the GBD 2015 has reported global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 32 cancer groups, for the period 1990 to 2015.[310] A Lancet Series on women's cancer was published in February 2017, describing the global and regional burden of breast and cervical cancer, and trends with regard to incidence, mortality, and survival.[311] Breast cancer is the most common cancer in women, being diagnosed in about 1.7 million every year. Breast cancer is responsible for an estimated 522 000 deaths a year (2012 data) and is the leading cause of cancer deaths in women. In 2012, an estimated 530 000 women were diagnosed with cervical cancer. There are persistent inequities in the outcomes achieved by women with cancer, such as overall survival.[312] Not surprisingly, the authors also highlighted the dearth of data in many settings, noting that "evidence-based policy making for women's cancers needs good quality cancer registration, as well as improvements in collecting health intelligence on cancer care".[313]

Data from the baseline survey of the South African National Health and Nutrition Examination Survey (SANHANES–1) have been used to explore the relationship between the symptoms of mental disorders and diabetes and hypertension.[314] The Programme for Improving Mental Health Care (PRIME) was conducted in five districts in Ethiopia, India, Nepal, South Africa and Uganda, and explored the prevalence and impact of priority maternal mental disorders (perinatal depression, alcohol use disorders during pregnancy and puerperal psychosis).[315] Limited data were accessible at district level, but the need for access to maternal mental health care was demonstrated. In February 2017, the WHO issued country and regional estimates of the burden of depressive disorders and anxiety disorders, drawing on the Global Burden of Disease 2015 data.[316] The estimate was that 4.4% of the global population had depressive disorders, 3.6% had anxiety disorders, and that an unknown proportion had both disorders (multi-morbidity). The estimates for South Africa were 4.6% with depressive disorders and 3.6% with anxiety disorders. Globally, it was estimated that 788 000 people died due to suicide in 2015, accounting for almost 1.5% of all deaths. Suicide was estimated to be the second leading cause

of death among 15–29 year-olds in 2015. The World Alzheimer reports of 2015 and 2016 consider the global impact of dementia and health care coverage.[317,318]

Summary statistics of cancer cases diagnosed histologically have been released up to 2012 by gender and population group for South Africa (Table 36).[319,320] These incidence rates differ from the estimates projected by GLOBOCAN that have been reported previously.[321]

Figure 19: Prevalence of hypertension by province, sex and age group, 2015



Source: NiDS Wave 4 v1.1.[205]

Table 32: Diabetes indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Diabetes incidence	2013	DHIS	2.0	1.7	2.5	1.8	2.7	1.7	3.9	1.2	1.3	2.0	a
	2014	DHIS	1.6	1.1	0.9	1.6	2.6	1.4	3.9	1.0	1.1	1.4	a
	2015	DHIS	1.8	1.1	1.5	2.2	2.5	1.7	1.4	1.6	1.0	1.7	a
Diabetes prevalence	1995	female 18+ years NCD-RisC age-standardised										9.0	b
		female 18+ years NCD-RisC crude										7.1	b
		male 18+ years NCD-RisC age-standardised										6.3	b
		male 18+ years NCD-RisC crude										4.5	b
	2005	female 18+ years NCD-RisC age-standardised										10.8	b
		female 18+ years NCD-RisC crude										9.5	b
		male 18+ years NCD-RisC age-standardised										8.1	b
		male 18+ years NCD-RisC crude										6.1	b
	2012	15+ years SANHANES	8.5	10.1	7.9	10.0	4.6	5.6	21.7	12.5	11.2	9.5	c
	2014	20–79 years Diabetes Atlas										8.4	d
		20–79 years Diabetes Atlas age-standardised										9.4	d
		both sexes 18+ years NCD-RisC										9.8	e
		DHIS public sector				14.3							f
		female 18+ years NCD-RisC age-standardised										12.6	b
		female 18+ years NCD-RisC crude										11.8	b
		male 18+ years NCD-RisC age-standardised										9.7	b
		male 18+ years NCD-RisC crude										7.7	b
	2015	both sexes 20–79 years Diabetes Atlas										7.0	g
		both sexes 20–79 years Diabetes Atlas age-standardised										7.6	g

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Diabetes prevalence (per 1 000)	2000	30–44 years										14.0	h
		30+ years										55.0	h
		45–59 years										87.0	h
		60–69 years										126.0	h
		70–79 years										131.0	h
		80+ years										138.0	h
	2003	female 15+ years SADHS										39.0	i
		male 15+ years SADHS										26.0	i
	2008	med schemes all beneficiaries										16.0	j
	2013	med schemes all beneficiaries										26.9	j
	2015	all ages med schemes all beneficiaries										48.3	k

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DHIS.[34]
b NCD-RisC.[274]
c SANHANES–1.[99]
d Diabetes Atlas 2014.[322] Modelled estimates based on best published studies. Estimated number of cases of diabetes = 2 713 380 of which 1 248 160 estimated to be undiagnosed.
e Global Diabetes 2016.[277] Estimated by the NCD Risk Factor Collaboration (NCD-RisC) – a worldwide network/consortium of public health and medical researchers and practitioners who together work with the World Health Organization to document NCD risk factors and their health effects around the world.
f Sahadew et al. 2016.[296]
g Diabetes Atlas 2015.[323] Estimated number of cases of diabetes = 2 286 000 of which 1 396 800 estimated to be undiagnosed.
h Comparative Risk Assessment.[324] The prevalence of diabetes was estimated as a weighted average of the results from selected studies to represent subpopulations.
i SADHS 2003 (Preliminary).[253]
j Medical Schemes 2014–15.[325] Diagnosed and treated.
k Medical Schemes 2015–16.[41] Diagnosed and treated – Diabetes mellitus type 2.

Table 33: Hypertension indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Hypertension prevalence	1998	female SADHS mod-sev	14.2	15.5	13.1	14.7	6.6	8.5	17.0	16.2	14.2	13.2	a
		male SADHS mod-sev	12.5	14.5	11.7	11.1	6.4	6.2	14.2	11.8	10.9	11.0	a
	2003	female 15+ years SADHS	19.2	23.9	20.7	12.9	11.0	14.8	27.9	18.7	21.4	17.9	b
		male 15+ years SADHS	10.9	11.6	17.3	9.7	5.4	6.2	17.7	11.2	18.3	12.5	b
	2007	both sexes 50+ years SAGE										77.9	c
		female 50+ years SAGE										80.3	c
		male 50+ years SAGE										74.7	c
	2008	both sexes 15+ years NiDS										31.0	d
		female 15+ years NiDS										33.5	d
		male 15+ years NiDS										27.6	d
	2009	2008–2009 both sexes 35–74 years age-standardised										54.9	e
		2008–2009 both sexes 35–74 years crude										55.3	e
		2008–2009 female 35–74 years										56.3	e
		2008–2009 male 35–74 years										53.4	e
	2010	both sexes 15+ years NiDS										30.6	d
		female 15+ years NiDS										33.0	d
		male 15+ years NiDS										27.8	d
	2012	2011–2012 both sexes 15+ years Dikgale					38.9						f
		both sexes 15+ years NiDS	36.3	33.0	31.3	31.1	22.8	23.9	38.6	35.6	38.6	31.8	d
		female 15+ years NiDS										33.5	d
		male 15+ years NiDS										29.8	d
	2015	both sexes 15+ years NiDS	30.3	28.4	27.7	26.2	21.4	22.6	40.1	30.8	35.6	28.2	g
		both sexes 25+ years NiDS	41.2	37.7	34.6	34.6	30.4	30.0	49.2	40.2	43.3	36.6	g
		both sexes 65+ years NiDS	72.6	90.7	68.9	81.8	56.6	60.2	79.5	82.4	74.3	73.0	g
		female 15+ years NiDS	31.3	31.9	29.4	27.7	19.8	23.3	38.1	33.2	37.9	29.4	g
		female 25+ years NiDS	42.3	40.7	37.5	36.4	27.3	31.3	48.2	44.7	46.3	38.3	g
		female 65+ years NiDS	75.5	94.6	71.7	84.1	59.5	60.7	86.9	86.9	73.9	75.2	g
		male 15+ years NiDS	29.3	24.4	26.1	24.3	23.4	21.9	42.3	28.3	32.9	26.8	g
		male 25+ years NiDS	39.7	34.0	31.8	32.2	35.2	28.5	50.3	35.9	39.7	34.6	g
		male 65+ years NiDS	67.6	85.5	64.2	77.5	50.7	59.4	68.2	73.5	75.1	69.2	g
Hypertension prevalence rate (age-standardised)	2015	2015 both sexes 15+ years NiDS	29.2	28.7	27.8	26.7	20.9	24.0	36.6	27.7	31.4	27.7	g
Hypertension prevalence (per 1 000)	2008	both sexes med schemes all beneficiaries										65.5	h
	2013	both sexes all ages med schemes all beneficiaries										87.2	h
	2014	both sexes all ages med schemes all beneficiaries										148.3	i
	2015	both sexes all ages med schemes all beneficiaries										153.6	i
Hypertension treatment coverage	2008	both sexes 15+ years NiDS	27.0	44.0	37.8	40.5	28.1	27.9	42.3	37.0	37.8	35.8	j
		female 15+ years NiDS										44.3	d
		male 15+ years NiDS										22.9	d
	2010	both sexes 15+ years NiDS	38.2	37.0	34.5	31.7	18.6	25.9	44.6	40.1	43.0	34.7	k
		female 15+ years NiDS										43.0	d
		male 15+ years NiDS										21.6	d
	2012	both sexes 15+ years NiDS	36.7	44.8	37.8	38.3	28.0	37.8	45.8	39.5	41.0	38.3	l
		female 15+ years NiDS										48.1	d
		male 15+ years NiDS										25.5	d
	2015	both sexes 15+ years NiDS	46.6	49.6	48.2	46.7	37.7	39.5	45.8	55.2	53.6	47.6	g
Hypertensives controlled on treatment	2008	both sexes 15+ years NiDS	48.5	33.5	48.9	38.1	43.5	41.5	37.5	31.2	38.4	41.8	j
	2010	both sexes 15+ years NiDS	39.0	34.5	36.6	32.9	35.8	49.4	28.9	44.9	43.9	37.9	k
	2012	both sexes 15+ years NiDS	43.5	44.3	49.3	46.6	43.4	56.1	34.2	30.9	35.8	44.4	l
	2015	both sexes 15+ years NiDS	46.3	57.7	60.0	49.6	63.2	56.8	51.0	42.0	43.2	51.8	g

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Prevalence of raised blood pressure	1995	female 18+ years NCD-RisC age-standardised										32.4	m
		female 18+ years NCD-RisC crude										26.3	m
		male 18+ years NCD-RisC age-standardised										33.5	m
		male 18+ years NCD-RisC crude										27.7	m
	2005	female 18+ years NCD-RisC age-standardised										29.0	m
		female 18+ years NCD-RisC crude										25.7	m
		male 18+ years NCD-RisC age-standardised										29.8	m
		male 18+ years NCD-RisC crude										25.0	m
	2008	both sexes 15+ years NiDS	28.9	25.9	23.8	27.0	18.4	26.0	34.5	30.8	32.4	26.3	j
	2010	both sexes 15+ years NiDS	27.5	30.9	25.8	25.8	20.7	17.2	34.2	21.9	33.8	25.7	k
	2012	both sexes 15+ years NiDS	30.2	25.9	25.3	25.9	20.6	19.9	31.5	31.1	33.5	26.5	l
		SANHANES raised SYS and DIA	10.4	17.3	11.4	8.4	6.6	9.1	10.8	13.0	9.4	10.2	n
		SANHANES raised SYS or DIA or both sexes	27.1	30.5	27.3	26.4	20.7	20.9	23.5	29.9	30.7	26.6	o
	2015	female 18+ years NCD-RisC age-standardised										26.1	m
		female 18+ years NCD-RisC crude										24.4	m
		male 18+ years NCD-RisC age-standardised										27.4	m
		male 18+ years NCD-RisC crude										23.5	m
	2015	both sexes 15+ years NiDS	23.8	20.2	19.6	20.1	16.3	17.5	30.4	23.6	27.2	21.1	g

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SADHS 1998.[198] Moderate and severe hypertension.

b SADHS 2003.[177] The measured prevalence of hypertension was defined as those with BP equal or above 140/90 mmHg and/or taking anti-hypertensive medication. The recorded BP levels of participants in the 2003 survey, particularly the diastolic BP, were much lower than was recorded in 1998. The consequence of this is that the apparent prevalence rate of hypertension in 2003 was reduced by almost half. This unrealistic finding prompted a series of exploratory analyses to attempt an explanation for this phenomenon. Caution should be exercised in interpretation as it is likely that the BP data do not reflect the true situation regarding hypertension in South Africa.

c Lloyd-Sherlock et al. 2014.[326] Study of Global Ageing and Adult Health (SAGE). Data collection over 2007–8.

d NCD Trends 2015.[275] National Income Dynamics Study (NiDS). The measured prevalence of hypertension was defined as those with BP equal or above 140/90 mmHg and/or taking anti-hypertensive medication.

e Irazola et al. 2016.[288]

f Maimela et al. 2016.[276] Data representative only of DSS site, not the entire province.

g NiDS Wave 4 v1.1.[205]

h Medical Schemes 2014–15.[325] Diagnosed and treated.

i Medical Schemes 2015–16.[41] Diagnosed and treated.

j NiDS Wave 1 v5.2.[201]

k NiDS Wave 2 v2.2.[202]

l NiDS Wave 3 v1.2.[204]

m NCD-RisC.[274]

n SANHANES–1.[99] Restrictive definition of both parameters raised – SYS = systolic blood pressure, DIA = diastolic blood pressure. Of participants 15 years and older (Age 15+).

o SANHANES–1.[99] Calculated from (raised SYS = systolic blood pressure) + (raised DIA = diastolic blood pressure) – (both SYS and DIA raised). Age 15+.

Table 34: Mental health indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Prevalence of mental disorders	2004	12-month prevalence										16.5	a
		lifetime prevalence	25.7	37.5	29.8	28.0	30.8	29.2	28.7	34.0	39.4	30.8	b
	2012	both sexes current (depression)	15.2										c
		both sexes lifetime (depression)	31.4										c
	2015	both sexes anxiety disorders										3.4	d
		both sexes depressive disorders										4.6	d

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Suicide rate (per 100 000 population)	2012	both sexes WHO age-standardised										3.0	e
		female WHO age-standardised										1.1	e
		male WHO age-standardised										5.5	e

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SASH 2002–4.[327]
b SAMJ 99(339–44).[328]
c Andersson et al. 2013.[329] Cross-sectional population-based survey of persons aged 18–40 living in the EC.
d Mental disorders 2017.[316]
e Global Health Observatory.[330]

Table 35: Other chronic disease indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Asthma prevalence (per 1 000)	2003	female 15+ years SADHS										44.0	a
		male 15+ years SADHS										30.0	a
	2007	female all ages private sector										16.3	b
		male all ages private sector										15.8	b
Hyperlipidaemia prevalence (per 1 000)	2000	both sexes 30+ years										476.0	c
		both sexes 60+ years										707.0	c
	2003	female 15+ years SADHS										21.0	a
		male 15+ years SADHS										20.0	a
	2007	female all ages private sector										19.0	b
		male all ages private sector										29.6	b
	2008	both sexes all ages med schemes all beneficiaries										27.7	d
	2013	both sexes all ages med schemes all beneficiaries										34.8	d
	2014	both sexes all ages med schemes all beneficiaries										66.5	e
	2015	both sexes all ages med schemes all beneficiaries										70.6	e
Mortality between 30–70 years from cardiovascular, cancer, diabetes or chronic respiratory disease	2000	both sexes 30–70 years WHO										30.0	f
	2004	BoD										29.0	g
	2010	BoD										26.0	g
		both sexes 30–70 years WHO										27.7	h
	2012	both sexes 30–70 years WHO										26.8	h
Prevalence of abnormal lipid profiles	2012	female SANHANES serum chol >5 mmol/L	30.8	29.0	27.1	22.9	15.9	22.9	32.4	38.2	39.3	28.1	i
		male SANHANES serum chol >5 mmol/L	20.8	20.3	14.7	18.7	10.9	14.6	15.4	17.5	34.8	18.9	i

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SADHS 2003 (Preliminary).[253]
b Risk Equalisation Fund.[214] Data from the REF study 2005– prevalence estimates for 2007.
c Comparative Risk Assessment.[324] This article used data from nine community studies to derive estimates of national prevalence of exposure to high total cholesterol in adults aged 30 years and older. Prevalence was calculated for the proportion with serum cholesterol values above 5mmol/l.
d Medical Schemes 2014–15.[325] Diagnosed and treated.
e Medical Schemes 2015–16.[41] Diagnosed and treated.
f Global Health Observatory.[330]
g Nojilana et al. 2016.[331] Based on second national burden of disease study.
h Global NCD 2014.[332]
i SANHANES–1.[99] 'Chol' = total cholesteral.

Table 36: Cancer incidence for leading types of cancer (per 100 000 population) for South Africa, 2011 and 2012

Female		Male		Ref
2011				a
Breast	31.4	Prostate	41.9	
Cervix	21.7	Colorectal	10.2	
Primary Unknown	6.6	Lung	9.9	
Colorectal	6.1	Primary unknown	9.3	
Uterus	4.9	Kaposi sarcoma	4.6	
2012				b
Breast	30.5	Prostate	26.6	
Cervix	21.5	Colorectal	7.2	
Primary Unknown	6.9	Lung	6.8	
Colorectal	5.8	Primary unknown	6.7	
Uterus	4.5	Kaposi sarcoma	4.8	

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Cancer incidence 2011.[320] Age-standardised incidence (World Standard Population). Rates are also given by gender and population group in the source tables.

b Cancer incidence 2012.[319] Age-standardised incidence (World Standard Population). Rates are also given by gender and population group in the source tables.

Risk behaviour and determinants of health

Context	There is strong evidence that behavioural, environmental, occupational, and metabolic risks are responsible for a high proportion of global deaths. Many of these risks act as clusters. The top 10 risks in South Africa have been identified as unsafe sex, high body-mass index, elevated fasting plasma glucose, elevated blood pressure, unsafe alcohol use, smoking, ambient particulate matter pollution, childhood under-nutrition, inadequate fruit intake and intimate partner violence.
New data sources	Nationally, new data have been reported in the: • South African Community Epidemiology Network on Drug Use updates • National Income Dynamics Study Wave 4 (2015) Internationally, reports of interest include the: • Global Burden of Disease Study 2015
Key issues and trends	Illicit drug use remains a challenge in all regions, though the primary substance of abuse varies somewhat. However, both crystal methamphetamine ('tik') and low-grade heroin/cannabis mixtures ('nyaope'/'whoonga') require urgent attention. As injectable drug use becomes more prevalent, harm reduction interventions such as needle exchanges will need to be made far more accessible.

The Global Burden of Disease Study 2015 has published estimates of the number of attributable deaths, disability-adjusted life-years (DALYs), and trends in exposure by age group, sex, year, and geography for 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, for the period 1990 to 2015.[333] In total, 388 risk-outcome pairs were considered. The risks were broadly characterised as environmental and occupational risks (such as unsafe sanitation or air pollution), behavioural risks (such as childhood stunting or smoking), and metabolic risks (such as high body-mass index). Jointly assessed, all of the risks were estimated to be responsible for 57.8% of global deaths. The top 10 risks in South Africa were listed as unsafe sex, high body-mass index, elevated fasting plasma glucose, elevated blood pressure, unsafe alcohol use, smoking, ambient particulate matter pollution, childhood under-nutrition, inadequate fruit intake and intimate partner violence. Based on data from the WHO Study on Global AGEing and Adult Health (SAGE) from China, Ghana, India, Mexico, Russia, and South Africa, from 2007 to 2010, it has been shown that those who achieve physical activity levels several times higher than the current recommended minimum have a significant reduction in the risk of breast cancer, colon cancer, diabetes, ischaemic heart disease, and ischaemic stroke.[334] Urban design has a major impact on the extent to which physical activity can be safely and conveniently enjoyed.[335] A WHO assessment has shown that 23% of global deaths and 26% of deaths among children under five are due to modifiable environmental factors.[336]

Two WHO reports in 2016 that were relevant to risk factor monitoring were those on air pollution[50] and chemicals.[337] The relevant SDG indicators are SDG Indicator 11.6.2 (annual mean levels of fine particulate matter ($PM_{2.5}$) in cities (population-weighted) and SDG Indicator 3.9.1 (mortality rate attributed to household and ambient air pollution). WHO estimated that 7 429 deaths were attributable to ambient air pollution in South Africa in 2012. The worst pollution levels have been recorded in low- and middle-income countries in the eastern Mediterranean and South East Asia, but the most polluted city in the world is Onitsha in Nigeria.[338]

The International Union against Tuberculosis and Lung Disease Union has created an index – the Index of Tobacco Control Sustainability – to assess national tobacco control programmes, based on 31 indicators.[339] Although no score for South Africa has been reported, the elements are worth considering. Using data from the National Income Dynamics Study, a positive effect of increased tobacco taxes on smoking initiation has been shown in South Africa, at least among men.[340] South Africa has an entirely unregulated market for electronic nicotine delivery systems (ENDS), which include e-cigarettes. The public health debate around the place of these devices in tobacco control continues to rage.[341]

In September 2016, the South African Community Epidemiology Network on Drug Use (SACENDU) reported on the dominant substances of abuse reported by patients of specialist substance abuse treatment centres in the Western Cape, KwaZulu-Natal (mostly Durban and Pietermaritzburg), Eastern Cape (Port Elizabeth, East London), Gauteng province, Mpumalanga and Limpopo (referred to as the Northern Region), and the Free State, Northern Cape and North West (Central Region).[342] Alcohol remains the dominant substance of abuse, with cannabis as the most common illicit drug. Methamphetamine is the most common primary substance of abuse in the Western Cape, but an increasing number of patients in Port Elizabeth are using this substance. Heroin use, either smoked or injected, is a problem across most centres. In Gauteng, the combination of cannabis and heroin (called either 'nyaope' or 'whoonga') is an increasingly important problem. A retrospective audit of autopsy data from the Pretoria Medico-Legal Laboratory showed that screening for illicit substances was requested in only 385 out of 22 566 medico-legal autopsies over 10 years.[343] Of these, 90.3% were male and 85.1% were White, indicating a profoundly biased sample.

Table 37: Behaviour and awareness indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Currently drink alcohol	1998	female SADHS	16.2	24.4	20.6	11.4	8.6	14.1	23.2	17.0	24.1	16.9	a
		male SADHS	47.4	56.0	49.5	39.7	28.3	45.8	48.4	46.6	43.5	44.6	a
	2003	female SADHS	10.5	21.0	21.0	3.6	11.3	8.3	29.3	18.2	28.8	15.5	b
		male SADHS	42.5	45.9	48.4	14.1	33.6	41.0	51.8	52.5	55.1	39.1	b
	2008	female NYRBS										29.5	c
		male NYRBS										40.5	c
		NYRBS	25.8	39.6	48.1	30.6	26.0	31.1	45.6	38.8	53.0	34.9	c
	2011	female NYRBS										28.2	d
		male NYRBS										36.6	d
		NYRBS	25.7	46.2	43.7	25.8	21.1	31.9	49.2	38.5	44.4	32.3	d
	2012	2011–2012 both sexes 15+ years Dikgale					84.4						e
Ever drank alcohol	1998	female SADHS	22.3	31.6	32.4	17.9	15.7	21.0	34.4	23.7	40.1	25.7	a
		male SADHS	60.1	66.5	59.1	54.4	45.1	62.1	63.4	57.5	61.4	58.1	a
	2003	female SADHS	18.1	27.5	27.8	6.6	17.2	12.3	39.1	21.5	39.2	21.6	b
		male SADHS	58.8	52.5	56.6	22.2	45.7	43.2	61.4	57.9	70.3	48.5	b
	2008	female NYRBS										45.1	c
		male NYRBS										54.4	c
		NYRBS	36.2	58.7	65.1	46.4	38.6	41.6	57.2	58.7	71.0	49.6	c
	2011	female NYRBS										44.9	f
		male NYRBS										53.8	f
		NYRBS	42.6	60.5	66.7	42.8	30.2	46.1	67.1	58.9	66.2	49.2	f
	2015	both sexes 15+ years NiDS	36.7	57.2	51.0	30.5	38.4	42.1	61.1	48.5	68.3	45.9	g
		female 15+ years NiDS	20.3	48.0	38.2	15.0	21.4	25.2	50.6	31.3	58.6	31.5	g
		male 15+ years NiDS	56.6	67.4	63.8	50.0	60.9	60.5	72.4	65.9	79.8	62.3	g
Ever smoked cigarettes	1999	GYTS										46.7	h
	2003	female 15+ years SADHS	18.1	36.2	26.2	10.5	21.9	18.9	50.2	31.2	39.6	24.5	i
		male 15+ years SADHS	54.4	49.7	49.2	25.4	41.8	44.0	63.4	48.1	62.2	44.9	i
	2008	both sexes 15+ years NiDS										25.6	j
		female 15+ years NiDS										12.2	j
		male 15+ years NiDS										42.6	j
		female GYTS										25.4	k
		male GYTS										43.2	k
		GYTS										34.0	k
		female NYRBS										22.4	c
		male NYRBS										36.8	c
		NYRBS	22.2	33.0	40.5	24.5	21.7	23.1	33.8	30.8	54.8	29.5	c
	2011	female GYTS										28.5	l
		female NYRBS										19.6	m
		Grade 8–11 GYTS										31.3	l
		male GYTS										34.9	l
		male NYRBS										35.9	m
		NYRBS	21.4	35.0	41.8	22.6	18.5	20.8	38.7	27.6	42.9	27.6	m
	2012	15+ years SANHANES	22.5	32.2	16.0	20.8	14.4	17.6	33.2	14.9	38.5	20.8	n
		2008–2012 female NiDS										10.2	o
		2008–2012 male NiDS										39.1	o
		both sexes 15+ years NiDS										22.5	j
		female 15+ years NiDS										9.8	j
		female 15+ years SANHANES	9.3	14.6	7.3	7.0	2.9	3.9	26.4	6.5	31.7	10.1	n
		male 15+ years NiDS										37.6	j
		male 15+ years SANHANES	36.8	50.4	24.6	38.1	29.4	33.6	40.2	25.2	46.0	32.8	n
	2015	both sexes 15+ years NiDS	22.2	31.4	26.0	16.9	15.6	19.8	38.8	24.7	49.3	25.6	g
		female 15+ years NiDS	7.2	12.6	10.9	4.0	3.0	4.7	29.0	3.8	38.4	11.3	g
		male 15+ years NiDS	40.6	52.6	41.0	33.3	32.1	36.3	49.3	45.7	62.2	41.9	g

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Frequent smokers	1999	GYTS										10.1	h
	2002	GYTS										5.8	h
	2008	female GYTS										2.4	h
		female NYRBS										3.1	c
		GYTS										5.0	k
		male GYTS										7.7	k
		male NYRBS										8.6	c
		NYRBS	5.5	5.5	8.3	4.1	3.3	3.0	7.9	6.4	14.6	5.8	c
	2011	female NYRBS										2.0	f
		male NYRBS										7.9	f
		NYRBS	3.4	8.8	7.9	3.6	3.5	3.1	8.7	3.7	7.6	4.9	f
	2012	2011–2012 both sexes 15+ years Dikgale					81.3						e
		both sexes 18+ years SANHANES	15.9	23.6	11.8	15.6	11.0	14.6	28.8	12.1	31.4	15.9	p
		female 18+ years SANHANES	5.6	8.4	3.0	3.6	2.0	3.4	23.1	4.9	25.6	6.5	p
		male 18+ years SANHANES	27.1	39.3	20.6	31.5	23.0	27.3	34.7	21.2	38.0	26.6	p
Number of admissions for alcohol and other drug abuse	2006	Jul-Dec SACENDU	645.0		3 295.0	921.0		539.0			2 798.0	8 771.0	q
	2010	Jul-Dec SACENDU	707.0		2 884.0	669.0					2 933.0	8 407.0	r
	2015	Jul-Dec both sexes all ages SACENDU	471.0		3 570.0	1 171.0					2 674.0	9 679.0	s
Percentage participating in insufficient physical activity	2002	both sexes NYRBS	41.5	31.9	31.2	42.3	35.5	32.6	46.2	33.2	41.7	37.5	t
		female NYRBS	45.9	38.4	37.9	46.5	40.7	35.5	58.3	37.9	49.1	43.0	t
		male NYRBS	35.3	24.4	23.8	37.0	28.6	29.0	26.2	28.0	30.8	30.5	t
	2003	female 15+ years SADHS	76.3	92.0	85.9	94.0	69.9	79.5	95.0	94.2	92.5	86.0	u
		male 15+ years SADHS	58.7	83.3	82.0	85.4	59.2	66.2	84.3	75.1	78.1	76.4	u
	2008	both sexes 50+ years SAGE										60.5	v
		both sexes Grade 8–11 NYRBS	45.4	30.2	39.0	43.6	36.8	44.4	48.6	35.2	51.6	41.5	c
		female 50+ years SAGE										63.1	v
		female Grade 8–11 NYRBS										46.2	c
		male 50+ years SAGE										57.2	v
		male Grade 8–11 NYRBS										36.7	c
	2011	both sexes Grade 8–11 NYRBS	43.8	37.6	38.1	49.7	42.4	35.4	35.9	38.0	49.9	42.8	f
		female Grade 8–11 NYRBS										47.5	f
		male Grade 8–11 NYRBS										37.7	f
	2012	2011–2012 both sexes 15+ years Dikgale					66.5						e
	2014	both sexes 18+ years										47.1	w
		female 18+ years										53.1	w
		male 18+ years										40.5	w
Prevalence of smoking	1980	female IHME										10.4	x
		IHME										25.0	x
		male IHME										40.4	x
	1996	female IHME										9.6	x
		IHME										23.4	x
		male IHME										38.5	x
	1998	female SADHS	10.8	10.9	12.2	4.8	1.8	6.3	31.0	7.6	29.4	10.7	y
		male SADHS	45.9	44.0	42.4	38.1	29.2	40.0	57.7	45.3	48.9	42.3	y
		SADHS										24.0	y
	1999	female GYTS										17.5	z
		GYTS										23.0	z
		male GYTS										28.8	z
	2000	AMPS										27.1	aa
		female AMPS										11.7	aa
		male AMPS										44.0	aa
	2003	female 15+ years SADHS	8.9	11.7	9.4	4.2	3.8	4.0	35.0	7.3	28.7	10.2	ab
		male 15+ years SADHS	43.9	40.6	38.5	21.0	24.9	33.4	51.4	37.6	49.8	35.1	ab
	2006	female IHME										8.5	x
		IHME										15.5	x
		male IHME										23.1	x

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
	2008	50+ years SAGE										19.4	ac
		both sexes 15+ years NiDS										21.2	j
		female 15+ years NiDS										9.1	j
		female Grade 8–11 NYRBS										15.8	c
		female GYTS										10.5	z
		Grade 8–11 NYRBS	16.8	22.1	26.7	18.2	17.3	17.4	27.0	19.9	36.7	21.0	c
		GYTS										16.5	z
		male 15+ years NiDS										36.5	j
		male Grade 8–11 NYRBS										26.4	c
		male GYTS										22.8	z
	2011	female GYTS										12.1	z
		female NYRBS										12.1	ad
		GYTS										16.9	z
		GYTS factsheet										12.7	l
		male GYTS										21.7	z
		male NYRBS										23.2	ad
		NYRBS	13.7	24.9	25.0	15.6	12.5	13.2	23.2	16.3	25.1	17.6	ad
	2012	2011–2012 both sexes 15+ years Dikgale					13.7						e
		both sexes 15+ years NiDS										19.6	j
		both sexes 18+ years SANHANES	18.4	27.4	13.0	17.8	12.8	15.3	31.2	12.7	32.9	17.6	ae
		female 15+ years NiDS										7.8	j
		female 18+ years SANHANES	6.7	8.5	4.4	4.1	2.1	3.6	24.5	5.2	26.8	7.3	ae
		female IHME										9.1	x
		IHME										15.3	x
		male 15+ years NiDS										33.6	j
		male 18+ years SANHANES	31.4	46.9	21.8	35.7	26.9	28.7	38.3	22.3	39.6	29.2	ae
		male IHME										22.0	x
	2013	both sexes 18+ years WHO age-standardised										16.0	af
	2015	both sexes 15+ years NiDS	19.1	23.1	20.2	14.6	12.2	16.2	32.8	20.5	36.5	20.3	g
		female 15+ years NiDS	6.2	6.7	7.2	2.4	2.1	3.5	24.2	2.9	27.3	7.9	g
		male 15+ years NiDS	34.9	41.5	33.3	30.0	25.5	30.1	42.1	38.1	47.3	34.5	g
Primary drug of abuse as % of all drugs of abuse	2006	Jul-Dec alcohol	45.0		48.0	54.0		47.0			26.0		ag
		Jul-Dec cannabis	19.0		22.0	19.0		34.0			11.0		ag
		Jul-Dec cocaine	19.0		11.0	11.0		5.0			5.0		ag
		Jul-Dec heroin	2.0		10.0	9.0		10.0			10.0		ag
		Jul-Dec mandrax	8.0		1.0	1.0		0.4			3.0		ag
		Jul-Dec methamphetamine	3.0		0.2	0.0		0.0			42.0		ag
	2010	Jul-Dec alcohol	44.0		41.0	55.0					28.0		ag
		Jul-Dec cannabis	18.0		28.0	26.0					18.0		ag
		Jul-Dec cocaine	7.0		6.0	6.0					2.0		ag
		Jul-Dec heroin	5.0		12.0	9.0					12.0		ag
		Jul-Dec mandrax	6.0		2.0	2.0					3.0		ag
		Jul-Dec methamphetamine	9.0		1.0	1.0					35.0		ag
	2015	Jul-Dec alcohol	24.0		20.0	37.0					20.0		s
		Jul-Dec cannabis	31.0		39.0	34.0					25.0		s
		Jul-Dec cocaine	3.0		4.0	5.0					1.0		s
		Jul-Dec heroin	2.0		12.0	7.0					11.0		s
		Jul-Dec mandrax	10.0		3.0	6.0					5.0		s
		Jul-Dec methamphetamine	25.0		4.0	1.0					37.0		s

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SADHS 1998.[198]
b SADHS 2003.[177] Currently drink alcohol defined as those who drank alcohol in the past 12 months.
c NYRBS 2008.[194]
d NYRBS 2011.[196] Defined in survey as 'Used alcohol in the past month'.
e Maimela et al. 2016.[276] Data representative only of DSS site, not the entire province. Defined in survey as "consumed alcoholic drinks in past 30 days".
f NYRBS 2011.[196]
g NiDS Wave 4 v1.1.[205]
h GYTS 2002.[344]
i SADHS 2003.[177] Any tobacco products.
j NCD Trends 2015.[275]

k GYTS 2008.[345]
l GYTS 2011.[346] Results quite different to those published by Reddy et al. from same survey.
m NYRBS 2011.[196] Defined as 'Ever smokers' in survey.
n SANHANES–1.[99] Indicated as 'have ever smoked tobacco' in SANHANES survey.
o Vellios et al. 2016.[340]
p Reddy et al. 2015.[347] Data reported as 'Current daily smoking'
q SACENDU.[33] The total figure includes patients from FS, NW and NC combined.
r SACENDU.[33] The total figure includes patients from MP and LP (Northern Region) and from FS, NW and NC combined (Central Region).
s SACENDU Phase 39.[342]
t NYRBS 2002.[130] Note: Data updated from errata received from MRC, May 2004, therefore doesn't correspond completely with source.
u SADHS 2003.[177] Inactive or minimally active.
v Phaswana-Mafuya et al. 2013.[348]
w Global Diabetes 2016.[277] Underlying data source or year of data not clear.
x Smoking 1980–2012.[349] Age-standardised prevalence.
y SADHS 1998.[198] Percentage who smoke daily or occasionally.
z Reddy et al. 2013.[350] Smoked cigarettes on 1 or more days in the past 30 days.
aa SAMJ 92(468–72).[351]
ab SADHS 2003.[177] Percentage who currently smoke daily or occasionally.
ac Wu et al. 2015.[352]
ad NYRBS 2011.[196] Defined in survey as 'Current smokers'.
ae Reddy et al. 2015.[347]
af Global Tobacco 2015.[353]
ag SACENDU.[33]

Table 38: Behaviour and awareness indicators by population group

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Currently drink alcohol	1998	female SADHS	12.3	23.7	9.0	50.5		a
		male SADHS	41.4	44.7	37.3	71.0		a
	2003	female SADHS	11.4	27.7	24.4	50.9		b
		male SADHS	35.2	52.3	50.3	69.9		b
	2008	NYRBS	31.8	48.7	34.8	56.4	39.1	c
	2011	NYRBS	29.6	51.7	36.7	50.7	33.7	d
Ever drank alcohol	1998	female SADHS	18.8	40.6	69.8	14.9		a
		male SADHS	53.4	63.6	64.7	84.9		a
	2003	female SADHS	16.4	40.2	37.7	58.6		e
		male SADHS	44.2	68.0	66.3	74.5		e
	2008	NYRBS	45.5	67.0	62.6	75.9	47.3	c
	2011	NYRBS	45.7	73.3	68.9	77.6	45.4	f
	2015	both sexes 15+ years NiDS	41.3	65.6	32.7	70.3		g
		female 15+ years NiDS	25.0	58.9	12.9	63.2		g
		male 15+ years NiDS	59.6	73.3	52.7	79.2		g
Ever smoked cigarettes	2002	NYRBS	23.9	56.6	47.4	66.7		h
	2003	female 15+ years SADHS	20.2	52.5	24.1	37.5		e
		male 15+ years SADHS	41.8	60.7	56.0	67.4		e
	2008	NYRBS	24.4	54.4	50.6	53.4	27.1	c
	2011	NYRBS	23.9	54.8	40.5	49.2	30.0	f
	2012	15+ years SANHANES	17.4	44.9	25.2	24.5		h
		female 15+ years SANHANES	4.8	39.7	9.4	23.7		h
		male 15+ years SANHANES	31.4	50.8	41.4	25.5		h
	2015	both sexes 15+ years NiDS	20.6	56.3	21.4	40.3		g
		female 15+ years NiDS	3.8	50.7	4.9	36.9		g
		male 15+ years NiDS	39.4	62.8	38.1	44.8		g
Frequent smokers	2008	NYRBS	4.2	13.1	13.0	16.0	6.0	c
	2011	NYRBS	3.9	12.6	5.5	12.7	4.7	f
	2012	both sexes 18+ years SANHANES	13.3	38.0	20.1	14.9		i
		female 18+ years SANHANES	2.6	32.1	4.8	12.8		i
		male 18+ years SANHANES	25.5	45.1	35.6	17.3		i
Percentage participating in insufficient physical activity	2002	both sexes NYRBS	37.5	45.6	33.0	29.4		h
		female NYRBS	42.4	56.8	36.0	37.0		h
		male NYRBS	31.1	32.5	30.1	19.9		h
	2003	female 15+ years SADHS	85.3	91.6	83.0	89.2		e
		male 15+ years SADHS	75.4	81.1	76.6	83.5		e
	2008	both sexes 50+ years SAGE	57.7	76.9	52.3	55.7		j
		both sexes Grade 8–11 NYRBS	46.5	50.9	55.1	27.2	51.2	c
	2011	both sexes Grade 8–11 NYRBS	42.9	47.2	38.7	29.2	45.5	f

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Prevalence of smoking	1999	GYTS	18.4	37.4	23.4	29.0		k
	2000	AMPS	22.7	48.7	28.2	36.6		l
	2002	GYTS	15.7	38.7	21.4	21.7		k
	2003	female 15+ years SADHS	5.2	41.8	13.1	27.3		m
		male 15+ years SADHS	32.8	52.1	55.5	35.7		m
	2008	Grade 8–11 NYRBS	17.9	35.9	26.5	34.4	25.9	c
		GYTS	13.0	38.0	28.3	25.6		k
	2011	GYTS	15.4	31.4	26.5	12.4		k
		NYRBS	15.9	31.9	25.3	24.2	14.9	f
	2012	both sexes 18+ years SANHANES	15.1	40.1	22.1	15.3		n
		female 18+ years SANHANES	3.3	34.4	7.5	12.9		n
		male 18+ years SANHANES	28.5	47.0	36.8	18.0		n
	2015	both sexes 15+ years NiDS	17.0	45.4	20.0	24.6		g
		female 15+ years NiDS	2.6	39.8	4.8	22.0		g
		male 15+ years NiDS	33.2	51.7	35.4	28.1		g

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SADHS 1998.[198]
b SADHS 2003.[177] Those who drank alcohol in the past 12 months.
c NYRBS 2008.[194]
d NYRBS 2011.[196] Defined in survey as 'Used alcohol in the past month'.
e SADHS 2003.[177]
f NYRBS 2011.[196]
g NiDS Wave 4 v1.1.[205]
h NYRBS 2002.[130]
i Reddy et al. 2015.[347] Data reported as 'Current daily smoking'
j Phaswana-Mafuya et al. 2013.[348]
k Reddy et al. 2013.[350] Smoked cigarettes on 1 or more days in the past 30 days.
l SAMJ 92(468–72).[351]
m SADHS 2003.[177] Percentage who currently smoke daily or occasionally.
n Reddy et al. 2015.[347]

Injuries

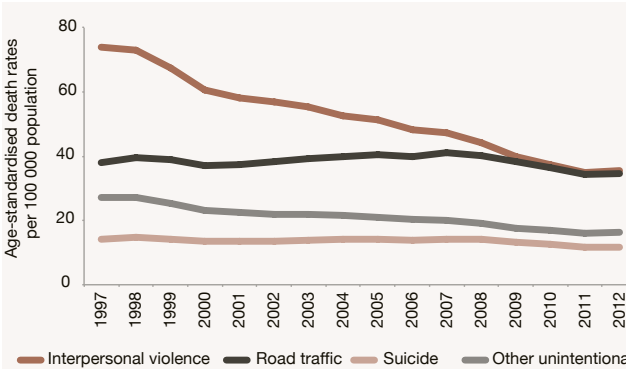
Context	Injuries disproportionately affect younger adults, and are thus of increased economic importance. Although the feasibility of collecting routine trauma-specific data has been demonstrated, the new National Indicator Dataset (NIDS) does not include a trauma module.
New data sources	Nationally, new data have been reported in the: • Second National Burden of Disease Study 1997–2012 • Stats SA Causes of death 2015
Key issues and trends	As was noted in previous editions of the *Review*, no new data have been issued by the Road Traffic Management Corporation since 2011. Alternative estimates, based on various sources, have been issued in the Medical Research Council's Second National Burden of Disease Study 1997–2012, but these are also somewhat dated. High rates of child homicide, and in particular neonaticide, need to be interpreted in the light of poor access to sexual and reproductive health services, including contraception and termination of pregnancy services.

As can be seen from Table 39, updated data on road traffic accident-associated fatalities were last issued by the Road Traffic Management Corporation (RTMC) in 2011. A systematic review and meta-analysis of 39 studies from 15 African countries produced an estimated pooled road traffic injury rate of 65.2 per 100 000 population and a fatality rate of 16.6 per 100 000 population.[354] Across Africa the highest road traffic death rate was among occupants of motorised four-wheeler vehicles (5.9 per 100 000 population), but that was closely followed by the fatality rate for pedestrians (3.4 per 100 000 population). This study underscored the problem of missing data and inadequate recording of deaths and their causes. Of the seven South African studies included, none was more recent than 2008. At a provincial level, an audit in KwaZulu-Natal recorded 197 219 emergency room visits for trauma (45% intentional) in the 2013/2014 financial year, resulting in 18 716 admissions and 1 045 inpatient deaths.[355] This study thus estimated an overall provincial rate of trauma at 17 per 1 000 population. These data were produced by a pilot study of the inclusion of trauma indicators in the routine District Health Information System (DHIS). The data collected were a count of all patients seen in the emergency room with a diagnosis of trauma, the mechanism of the trauma (blunt assault, motor vehicle collision, pedestrian vehicle collision, stab, gunshot wound, other), whether the patient was admitted to a health facility for longer than twelve hours, whether the patient required transfer to a higher level of care, and all trauma deaths in hospital. However, trauma-specific data elements and indicators have not been included in the new National Indicator Dataset (NIDS), to be implemented from 1 April 2017. Nonetheless, without accurate mortuary surveillance data, the DHIS will always return an under-estimate of the true burden of trauma. The Second National Burden of Disease Study 1997–2012 noted a decline in deaths due to road injuries, from an age-standardised rate of 38 per 100 000 in 1997 to 35 in 2012 (8.9% decrease), but this remained the 9th leading cause of death (Figure 20).[74] In 2012, injuries from all causes were responsible for 9.6% of all deaths, mainly affecting young adults. Nationally, interpersonal violence was responsible for as large a proportion of life years lost (4.2%) as road traffic injuries (4.5%), but in four provinces (Western Cape, Northern Cape, Eastern Cape, KwaZulu-Natal), interpersonal violence was responsible for a greater proportion of life years lost than road traffic injuries.

The issue of intimate partner violence was brought to the fore by Médecins Sans Frontières' account of sexual violence in the Rustenburg area.[356] The survey reported that "one in four women living in Rustenburg has been raped in her lifetime, and approximately half have been subject to some form of sexual violence or intimate partner violence". A survey of 3 515 children aged 10–17 years (56.6% female) in Mpumalanga and the Western Cape reported a 56.3% prevalence for lifetime physical abuse, 35.5% for lifetime emotional abuse, and 9% for lifetime sexual abuse.[357]

Based on a random sample of 38 medico-legal laboratories, a retrospective national cross-sectional study of child homicide was conducted, extracting data from mortuary files and autopsy reports for 2009.[358] The study estimated that 454 children under the age of 5 years were killed in South Africa in 2009, of which 53.2% were neonates. The calculated neonaticide rate was therefore 19.6 per 100 000 live births and the infanticide rate 28.4 per 100 000 live births. An accompanying editorial pointed out that neonaticide accounted for almost 1.5% of all neonatal deaths in South Africa in 2009.[359]

Figure 20: Injury mortality trends in South Africa, 1997–2012



Source: Pillay-van Wyk et al. 2016[74] as presented at the National Health Information System of South Africa (NHISSA) meeting in February 2017.

Table 39: Injury indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Always wear a seat belt when driven by someone else	2008	NYRBS	12.8	16.2	18.4	13.6	18.5	17.5	13.6	16.2	11.6	15.5	a
	2011	NYRBS	14.6	25.2	29.1	16.6	24.6	22.4	25.4	24.9	19.2	21.5	b
Drove after drinking alcohol	2008	female NYRBS										18.0	a
		male NYRBS										29.2	a
		NYRBS	19.3	22.0	27.1	26.7	31.8	31.3	26.2	23.6	21.4	25.9	a
	2011	female NYRBS										8.4	b
		male NYRBS										14.5	b
		NYRBS	10.9	19.4	19.2	10.6	8.1	10.8	12.0	13.6	11.7	12.8	b
Intimate partner violence prevalence (%)	2014	2013–2014 female 16+ years SAHMS physically assaulted			50.9	14.1					47.3		c
		2013–2014 female 16+ years SAHMS sexually assaulted			21.9	16.6					16.2		c
Percentage adults experienced work-related illness/injuries	1998	SADHS	6.3	5.1	8.0	9.0	8.2	7.1	7.4	2.8	8.2	7.3	d
	2003	SADHS	7.5	7.2	6.4	2.7	7.4	5.5	4.7	6.5	8.6	6.2	e
Road accident fatalities per 100 000 population	1990	RTMC										36.5	f
	1995	RTMC										25.2	f
	2000	RTMC										19.6	f
	2005	RTMC	20.7	36.3	28.9	28.8	25.5	42.3	32.4	37.8	33.3	29.9	f
	2009	both sexes postmortem										36.1	g
		female postmortem										16.8	g
		male postmortem										57.2	g
	2010	RTMC	26.5	41.4	19.5	26.2	28.1	44.0	40.1	36.2	25.3	27.9	h
	2011	RTMC										27.6	f

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a NYRBS 2008.[194] Learners in grades 8–11.
b NYRBS 2011.[196]
c SAHMS 2013–14.[110] Among female sex workers.
d SADHS 1998.[198]
e SADHS 2003 (Preliminary).[253]
f Arrive Alive.[360]
g Matzopoulos et al. 2015.[361]
h Road Accidents 2010.[362] Total of 13 966 road accident facilities in 2010. Calculated using Stats SA mid-year population estimates for the relevant year.

Table 40: Injury indicators by population group

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Always wear a seat belt when driven by someone else	2008	NYRBS	14.0	12.2	18.6	38.0	20.0	a
	2011	NYRBS	19.7	22.3	28.4	48.0	27.4	b
Drove after drinking alcohol	2008	NYRBS	26.0	27.7	23.1	20.0	37.9	a
	2011	NYRBS	11.7	23.4	21.1	15.6	1.2	b
Percentage adults experienced work-related illness/injuries	1998	SADHS	6.6	8.6	6.3	8.9		c
	2003	SADHS	6.7	5.8	5.6	4.6		d
Road accident fatalities per 100 000 population	2009	both sexes postmortem	37.2	28.4	37.0	37.2		e

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a NYRBS 2008.[194] Learners in grades 8–11.
b NYRBS 2011.[196]
c SADHS 1998.[198]
d SADHS 2003 (Preliminary).[253]
e Matzopoulos et al. 2015.[361]

Health services indicators

Health facilities

Context	Although the implementation of National Health Insurance will demand consideration of the entire health services infrastructure, as a national resource, data sources are still fragmented and incomplete, and to a great extent only cover the public health sector. Some data on private sector health service delivery are being presented in the technical reports developed by the Competition Commission Health Market Inquiry.[f]
New data sources	Nationally, new data have been reported in the: • Stats SA General Household Survey 2015 • Auditor-General of South Africa Performance audit of the management of pharmaceuticals at departments of health 2016 • Stop Stock Outs Project report 2015 • Helen Suzman Foundation Pharmaceuticals in South Africa – an enquiry 2016
Key issues and trends	The Auditor-General of South Africa's report on the management of pharmaceuticals at departments of health has focused attention on the chronic under-investment in this important health systems building block.

Each year the Statistics South Africa General Household Survey includes questions about users' satisfaction with health services. The most recent survey, for 2015, again reported that the majority of households that attended public health-care facilities (81.1%) or private health-care facilities (97.7%) were either very satisfied or satisfied with the service they received.[40] In the vast majority of households (92.8%), the nearest health facility of its type was consulted first. The proportion of households that would first consult a public sector clinic or hospital (70.5%) has remained relatively constant since 2004, but with a marked shift towards clinics and away from hospitals, reflecting not only improved access but also the effect of bypass fees. As before, very few households indicated that they would first consult a pharmacy (0.4%) or a traditional healer (0.5%). Implementing National Health Insurance, as a means to achieving the SDG goal of universal health coverage, will require that the entire health sector infrastructure is mobilised. To date, the experience of general practitioners who have been contracted to deliver services in public sector clinics has revealed significant challenges, many related to the quality of infrastructure and equipment.[363] Specifically in relation to child health, an argument has been made for greater use of community health workers (CHW), and for this cadre to be enabled to provide more than just basic preventive services and adherence support counselling.[364]

Particular attention still needs to be paid to rational and responsible medicines use, and to the problem of stock outs at public sector facilities. In 2016, the Auditor-General delivered a hard-hitting assessment of the management of pharmaceuticals at national and provincials levels of the public sector.[365,366] The Auditor-General noted that necessary policies were in place, but not implemented, that pharmaceutical budgets did not align with health needs, but most critically, that a shortage of pharmacists and pharmacist's assistants meant that nurses' workloads were increased, negatively affecting quality of care. Inadequate standards of performance at the provincial depots were also identified. At health facility level, pharmaceutical infrastructure was inadequate to meet patient needs. Although some interventions (such as the stock visibility system and the Central Chronic Medicines Dispensing and Distribution (CCMDD) programme) are expected to make a difference, much will need to be done to overcome decades of under-investment in pharmaceutical systems, infrastructure and human resources. An assessment of the pharmaceutical infrastructure of the country as a whole, by the Helen Suzman Foundation concluded that the "existing network of retail pharmacies and hospitals is not adequate for the provision of pharmaceuticals to the public".[367] The third annual report from the civil society-conducted Stop Stock Outs Project (SSP) was published in 2016.[368] Based on telephonic surveys in 2015, 589 out of 2 414 health facilities (25%) reported that at least one antiretroviral or TB medicines had been out of stock in the preceding 3 months. The new National Indicator Data Set (NIDS) for 2017–2019 will include a count of stable patients served by the CCMDD programme, but this will be inadequate to track medicines availability, both in hospitals and for ambulatory care. Putting the stock visibility programme data into the public domain would make a difference. The Lancet Commission on Essential Medicines Policies has recommended that it is "desirable to have multiple independent institutions, including academic centres, studying essential medicines availability, prices, and consumption" and has also emphasised the positive consequences of increased transparency in this field.[369] Access to medicines was one of the MDG goals that was inadequately measured.[370] As before, only one medical scheme administrator has placed private sector medicines-related data in the public domain.[371] Of all items claimed in 2015, 56.2% were for generic medicines, up slightly from 55.6% in 2014. Put another way, "in 76.5% of instances where a generic equivalent was available, the generic medicine was used".

Table 45 shows key coverage statistics for birth and death registration over time. Both of these are included in the WHO 100 Core Health Indicators, and were previously identified as being data elements for which South African data are not readily available or routinely reported.[8,372]

f http://www.compcom.co.za/healthcare-inquiry/

Table 41: Health services indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Percentage of users of private health services very satisfied with the service received	2009	GHS	95.1	92.4	91.2	94.7	92.2	87.8	95.6	94.2	92.5	92.5	a
	2012	GHS	96.0	93.5	94.7	81.0	94.1	93.0	87.0	91.8	94.1	92.2	b
		SANHANES inpatient care										69.5	c
		SANHANES outpatient care										57.1	c
	2015	GHS	93.5	89.2	91.3	87.8	97.3	95.3	91.3	89.8	94.6	91.9	d
Percentage of users of public health services very satisfied with the service received	2009	GHS	56.0	41.8	52.9	53.7	67.4	46.8	65.8	44.8	58.1	54.5	a
	2012	GHS	64.6	61.4	52.3	51.6	67.5	59.2	61.7	50.7	57.8	57.3	b
		SANHANES inpatient care										32.7	c
		SANHANES outpatient care										24.5	c
	2015	GHS	60.5	53.3	57.0	56.2	73.1	59.2	60.2	50.9	45.5	57.6	d

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Stats SA GHS 2011.[62]
b Stats SA GHS 2012.[98]
c SANHANES–1.[99]
d Stats SA GHS 2015.[40]

Table 42: Health facilities indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Number of health facilities	1998	private sector total	14	7	66	27	2	5	4	10	27	162	a
		provincial-aided hosp										43	b
		public clinics										2 604	b
		public hospitals										343	b
		public sector CHCs										101	b
	2009	DHIS central hospitals		2	4	1					3	10	c
		DHIS district hospitals	62	24	11	39	30	23	17	14	31	251	c
		DHIS provincial hospitals	7			3	2	2				14	c
		DHIS public hospitals	90	32	31	75	41	33	21	20	58	401	c
		DHIS regional hospitals	2	5	11	12	5	3	1	4	9	52	c
		DHIS specialised hospitals	19	1	5	20	4	5	3	2	15	74	c
	2010	private hospitals	15	16	84	33	8	9	3	14	34	216	d
	2015	DHIS all main types	1 132	446	675	1 060	718	514	262	462	716	5 985	c
		DHIS central hospitals	1	1	4	1					2	9	c
		DHIS CHC/CDC	41	12	38	21	28	57	33	47	89	366	c
		DHIS district hospitals	65	25	12	40	32	23	11	13	34	255	c
		DHIS mobile services	187	129		241	166	110	63	79	165	1 140	c
		DHIS private clinics	18	6	113	24		5	5	17	81	269	c
		DHIS private hospitals	23	26	107	45	12	23	7	18	52	313	c
		DHIS provincial hospitals	3	1	3	3	2	2	1	2	1	18	c
		DHIS public clinics	771	238	375	650	469	286	137	281	268	3 475	c
		DHIS regional hospitals	5	4	9	12	5	3	1	3	8	50	c
		DHIS specialised hospitals	18	4	14	23	4	5	4	2	16	90	c

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a SAHR 1998 Ch13.[373] Based on membership of the Hospital Association of South Africa. Virtually all private hospitals with inpatient treatment facilities are members of HASA.
b SAHR 1999 Ch9.[374]
c DHIS.[34]
d Hospitals Direct Database.[375]

Table 43: Inpatient health facility indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Average length of stay – total	2000	DHIS	8.8	5.9	6.0	5.1	6.8	4.7	3.9	6.8	6.5	6.1	a
	2005	DHIS	7.1	5.1	5.2	6.4	5.8	4.6	3.4	5.9	6.1	5.8	a
	2010	DHIS	6.7	4.9	5.1	6.9	5.5	4.7	3.3	5.7	5.3	5.7	a
	2015	DHIS	7.2	5.7	5.8	7.0	5.7	5.0	4.6	7.2	5.7	6.2	a
Hospital bed density (beds per 1 000 target population)	2003	DHIS central hospitals	0.0	0.4	1.0	0.3	0.0	0.0	0.0	0.0	1.0	0.3	b
		DHIS district hospitals	1.3	1.0	0.2	1.2	1.3	0.7	1.3	1.0	0.5	1.0	b
		DHIS public sector	2.8	2.9	2.7	3.5	2.4	1.4	2.3	2.3	3.4	2.8	b
		DHIS regional hospitals	0.7	0.8	1.0	1.0	0.7	0.5	0.6	0.7	0.5	0.8	b
		DHIS specialised hospitals	0.8	0.6	0.4	0.9	0.4	0.2	0.4	0.5	1.4	0.7	b
	2004	Hospital Yearbook private sector	5.2	6.4	6.5	4.1	1.0	3.4	6.8	4.3	3.9	5.1	c
	2009	DHIS district hospitals	1.0	0.6	0.3	0.9	0.8	0.9	0.8	0.4	0.5	0.7	b
		DHIS public sector	2.5	2.1	2.2	2.5	1.6	1.7	2.0	1.5	2.5	2.2	b
		DHIS regional hospitals	0.1	0.7	0.8	0.8	0.3	0.3	0.7	0.6	0.6	0.6	b
		Econex public and private										2.5	d
	2010	Hospitals Direct private sector	2.1	4.9	4.8	2.7	1.3	2.4	2.0	3.6	3.4	3.5	e
	2014	DHIS central hospitals	0.1	0.3	0.7	0.1					0.5	0.2	b
		DHIS district hospitals	1.0	0.7	0.3	0.9	0.8	0.8	0.6	0.5	0.6	0.7	b
		DHIS provincial hospitals	0.3	0.3	0.2	0.1	0.2	0.2	0.7	0.2	0.1	0.2	b
		DHIS public sector	2.2	2.1	1.8	2.4	1.5	1.3	1.6	1.6	2.1	1.9	b
		DHIS regional hospitals	0.4	0.5	0.5	0.8	0.3	0.2	0.2	0.6	0.3	0.5	b
		DHIS specialised psychiatric	0.2	0.3	0.2	0.3	0.2		0.1	0.4	0.4	0.2	b
		DHIS specialised TB	0.3			0.2	0.0	0.1	0.0		0.2	0.1	b
Inpatient bed utilisation rate – total	2000	DHIS	63.0	70.2	66.1	62.9	61.1	57.0	68.8	68.9	78.4	65.4	a
	2005	DHIS	60.2	71.3	75.8	65.2	69.8	65.2	62.2	68.3	83.0	69.1	a
	2010	DHIS	70.8	69.4	73.1	64.8	68.3	66.0	59.3	69.9	79.8	70.0	a
	2015	DHIS	66.7	69.0	76.5	65.4	74.0	71.4	65.7	74.6	85.1	72.0	a
Inpatient crude death rate	2009	DHIS	6.9	6.4	5.4	6.6	5.9	6.8	4.8	5.6	2.6	5.6	a
	2010	DHIS	6.5	6.1	5.2	6.6	5.6	6.5	4.6	6.0	2.9	5.5	a
	2015	DHIS	6.3	5.8	4.7	5.2	5.4	5.5	5.1	6.5	2.9	5.0	a
Number of beds	1998	private sector	1 207	827	10 049	3 371	273	627	288	928	3 338	20 908	f
		public sector										107 634	g
	2010	DHIS central hospitals		613	6 151	820					1 473	9 057	h
		DHIS district hospitals	6 177	1 535	2 236	8 606	4 050	2 732	798	1 483	2 308	29 925	h
		DHIS provincial hospitals	3 757			471	952	644				5 824	h
		DHIS public sector	13 477	4 848	16 684	23 928	7 744	4 744	1 468	4 615	9 266	86 774	h
		DHIS regional hospitals	556	1 823	6 222	8 768	1 555	906	635	1 868	2 329	24 662	h
		DHIS specialised hospitals	2 987	877	2 075	5 263	1 187	462	35	1 264	3 156	17 306	h
		private sector	1 723	2 337	14 278	4 514	600	1 252	293	1 685	4 385	31 067	i
	2014	DHIS central hospitals	527	636	6 053	846					2 359	10 421	h
		DHIS district hospitals	6 120	1 598	2 538	8 637	4 153	2 796	583	1 494	2 784	30 703	h
		DHIS provincial hospitals	1 615	609	2 172	995	1 003	725	657	471	272	8 518	h
		DHIS public sector	13 200	4 798	16 656	22 048	7 745	4 745	1 523	5 132	12 421	85 362	h
		DHIS regional hospitals	2 122	1 195	4 425	7 091	1 533	840	141	1 953	1 384	20 682	h
		DHIS specialised psychiatric	1 316	760	1 468	2 456	994		106	1 214	1 692	10 007	h
		DHIS specialised TB	1 500			2 023	62	384	36		1 026	5 031	h
	2015	DHIS public sector	14 039	4 765	18 026	22 701	7 687	4 764	1 890	4 661	11 086	89 619	h
Usable beds per 1 000 total population	2009	DHIS	2.2	1.7	1.5	2.1	1.5	1.4	1.8	1.4	2.0	1.8	a
	2010	DHIS	2.2	1.7	1.5	2.1	1.5	1.3	1.5	1.4	2.0	1.8	a
	2015	DHIS	2.0	1.7	1.3	2.1	1.3	1.1	1.6	1.2	1.8	1.6	a

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DHIS.[34] All facility types.
b DHIS.[34] Calculated from DHIS usable beds per 1 000 uninsured population.
c Hospital Yearbook 2004.[376] Calculated from Hospital Yearbook data on beds, per 1 000 population with medical scheme cover from Stats SA GHS.
d Econex Health Reform Note 4.[377]
e Hospitals Direct Database.[375] Calculated from Wilbury & Claymore data on beds, per 1 000 population with medical scheme cover from Stats SA GHS.
f SAHR 1998 Ch13.[373] Based on membership of the Hospital Association of South Africa. Virtually all private hospitals with inpatient treatment facilities are members of HASA. Table 5 pg 148.
g SAHR 1999 Ch9.[374] Figure 1 pg 104.
h DHIS.[34] Usable beds for all main public sector facility types.
i Hospitals Direct Database.[375]

Table 44: PHC health facilities indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Any ARV and/or TB drug stock out rate	2013	Stock outs survey	19.9	53.9	20.4	13.6	40.8	25.9	17.7	4.4	4.9	21.5	a
	2014	Stock outs survey	28.0	28.0	25.0	19.0	29.0	40.0	21.0	39.0	4.0	25.0	a
	2015	Stock outs survey	19.0	36.0	39.0	20.0	12.0	58.0	14.0	31.0	9.0	25.0	b
Tracer items stock-out rate (fixed clinic/CHC/CDC)	2011	DHIS	8.9	12.3	20.4	3.1	14.1	14.9	17.7	14.4		10.5	c
	2012	DHIS	15.5	13.5	22.6	4.9	33.3	17.7	10.4	30.3		16.4	c
	2013	DHIS	18.9	31.9	14.8	6.5	34.6	18.3	17.3	26.3	2.4	18.2	c
	2014	DHIS	24.8	30.5	16.4	9.0	45.4	27.2	16.3	42.2	4.5	23.6	c
	2015	DHIS	21.3	51.6	11.2	14.2	41.0	15.3	8.7	38.3	5.0	22.6	c
PHC doctor clinical work load	2006	DHIS	24.9	19.6	17.0	23.6	18.3	30.1	18.8	11.8	56.3	24.5	c
	2012	DHIS	24.5	34.6	36.6	24.3	22.7	22.7	16.0	14.5		27.2	c
	2015	DHIS	21.5	25.5	27.7	26.2	23.1	17.1	15.3	12.5	26.7	24.4	c
PHC professional nurse clinical work load	2000	DHIS	24.3	23.2						22.1		23.5	c
	2005	DHIS	27.8	29.2	21.7	32.1	17.7	29.7	50.3	46.3		26.4	c
	2012	DHIS	32.1	35.6	32.9	33.8	25.0	41.7	30.2	25.1		31.6	c
	2015	DHIS	32.6	36.4	28.4	32.4	22.0	32.2	26.6	17.5	22.1	27.7	c
PHC utilisation rate	2000	DHIS	2.3	2.0	1.3	1.6	2.1	1.7	2.4	2.3	2.6	1.9	c
	2005	DHIS	2.4	2.1	1.5	1.9	2.7	2.1	2.7	2.6	2.7	2.2	c
	2010	DHIS	2.7	2.3	1.8	2.5	2.7	2.2	3.0	2.4	2.9	2.4	c
	2015	DHIS	2.7	2.4	1.7	2.9	2.5	2.2	2.5	2.2	2.3	2.3	c
PHC utilisation rate under 5 years	2000	DHIS	3.5	2.6	2.4	3.2	3.9	2.8	3.6	4.2	5.1	3.4	c
	2005	DHIS	3.7	3.1	2.9	3.5	5.3	4.0	3.8	4.1	4.5	3.8	c
	2010	DHIS	4.3	3.5	3.9	4.4	5.9	4.8	4.7	4.5	4.7	4.5	c
	2015	DHIS	4.1	4.1	4.0	4.5	5.0	4.1	4.3	4.1	4.0	4.3	c

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Stock outs survey 2014.[378]
b Stock outs survey 2015.[368]
c DHIS.[34]

Table 45: Health information system indicators by province

Indicator	Year	Subgroup	SA	Ref
Birth registration coverage	2013	both sexes live births	55.5	a
	2014	both sexes live births	60.1	a
	2015	both sexes live births	65.1	a
Death registration coverage	2014	15+ years vital registration	94.0	b
	2015	15+ years vital registration	96.0	c

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Stats SA Live Births 2013–2015.[18] Registered within 30 days.
b Stats SA Causes of death 2014.[117]
c Stats SA Causes of death 2015.[31]

Health personnel

Context	Sufficient and appropriately trained health professionals, equitably distributed, remains one of the targets of the Department of Health. It is also a target for the global effort to achieve the Sustainable Development Goals.
New data sources	Nationally, new data have been reported in the: • Health Professions Council of South Africa • South African Nursing Council • South African Pharmacy Council • Government personnel administration system (PERSAL)
Key issues and trends	Community service (CS), involving a year of remunerated service in the public sector, has been entrenched in various pieces of health legislation. Although nationally managed, the CS programme remains entirely dependent on young graduates being able to secure appropriate appointments in time to make the transition (usually) from interns to fully-competent practising professionals.

Combining the data from the Government personnel administration system (PERSAL) with the figures reported by the statutory health councils, in order to contrast the total number of registered health professionals with those employed in the public sector, should be simple, but has some challenges. The PERSAL data presented here are from March 2016. The data on the South African Pharmacy Council web site are undated, but appear to update continually. One of the highly contested issues in 2016/17 has been the appointment of community service personnel in various categories. As a result, detailed data on the placement of community service officers is generally missing. The universities have increased their outputs in response to a clear signal from the Department of Health, but new graduates are struggling to find internship positions and community service positions in a public service that is cash-strapped and freezing any vacant post that is not immediately filled. Community service pharmacists have been accommodated in private sector pharmacies in 2017, supposedly those that are pick-up points for the CCMDD programme. The ability to accommodate all of the 2017 interns in 2018 is highly questionable, even if corporate and independent pharmacy positions are included. A Community Health Service Summit was held in 2015, but focused predominantly on the medical practitioner and, to a lesser extent, on the dentist categories.[379] The Summit recommended that "qualitative information about community service should also be collected and analysed on an ongoing basis". The net effect of the occupation-specific dispensation (OSD) should not be assumed to be positive.[380] Models for dual practice, in both the private and public sectors will need to be refined.[381] Lessons learned from the process of contracting private general practitioners also need to be carefully considered.[363,382]

Currently, community health workers (CHW's, or community caregivers) are not registered with a statutory health council, nor are they considered to be "health providers" in terms of the National Health Act. It has been identified that there are too few CHWs to support ward-based outreach teams, and that their scope of practice is unduly restricted.[364]

Table 46: Number of health personnel practising by sector, and registered with applicable professional council, by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Number of clinical associates	2012	public sector	29	5	19	7	4	5	3	5	0	77	a
	2015	public sector	58	20	39	40	7	54	4	48	0	270	a
	2016	public sector	68	18	40	62	7	66	2	40		303	a
Number of clinical associates registered	2009	HPCSA			4			1				5	b
	2010	HPCSA			5			1				10	b
	2015	HPCSA	75	20	146	64	25	72	16	59	7	484	b
	2016	HPCSA	90	24	156	91	26	101	18	62	9	577	b
		female HPCSA	51	10	89	49	11	59	10	28	6	313	b
		male HPCSA	39	14	67	42	15	42	8	34	3	264	b
Number of dental practitioners	2000	public sector	47	25	225	61	30	45	11	41	112	597	a
	2005	public sector	55	48	186	62	62	49	16	48	125	651	a
	2010	public sector	96	62	215	84	95	74	25	40	79	770	a
	2015	public sector	134	74	244	154	180	114	43	58	135	1 137	a
	2016	public sector	132	55	247	141	191	120	59	44	129	1 118	a
Number of dental practitioners registered	2007	HPCSA	251	172	2 025	651	163	209	70	157	1 087	4 937	b
	2010	HPCSA	249	154	1 910	629	128	356	68	84	1 076	5 320	b
	2015	HPCSA	323	195	2 349	839	247	294	97	196	1 371	6 035	b
	2016	HPCSA	331	199	2 375	851	261	297	98	203	1 417	6 155	b
		female HPCSA	102	55	947	305	129	105	32	76	504	2 292	b
		male HPCSA	229	144	1 428	546	132	192	66	127	913	3 863	b

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Number of dental specialists	2000	public sector	0	1	34	4	0	2	0	0	12	53	a
	2005	public sector	0	0	16	3	1	2	2	1	18	43	a
	2010	public sector	0		54	8	0	36		1	22	121	a
	2015	public sector		1	118		3	1	1		30	154	a
	2016	public sector		1	120	1	2	1	1		33	160	a
Number of dental therapists	2000	public sector	3	1	28	31	22	8	2	15	2	112	a
	2005	public sector	4	4	26	29	43	14	2	19	2	143	a
	2010	public sector	8	2	39	25	63	19	10	16	3	185	a
	2015	public sector	10	1	38	116	101	16	9	16	2	309	a
	2016	public sector	9	1	41	120	102	14	8	20	2	318	a
Number of dental therapists registered	2007	HPCSA	11	23	144	147	54	28	6	34	3	450	b
	2010	HPCSA	7	15	132	159	38	66	7	17	3	492	b
	2015	HPCSA	15	20	186	249	67	48	10	38	4	638	b
	2016	HPCSA	15	20	180	261	73	49	10	47	5	661	b
		female HPCSA	7	5	93	161	33	16	5	20	2	343	b
		male HPCSA	8	14	87	100	40	33	5	27	3	317	b
Number of enrolled nurses	2000	public sector	3 586	815	2 159	6 521	3 077	1 087	302	1 397	1 782	20 726	a
	2005	public sector	2 326	418	2 927	8 119	2 591	1 182	242	1 077	1 699	20 582	a
	2010	public sector	2 377	435	4 975	9 232	2 732	1 414	188	774	2 188	24 316	a
	2015	public sector	3 293	882	6 485	10 603	4 240	1 739	232	927	2 468	30 870	a
	2016	public sector	3 222	861	6 886	10 708	4 292	1 724	204	876	2 551	31 325	a
Number of enrolled nurses registered	1998	SANC										32 744	c
	2000	SANC										32 399	c
	2005	SANC	2 837	1 256	9 023	12 404	2 861	1 730	498	2 134	4 342	37 085	c
	2010	SANC	3 566	1 846	13 006	18 895	4 170	2 276	461	2 549	5 601	52 370	c
	2015	SANC	5 733	2 382	17 469	24 962	6 158	3 262	453	3 265	6 616	70 300	c
	2016	SANC	6 117	2 482	18 734	25 292	6 617	3 489	452	3 424	6 951	73 558	c
Number of environmental health practitioners	2002	public sector	81	39	18	131	156	51	6	41	13	537	a
	2005	public sector	149	54	34	199	210	130	15	88	10	890	a
	2010	public sector	128	51	111	171	156	126	11	30	9	795	a
	2015	public sector	39	73	92	93	91	89	23	37	0	799	a
	2016	public sector	27	54	101	94	62	85	21	36		711	a
Number of environmental health practitioners registered	2007	HPCSA	238	168	660	615	268	173	98	86	442	2 751	b
	2010	HPCSA	223	138	612	501	180	258	75	56	421	2 842	b
	2015	HPCSA	388	261	887	726	305	225	111	164	464	3 535	b
	2016	HPCSA	394	266	899	737	306	239	108	169	462	3 585	b
		female HPCSA	247	139	505	441	176	147	49	102	210	2 018	b
		male HPCSA	147	127	394	296	130	92	59	67	251	1 566	b
Number of medical practitioners	2000	public sector	745	548	1 693	1 842	604	419	198	361	1 181	7 591	a
	2005	public sector	964	496	1 841	2 116	750	622	246	461	1 244	8 747	a
	2010	private sector										6 775	d
		public sector	1 323	577	2 480	3 058	962	709	321	480	1 392	11 309	a
	2011	public sector	1 490	588	2 709	3 101	997	704	361	595	1 463	12 014	a
	2015	public sector	1 616	539	3 280	3 418	1 279	836	433	674	1 563	13 656	a
	2016	public sector	1 631	572	3 394	3 517	1 288	937	458	721	1 500	14 036	a
Number of medical practitioners (including specialists) registered	2007	HPCSA	2 183	1 722	12 246	5 707	1 196	1 149	432	962	7 288	34 324	b
	2010	HPCSA	2 149	1 559	11 524	5 670	937	1 819	403	631	7 086	36 912	b
	2015	HPCSA	2 881	1 878	14 564	7 395	1 484	1 516	598	1 356	9 224	42 323	b
	2016	both sexes HPCSA General MPs	2 261	1 293	9 522	5 267	1 328	1 288	502	1 136	5 870	29 311	b
		both sexes HPCSA General MPs + Specialists	2 952	1 915	14 961	7 625	1 548	1 555	622	1 423	9 485	43 503	b
		both sexes HPCSA Specialist MPs	691	622	5 439	2 358	220	267	120	287	3 615	14 192	b
		female HPCSA General MPs	923	505	4 425	2 188	450	442	170	386	2 732	12 506	b
		female HPCSA General MPs + Specialists	1 052	670	6 167	2 867	512	485	192	439	3 793	16 575	b
		female HPCSA Specialist MPs	129	165	1 742	679	62	43	22	53	1 061	4 069	b
		male HPCSA General MPs	1 338	788	5 097	3 079	878	846	332	750	3 138	16 805	b
		male HPCSA General MPs + Specialists	1 900	1 245	8 794	4 758	1 036	1 070	430	984	5 692	26 928	b
		male HPCSA Specialist MPs	562	457	3 697	1 679	158	224	98	234	2 554	10 123	b

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Number of medical researchers	2002	public sector		17	56	5	2			1	60	189	a
	2005	public sector	0	6	14	3	6	0	0	0	51	103	a
	2010	public sector		9	18	12	4	1	1		28	107	a
	2015	public sector		6	21	6	3		1		40	100	a
	2016	public sector		4	17	62	8		1		38	130	a
Number of medical specialists	2000	public sector	160	247	1 500	566	48	31	14	46	1 269	3 881	a
	2005	public sector	142	330	1 297	544	79	15	17	64	1 003	3 499	a
	2010	private sector										5 410	d
		public sector	240	370	1 721	588	107	62	20	49	1 279	4 442	a
	2015	public sector	161	300	1 964	736	80	81	26	115	1 512	4 986	a
	2016	public sector	161	280	1 998	719	68	73	26	106	1 299	4 737	a
Number of nursing assistants	2000	public sector	4 381	2 131	5 010	5 508	2 786	1 519	564	2 395	3 900	28 194	a
	2005	public sector	4 558	2 495	5 159	5 871	3 834	1 747	656	2 897	3 789	31 006	a
	2010	public sector	5 369	2 230	6 877	6 123	4 524	2 103	759	2 730	4 143	34 858	a
	2015	public sector	5 577	2 114	6 454	6 353	5 049	1 602	887	2 750	4 091	34 877	a
	2016	public sector	5 433	2 162	6 535	6 223	5 113	1 602	878	2 525	4 112	34 583	a
Number of nursing assistants registered	2005	SANC	5 341	3 049	15 625	9 689	5 834	2 241	926	4 096	7 849	54 650	c
	2010	SANC	6 124	2 951	16 667	11 489	8 331	3 732	1 311	4 732	8 135	63 472	c
	2015	SANC	7 535	3 331	19 178	13 208	9 852	3 892	1 083	4 862	8 522	71 463	c
	2016	SANC	7 779	3 187	19 767	14 061	10 062	3 824	1 075	5 009	8 538	73 302	c
Number of occupational therapists	2000	public sector	14	32	115	69	54	21	5	18	86	414	a
	2005	public sector	33	62	130	96	88	60	15	38	83	605	a
	2010	public sector	80	71	171	119	113	55	40	38	151	838	a
	2015	public sector	139	67	306	229	205	95	68	59	144	1 313	a
	2016	public sector	131	71	290	219	216	103	54	53	142	1 280	a
Number of occupational therapists registered	2007	HPCSA	121	241	1 100	337	111	133	55	80	800	3 015	b
	2010	HPCSA	141	232	1 085	347	86	221	49	49	829	3 508	b
	2015	HPCSA	220	310	1 618	537	197	223	92	133	1 208	4 575	b
	2016	HPCSA	226	313	1 679	569	220	239	95	142	1 278	4 792	b
		female HPCSA	217	308	1 603	543	168	214	93	125	1 256	4 547	b
		male HPCSA	9	5	76	26	52	25	2	17	32	245	b
Number of pharmacists	2000	public sector	141	52	238	253	97	58	16	48	182	1 085	a
	2005	public sector	206	99	269	365	145	123	35	108	257	1 617	a
	2010	public sector	252	112	751	401	297	266	89	130	660	2 966	a
	2015	public sector	547	343	1 102	788	511	276	151	238	915	4 970	a
	2016	public sector	618	351	1 209	822	566	300	150	245	932	5 223	a
Number of pharmacists registered	2003	SAPC	834	436	4 336	1 561	280	393	135	478	1 783	10 629	e
	2005	SAPC	870	421	4 320	1 593	310	397	117	512	1 832	10 824	e
	2010	SAPC	775	381	2 917	1 502	344	455	137	443	1 479	12 218	e
	2015	both sexes SAPC	1 570	431	4 655	1 888	516	568	181	639	2 166	13 479	e
		female SAPC										8 134	e
		male SAPC										5 345	e
	2017	both sexes SAPC	1 771	486	5 027	2 063	630	625	197	651	2 378	14 412	e
		female SAPC										8 846	e
		male SAPC										5 566	e
Number of physiotherapists	2000	public sector	37	27	120	115	42	13	4	11	85	454	a
	2005	public sector	50	58	144	191	64	58	15	46	98	724	a
	2010	public sector	110	75	199	231	115	60	56	34	129	1 009	a
	2015	public sector	160	67	205	326	188	75	63	75	155	1 315	a
	2016	public sector	140	58	268	325	188	91	58	66	145	1 339	a
Number of physiotherapists registered	2007	HPCSA	216	281	1 945	691	154	174	70	143	1 294	5 059	b
	2010	HPCSA	240	267	1 831	732	137	311	72	85	1 355	5 777	b
	2011	HPCSA	217	245	1 698	665	122	290	65	75	1 249	5 937	b
	2015	HPCSA	355	375	2 436	987	276	275	114	197	1 824	6 942	b
	2016	HPCSA	381	385	2 512	1 018	285	293	119	204	1 879	7 183	b
		female HPCSA	318	321	2 151	823	182	227	102	144	1 604	5 972	b
		male HPCSA	63	64	361	195	103	66	17	60	275	1 211	b

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Number of professional nurses	2000	public sector	6 429	2 909	7 984	9 195	5 058	2 306	839	2 855	4 159	41 734	a
	2005	public sector	6 642	3 580	7 587	9 531	5 763	2 696	975	3 053	3 830	43 660	a
	2010	public sector	8 287	1 868	9 393	12 463	7 243	3 732	1 258	3 321	4 399	51 966	a
	2015	public sector	10 273	2 353	12 672	16 431	9 356	5 194	1 365	4 337	5 268	68 105	a
	2016	public sector	10 292	2 274	12 906	16 628	9 602	5 213	1 438	4 242	5 156	67 766	a
Number of professional nurses registered	1998	SANC										91 011	c
	2000	SANC										93 303	c
	2005	SANC	12 176	7 175	26 754	19 445	7 540	4 774	1 936	6 495	13 239	99 534	c
	2010	SANC	13 985	7 550	30 063	24 360	9 025	5 714	2 146	7 775	14 626	115 244	c
	2015	SANC	15 392	8 075	35 770	30 475	11 464	7 106	2 250	9 621	16 701	136 854	c
	2016	SANC	15 563	8 205	36 603	31 608	11 853	7 502	2 284	9 845	17 135	140 598	c
Number of psychologists	2000	public sector	23	11	97	35	5	2	1	10	54	238	a
	2005	public sector	37	29	122	67	35	17	7	27	58	399	a
	2010	public sector	56	32	176	68	50	18	9	15	74	498	a
	2015	public sector	72	33	231	109	119	36	19	52	88	1 238	a
Number of psychologists registered	2007	HPCSA	333	244	3 094	697	96	131	40	198	1 344	6 310	b
	2010	HPCSA	362	238	3 136	709	102	234	40	152	1 388	7 037	b
	2015	HPCSA	482	275	3 944	905	158	186	61	266	1 838	8 255	b
	2016	HPCSA	486	277	4 014	916	162	194	61	272	1 890	8 415	b
		female HPCSA	355	178	3 005	680	115	142	38	202	1 315	6 117	b
		male HPCSA	131	99	1 009	236	47	52	23	70	575	2 298	b
Number of pupil auxiliary nurses registered	2005	SANC	157	165	3 269	1 331	395	144	231	146	451	6 289	c
	2010	SANC	590	224	3 190	1 336	281	247	113	194	536	6 711	c
	2015	SANC	1 132	199	3 817	1 864	375	428	149	572	776	9 312	c
	2016	SANC	487	79	1 146	606	96	100	117	84	275	2 990	c
Number of pupil nurses registered	2005	SANC	39	201	2 373	4 715	209	155	0	2	402	8 096	c
	2010	SANC	1 336	332	6 548	6 354	672	401	0	28	1 165	16 836	c
	2015	SANC	2 074	461	6 765	6 501	434	527	0	614	1 470	18 846	c
	2016	SANC	1 200	176	3 933	4 005	146	139	0	366	808	10 773	c
Number of radiographers	2000	public sector	237	192	634	361	81	44	21	63	483	2 116	a
	2005	public sector	258	159	553	393	113	82	46	83	358	2 048	a
	2010	public sector	359	167	560	455	144	91	57	66	401	2 301	a
	2015	public sector	352	163	694	595	175	95	106	115	468	2 765	a
	2016	public sector	356	170	706	615	183	123	101	119	452	2 827	a
Number of radiographers registered	2007	HPCSA	405	414	1 940	980	168	173	87	177	1 109	5 509	b
	2010	HPCSA	447	380	1 866	1 013	110	324	87	107	1 076	6 215	b
	2015	HPCSA	635	528	2 610	1 384	267	321	167	287	1 524	7 787	b
	2016	HPCSA	666	527	2 694	1 434	304	341	175	304	1 563	8 072	b
		female HPCSA	573	391	2 340	1 196	196	270	141	239	1 410	6 810	b
		male HPCSA	93	136	354	238	108	71	34	65	153	1 262	b
Number of student nurses	2000	public sector	1 282	501	2 005	1 420	715	377	89	326	794	7 509	a
	2005	public sector	2 226	33	2 177	2 051	490	670	110	575	219	8 551	a
	2010	public sector	1 273	2	4 916	2 272	789	689	4	961		10 906	a
	2015	public sector	73		3 734	1 694	461	865		70		6 897	a
	2016	public sector	11		4 059	1 544	445	789		42		6 890	a
Number of student nurses registered	2005	SANC	2 863	681	3 056	2 704	1 193	299	124	1 172	1 004	13 096	c
	2010	SANC	3 761	1 079	4 839	3 318	1 778	704	168	1 577	2 554	19 778	c
	2015	SANC	3 611	1 294	4 498	3 387	1 922	958	243	2 003	2 633	20 549	c
	2016	SANC	3 756	1 213	4 737	3 631	1 895	991	264	2 071	2 781	21 339	c
Total number of health professional posts	2005	public sector filled posts	17 650	7 871	22 482	29 640	14 274	7 467	2 399	8 585	12 844	123 268	a
	2010	public sector filled posts	19 958	6 063	32 656	35 310	17 394	9 455	2 848	8 685	14 957	147 387	a
	2015	public sector filled posts	22 504	7 036	37 679	41 691	22 048	11 168	3 431	9 571	16 879	173 761	a
	2016	public sector filled posts	22 163	6 914	38 777	41 738	22 326	11 175	3 442	9 110	16 491	172 443	f

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a PERSAL.[383] These figures include only the posts that are filled at time of data extraction. The South African total includes the sum of the provinces plus posts within the National Department of Health. Data for Environmental Health Practitioners only include those employed by provincial government. Note that for provinces such as GP and WC a substantial number of EHPs may be employed by local government.

b HPCSA.[384] Total for South Africa includes those with REGION indicated as Foreign or Unknown. The number on the register includes those professionals who are retired, overseas, working part-time, working in other sectors or not working at all (a substantial proportion of the total for some professions).

c SANC.[385] The number on the register includes those professionals who are retired, overseas, working part-time, working in other sectors or not working at all.

d Econex Health Reform Note 7.[386]
e SAPC.[387] Includes those with province unknown or foreign. Total for South Africa by province and by population group does not correspond based on data extracted from web site on 1 Feb 2017.
f PERSAL.[383] Data for psychologists were not included in the dataset for 2016. Figure for South Africa includes the sum of the provinces plus staff at NDoH.

Table 47: Number of health personnel by population group

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Number of clinical associates	2012	public sector	74	1	2			a
	2015	public sector	258	5	2	5		a
	2016	public sector	291	5	2	5		a
Number of clinical associates registered	2009	HPCSA	3			1	1	b
	2010	HPCSA	7			2	1	b
	2015	HPCSA	438	13	9	22	2	b
	2016	HPCSA	521	14	10	25	7	b
Number of dental practitioners	2001	public sector	172	45	125	292		a
	2005	public sector	237	60	135	219		a
	2010	public sector	380	74	144	172		a
	2015	public sector	567	113	217	236	4	a
	2016	public sector	560	112	214	228	4	a
Number of dental practitioners registered	2007	HPCSA	453	90	582	1 690	2 122	b
	2010	HPCSA	631	166	797	1 910	1 816	b
	2015	HPCSA	923	266	1 077	2 221	1 548	b
	2016	HPCSA	989	290	1 114	2 247	1 515	b
Number of dental specialists	2001	public sector	4	0	9	32		a
	2005	public sector	7	5	9	22		a
	2010	public sector	36	9	28	48		a
	2015	public sector	48	9	34	63		a
	2016	public sector	47	7	39	67		a
Number of dental therapists	2001	public sector	102	0	14	4		a
	2005	public sector	126	1	12	4		a
	2010	public sector	164	5	14	2		a
	2015	public sector	269	6	33	1		a
	2016	public sector	276	6	32	4		a
Number of dental therapists registered	2007	HPCSA	186	2	72	27	163	b
	2010	HPCSA	242	1	98	30	121	b
	2015	HPCSA	394	4	126	29	85	b
	2016	HPCSA	418	3	127	30	83	b
Number of enrolled nurses	2001	public sector	17 227	2 375	278	811		a
	2005	public sector	17 358	2 214	378	632		a
	2010	public sector	21 071	2 339	393	513		a
	2015	public sector	28 106	2 069	299	360	36	a
	2016	public sector	28 682	1 986	272	334	51	a
Number of environmental health practitioners	2002	public sector	445	16	14	62		a
	2005	public sector	786	23	27	54		a
	2010	public sector	735	14	17	29		a
	2015	public sector	741	16	17	22	3	a
	2016	public sector	654	16	16	18	7	a
Number of environmental health practitioners registered	2008	HPCSA	1 075	101	57	442	1 056	b
	2010	HPCSA	1 355	139	75	408	865	b
	2015	HPCSA	2 227	214	77	366	651	b
	2016	HPCSA	2 317	213	78	355	622	b
Number of medical practitioners	2001	public sector	2 042	267	1 365	3 678		a
	2005	public sector	3 295	386	1 651	3 415		a
	2010	public sector	5 410	573	1 900	3 426		a
	2015	public sector	7 164	805	1 969	3 663	55	a
	2016	public sector	7 461	804	1 984	3 689	98	a
Number of medical practitioners (including specialists) registered	2007	HPCSA	5 143	481	4 269	15 367	9 064	b
	2010	HPCSA	7 140	727	5 014	16 560	7 471	b
	2015	HPCSA General MPs + Specialists	10 541	1 324	5 949	18 345	6 164	b
	2016	HPCSA General MPs	9 294	1 238	4 036	11 297	3 446	b
		HPCSA General MPs + Specialists	11 114	1 496	6 114	18 767	6 012	b
		HPCSA Specialist MPs	1 820	258	2 078	7 470	2 566	b

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Number of medical researchers	2002	public sector	33	10	13	133		a
	2005	public sector	33	2	11	57		a
	2010	public sector	40	6	15	46		a
	2015	public sector	47	22	7	24		a
	2016	public sector	83	20	3	24		a
Number of medical specialists	2001	public sector	474	131	509	2 698		a
	2005	public sector	617	110	618	2 154		a
	2010	public sector	1 066	221	858	2 297		a
	2015	public sector	1 505	267	958	2 243	13	a
	2016	public sector	1 525	254	938	1 999	21	a
Number of nursing assistants	2001	public sector	21 711	4 920	409	1 606		a
	2005	public sector	24 957	4 458	346	1 245		a
	2010	public sector	29 818	3 912	244	884		a
	2015	public sector	30 701	3 306	189	621	60	a
	2016	public sector	30 647	3 156	174	566	40	a
Number of occupational therapists	2001	public sector	136	49	50	167		a
	2005	public sector	218	55	50	282		a
	2010	public sector	300	122	72	344		a
	2015	public sector	562	152	115	482	2	a
	2016	public sector	572	140	110	453	5	a
Number of occupational therapists registered	2007	HPCSA	285	103	177	1 806	644	b
	2010	HPCSA	410	172	242	2 178	506	b
	2015	HPCSA	674	304	326	2 870	401	b
	2016	HPCSA	733	335	344	2 988	392	b
Number of pharmacists	2001	public sector	290	74	290	606		a
	2005	public sector	540	115	339	623		a
	2010	public sector	1 552	407	360	647		a
	2015	public sector	2 787	598	691	879	15	a
	2016	public sector	3 005	621	686	883	28	a
Number of pharmacists registered	2008	SAPC	1 302	347	1 895	7 864		c
	2010	SAPC	1 567	381	2 035	7 850	385	c
	2015	SAPC	2 595	487	2 736	7 608	53	c
	2017	SAPC	3 083	534	2 991	7 760	44	c
Number of physiotherapists	2001	public sector	191	62	74	132		a
	2005	public sector	265	96	111	252		a
	2010	public sector	397	168	144	300		a
	2015	public sector	596	204	183	329	3	a
	2016	public sector	614	192	193	332	8	a
Number of physiotherapists registered	2007	HPCSA	472	179	374	2 581	1 453	b
	2010	HPCSA	699	343	487	3 023	1 225	b
	2015	HPCSA	1 059	598	638	3 717	930	b
	2016	HPCSA	1 133	633	665	3 846	906	b
Number of professional nurses	2001	public sector	32 747	4 360	892	3 461		a
	2005	public sector	35 356	4 341	1 027	2 936		a
	2010	public sector	43 304	4 987	1 247	2 428		a
	2015	public sector	58 311	5 890	1 528	2 216	160	a
	2016	public sector	58 372	5 587	1 526	2 022	259	a
Number of psychologists	2001	public sector	69	17	27	146		a
	2005	public sector	121	23	32	223		a
	2010	public sector	174	30	37	257		a
	2015	public sector	723	86	69	353	7	a
Number of psychologists registered	2007	HPCSA	390	125	279	3 224	2 292	b
	2010	HPCSA	605	211	380	3 924	1 917	b
	2015	HPCSA	1 004	349	515	4 930	1 457	b
	2016	HPCSA	1 057	369	526	5 048	1 415	b
Number of radiographers	2001	public sector	884	427	160	590		a
	2005	public sector	927	378	230	513		a
	2010	public sector	1 218	395	247	441		a
	2015	public sector	1 554	497	305	402	7	a
	2016	public sector	1 633	489	303	391	11	a

Indicator	Year	Subgroup	African/ Black	Coloured	Indian/ Asian	White	Other/ Unspecified	Ref
Number of radiographers registered	2007	HPCSA	737	230	351	1 545	2 646	b
	2010	HPCSA	1 192	418	514	1 968	2 123	b
	2015	HPCSA	2 243	764	756	2 477	1 547	b
	2016	HPCSA	2 430	803	803	2 551	1 485	b
Number of student nurses	2001	public sector	5 063	775	300	869		a
	2005	public sector	7 334	534	249	434		a
	2010	public sector	10 028	297	312	269		a
	2015	public sector	6 394	155	205	140	3	a
	2016	public sector	6 416	128	200	137	9	a
Total number of health professional posts	2002	public sector	81 478	13 273	4 575	14 367		a
	2005	public sector filled posts	92 177	12 801	5 225	13 065		a
	2010	public sector filled posts	115 693	13 559	6 032	12 103		a
	2015	public sector filled posts	140 333	14 200	6 821	12 039	368	a
	2016	public sector filled posts	111 865	11 532	6 418	10 813	490	d

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a PERSAL.[383] These figures include only the posts that are filled at time of data extraction.
b HPCSA.[384] The number on the register includes those professionals who are retired, overseas, working part-time, working in other sectors or not working at all (a substantial proportion of the total for some professions).
c SAPC.[387]
d PERSAL.[383] Data for psychologists were not included in the dataset for 2016.

Table 48: Public and private sector health personnel per 100 000 target population by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Dental practitioners per 100 000 population	2000	public sector	0.8	1.1	4.9	0.8	0.6	1.8	1.6	1.4	3.8	1.7	a
	2005	public sector	0.9	2.0	2.5	0.7	1.3	1.6	1.7	1.6	3.2	1.6	a
	2010	public sector	1.6	2.6	2.7	0.9	2.0	2.3	2.6	1.3	1.9	1.9	a
	2015	public sector	2.2	3.2	2.6	1.6	3.4	3.1	4.5	1.8	3.0	2.5	a
	2016	both sexes public sector	2.1	2.3	2.5	1.4	3.6	3.3	6.0	1.4	2.7	2.4	a
Dental specialists per 100 000 population	2000	public sector	0.0	0.0	0.7	0.1	0.0	0.1	0.0	0.0	0.4	0.2	a
	2005	public sector	0.0	0.0	0.2	0.0	0.0	0.1	0.2	0.0	0.5	0.1	a
	2010	public sector	0.0		0.7	0.1	0.0	1.1		0.0	0.5	0.3	a
	2015	public sector		0.0	1.2		0.1	0.0	0.1		0.7	0.3	a
	2016	both sexes public sector		0.0	1.2	0.0	0.0	0.0	0.1		0.7	0.4	a
Dental therapists per 100 000 population	2000	public sector	0.0	0.0	0.6	0.4	0.5	0.3	0.3	0.5	0.1	0.3	a
	2005	public sector	0.1	0.2	0.3	0.3	0.9	0.4	0.2	0.7	0.1	0.4	a
	2010	public sector	0.1	0.1	0.5	0.3	1.3	0.6	1.0	0.5	0.1	0.4	a
	2015	public sector	0.2	0.0	0.4	1.2	1.9	0.4	0.9	0.5	0.0	0.7	a
	2016	both sexes public sector	0.1	0.0	0.4	1.2	1.9	0.4	0.8	0.6	0.0	0.7	a
Enrolled nurses per 100 000 population	2000	public sector	59.2	36.1	46.6	85.0	63.6	42.7	44.0	46.1	60.0	59.7	a
	2005	public sector	39.3	17.1	38.6	90.1	54.7	37.6	25.0	37.0	44.0	50.7	a
	2010	public sector	40.3	18.2	63.2	100.1	57.0	44.9	19.3	25.8	53.8	58.8	a
	2015	public sector	53.2	38.1	68.4	111.4	81.0	47.7	24.4	29.4	54.0	68.6	a
	2016	both sexes public sector	51.1	35.9	70.6	109.7	80.8	47.1	20.8	27.2	53.5	67.9	a
Environmental health practitioners per 100 000 population	2002	public sector	1.4	1.6	0.3	1.5	3.4	1.7	0.7	1.5	0.4	1.4	a
	2005	public sector	2.5	2.2	0.4	2.2	4.4	4.1	1.6	3.0	0.3	2.2	a
	2010	public sector	2.2	2.1	1.4	1.9	3.3	4.0	1.1	1.0	0.2	1.9	a
	2015	public sector	0.6	3.2	1.0	1.0	1.7	2.4	2.4	1.2		1.8	a
	2016	both sexes public sector	0.4	2.3	1.0	1.0	1.2	2.3	2.1	1.1		1.5	a
Medical practitioners per 100 000 population	2000	public sector	12.3	24.3	36.6	24.0	12.5	16.4	28.9	11.9	39.7	21.9	a
	2005	public sector	16.3	20.3	24.3	23.5	15.8	19.8	25.5	15.8	32.2	21.6	a
	2010	private sector										37.0	b
		public sector	22.4	24.1	31.5	33.2	20.1	22.5	32.9	16.0	34.2	27.3	a
		public sector adjusted										35.0	b
	2015	public sector	26.1	23.3	34.6	35.9	24.4	22.9	45.5	21.3	34.2	30.3	a
	2016	both sexes public sector	25.9	23.9	34.8	36.0	24.3	25.6	46.6	22.4	31.4	30.4	a

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Medical researchers per 100 000 population	2002	public sector	0.0	0.7	0.8	0.1	0.0	0.0	0.0	0.0	1.7	0.5	a
	2005	public sector	0.0	0.2	0.2	0.0	0.1	0.0	0.0	0.0	1.3	0.3	a
	2010	public sector		0.4	0.2	0.1	0.1	0.0	0.1		0.7	0.3	a
	2015	public sector		0.3	0.2	0.1	0.1		0.1		0.9	0.2	a
	2016	both sexes public sector		0.2	0.2	0.6	0.2		0.1		0.8	0.3	a
Medical specialists per 100 000 population	2000	public sector	2.6	10.9	32.4	7.4	1.0	1.2	2.0	1.5	42.7	11.2	a
	2005	public sector	2.4	13.5	17.1	6.0	1.7	0.5	1.8	2.2	26.0	8.6	a
	2010	private sector										57.0	c
		public sector	4.1	15.5	21.9	6.4	2.2	2.0	2.1	1.6	31.5	10.7	a
		public sector adjusted										10.0	c
	2015	public sector	2.6	13.0	20.7	7.7	1.5	2.2	2.7	3.6	33.1	11.1	a
	2016	both sexes public sector	2.6	11.7	20.5	7.4	1.3	2.0	2.7	3.3	27.2	10.3	a
Nursing assistants per 100 000 population	2000	public sector	72.3	94.4	108.2	71.8	57.6	59.6	82.2	79.1	131.2	81.3	a
	2005	public sector	77.1	102.3	68.0	65.1	80.9	55.6	67.9	99.5	98.1	76.4	a
	2010	public sector	91.0	93.2	87.3	66.4	94.4	66.8	77.8	91.1	101.9	84.2	a
	2015	public sector	90.1	91.4	68.1	66.7	96.5	43.9	93.3	87.1	89.5	77.5	a
	2016	both sexes public sector	86.2	90.2	67.0	63.8	96.3	43.8	89.4	78.4	86.2	75.0	a
Occupational therapists per 100 000 population	2000	public sector	0.2	1.4	2.5	0.9	1.1	0.8	0.7	0.6	2.9	1.2	a
	2005	public sector	0.6	2.5	1.7	1.1	1.9	1.9	1.6	1.3	2.1	1.5	a
	2010	public sector	1.4	3.0	2.2	1.3	2.4	1.7	4.1	1.3	3.7	2.0	a
	2015	public sector	2.2	2.9	3.2	2.4	3.9	2.6	7.2	1.9	3.2	2.9	a
	2016	both sexes public sector	2.1	3.0	3.0	2.2	4.1	2.8	5.5	1.6	3.0	2.8	a
Pharmacists per 100 000 population	2000	public sector	2.3	2.3	5.1	3.3	2.0	2.3	2.3	1.6	6.1	3.1	a
	2005	public sector	3.5	4.1	3.5	4.1	3.1	3.9	3.6	3.7	6.7	4.0	a
	2010	public sector	4.3	4.7	9.5	4.3	6.2	8.4	9.1	4.3	16.2	7.2	a
	2015	public sector	8.8	14.8	11.6	8.3	9.8	7.6	15.9	7.5	20.0	11.0	a
	2016	both sexes public sector	9.8	14.6	12.4	8.4	10.7	8.2	15.3	7.6	19.5	11.3	a
Physiotherapists per 100 000 population	2000	public sector	0.6	1.2	2.6	1.5	0.9	0.5	0.6	0.4	2.9	1.3	a
	2005	public sector	0.8	2.4	1.9	2.1	1.4	1.8	1.6	1.6	2.5	1.8	a
	2010	public sector	1.9	3.1	2.5	2.5	2.4	1.9	5.7	1.1	3.2	2.4	a
	2015	public sector	2.6	2.9	2.2	3.4	3.6	2.1	6.6	2.4	3.4	2.9	a
	2016	both sexes public sector	2.2	2.4	2.8	3.3	3.5	2.5	5.9	2.1	3.0	2.9	a
Professional nurses per 100 000 population	2000	public sector	106.1	128.9	172.5	119.8	104.6	90.5	122.3	94.3	139.9	120.3	a
	2005	public sector	112.3	146.7	100.0	105.8	121.6	85.8	100.9	104.8	99.2	107.6	a
	2010	public sector	140.5	78.1	119.3	135.1	151.1	118.5	129.0	110.8	108.2	125.6	a
	2015	public sector	166.0	101.7	133.7	172.6	178.7	142.5	143.6	137.3	115.3	151.3	a
	2016	both sexes public sector	163.2	94.8	132.2	170.4	180.8	142.5	146.4	131.7	108.1	146.9	a
Psychologists per 100 000 population	2000	public sector	0.4	0.5	2.1	0.5	0.1	0.1	0.1	0.3	1.8	0.7	a
	2005	public sector	0.6	1.2	1.6	0.7	0.7	0.5	0.7	0.9	1.5	1.0	a
	2010	public sector	0.9	1.3	2.2	0.7	1.0	0.6	0.9	0.5	1.8	1.2	a
	2015	public sector	1.2	1.4	2.4	1.1	2.3	1.0	2.0	1.6	1.9	2.8	a
Radiographers per 100 000 population	2000	public sector	3.9	8.5	13.7	4.7	1.7	1.7	3.1	2.1	16.3	6.1	a
	2005	public sector	4.4	6.5	7.3	4.4	2.4	2.6	4.8	2.8	9.3	5.0	a
	2010	public sector	6.1	7.0	7.1	4.9	3.0	2.9	5.8	2.2	9.9	5.6	a
	2015	public sector	5.7	7.0	7.3	6.2	3.3	2.6	11.1	3.6	10.2	6.1	a
	2016	both sexes public sector	5.7	7.1	7.2	6.3	3.5	3.4	10.3	3.7	9.5	6.1	a
Student nurses per 100 000 population	2000	public sector	21.2	22.2	43.3	18.5	14.8	14.8	13.0	10.8	26.7	21.6	a
	2005	public sector	37.7	1.4	28.7	22.8	10.3	21.3	11.4	19.7	5.7	21.1	a
	2010	public sector	21.6	0.1	62.4	24.6	16.5	21.9	0.4	32.1		26.4	a
	2015	public sector	1.2		39.4	17.8	8.8	23.7		2.2		15.3	a
	2016	both sexes public sector	0.2		41.6	15.8	8.4	21.6		1.3		14.9	a

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a PERSAL.[383] These values were calculated using only the posts that are filled at time of data extraction. Population estimates for the applicable year and medical scheme coverage from Stats SA GHS were used to estimate the public sector dependent population denominator.

b Econex Health Reform Note 7.[386] Based on evidence that at least 36.9% of population utilise private medical services for PHC, and thus the population served by the private sector doctors is greater than the number of medical scheme beneficiaries.

c Econex Health Reform Note 7.[386] Based on evidence that about 15% of patients seeing private specialists are not medical scheme beneficiaries.

Table 49: Community service health professionals by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Number of CS pharmacists	2001		33	39	68	82	33	39	5	31	48	406	a
	2005		34	35	56	49	36	40	16	37	40	345	b
	2010		28	23	45	43	52	29	18	30	45	344	b
	2013		38	25	66	63	71	51	27	31	35	415	b
	2017	SAPC	115	44	162	138	52	44	39	55	55	706	c

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a DoH Annual Report 2000/01.[388] Note: Community Service Professional Posts are allocated against existing (vacant) posts, therefore these health professionals form part of the figure reported by PERSAL for the relevant profession. The national figure also includes CSPs allocated to SA Military Health Services – SAMHS (14) and Department of Correctional Services – DCS (14) and is therefore greater than the sum of provincial figures.

b DoH Community Service.[389] The national figure also includes CSPs for whom province could not be determined and those allocated to SA Military Health Services – SAMHS and Department of Correctional Services – DCS.

c SAPC.[387] Includes CSPs with province unknown.

Health financing

Context	In his Budget Speech in February 2016, the Minister of Finance indicated that clarity on the initial financing of the NHI Fund would be issued by October 2017, together with final details on the White Paper on NHI. The ongoing Competition Commission Health Market Inquiry has yet to complete its work, but has focused attention on the medical scheme industry, its financing and performance, as well as on concentration in the private hospital sector.
New data sources	Nationally, new data have been reported in the: • Council for Medical Schemes Report 2015/16 • National Income Dynamics Study Wave 4 • Treasury Budget Review 2017 Internationally, reports of interest include: • IHME Financing Global Health 2015
Key issues and trends	South Africa's health financing remains highly fragmented, with marked differences in per capita expenditure in the public and private sectors. Overall, the percentage of expenditure on health as a proportion of Gross Domestic Product is not expected to increase, but movement towards equity in financing will be key to ensuring sustainable universal health coverage.

The Council for Medical Schemes Annual Report 2015/16 provided updated figures on the industry and private sector health expenditure reimbursed by medical schemes.[41] At the end of March 2016, there were the same number of registered medical schemes (83) as at the same point in 2015, with 23 of these being open schemes. A total of 323 benefits options were registered (184 by open schemes and 139 by restricted schemes). Of the 184 open scheme benefits options, 42 were registered as one option but had differing contributions based on differing levels of provider choice (so-called options with efficiency discounts). In addition, the Council for Medical Schemes registered 16 third-party administrators, while only 10 schemes were self-administered. Detailed utilisation data, apart from those reported by the Council, are thus fragmented among these 26 potential sources. The Council also accredited 41 managed care organisations, 8 688 individual brokers and 2 214 broker organisations as at the end of March 2016. As at the end of 2015, there were 4 938 453 beneficiaries of open schemes and 3 871 030 beneficiaries of restricted schemes. The Council report noted a sustained increase in claims for the conditions on the Chronic Disease List (CDL), but whether this was due to an actual increase in prevalence of these conditions, changes in health-seeking behaviour, or merely changes in claims behaviour and data completeness, could not be determined. In 2015, the proportion of expenditure recorded as out-of-pocket was 18.6%, but this would have excluded expenditure for which no claims were submitted. It would also exclude all out-of-pocket expenditure by non-beneficiaries of medical schemes. The Intergovernmental Fiscal Review 2015 projected total out-of-pocket expenditure to be R24.198 billion for fiscal year 2016/17, or 6.5% of total (public and private sector) expenditure.[390] Total medical scheme expenditure increased (in nominal terms) from R127.2 billion in 2014 to R138.6 billion in 2015, or R15 822.76 per average beneficiary per year. Of total medical schemes expenditure in 2015, 37.1% was on hospital care, 16.1% on medicines dispensed by pharmacists and providers other than hospitals, 7.2% on supplementary and allied health professionals, 6.6% on medical specialists and 6.2% on general practitioners.

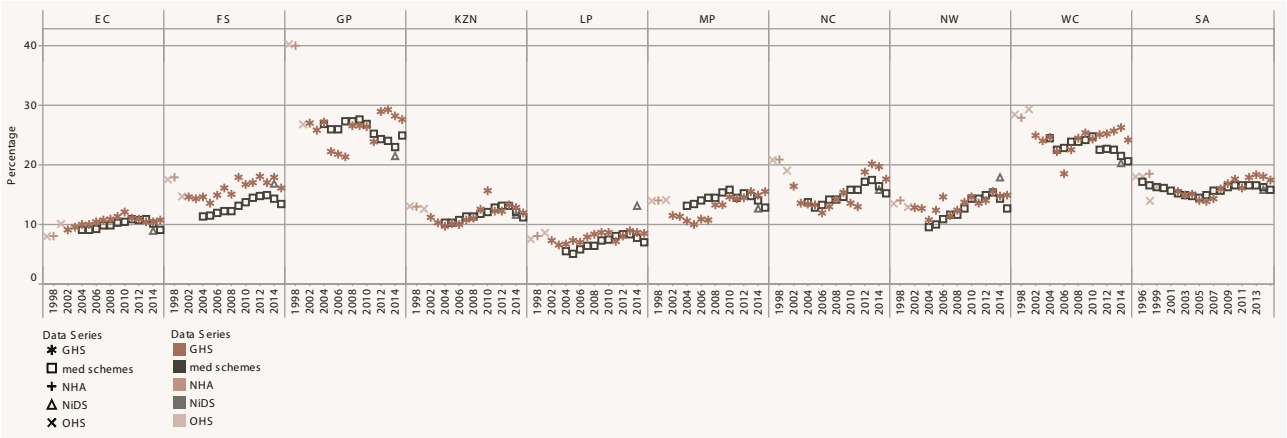
Although the Council for Medical Schemes reports of the numbers of members and beneficiaries are perhaps the most complete, these can be compared with the data from the Stats SA General Household Survey,[40] and also from the National Income Dynamics Study (NiDS) 2015. The 2015 General Household Survey estimated that 9 458 000 South Africans were covered by medical schemes (17.5% of the population), and that 23.5% of households had at least one member that was covered. Based on General Household Survey data, the Stats SA Vulnerable Groups Indicator Report 2014 estimated that 5.5% of rural inhabitants were covered by medical schemes, compared with 25.3% of urban residents.[57] The NiDS wave 4 (2015) estimate of national population coverage was 15.8%, matching the CMS reported national coverage, but with some differences in provincial estimates, as shown in Table 50.

The Intergovernmental Fiscal Review (IGFR) 2015 projection of public sector health expenditure for fiscal year 2016/17 was R178.825 billion, of which R154.117 billion would be expended from provincial budgets.[390] The Treasury's Budget Review 2017 revised the 2016/17 estimate to be R170.888 billion, and projected expenditure to reach R217.131 billion in 2019/20. Table 52 shows actual expenditure to 2015/16, as extracted from the Basic Accounting System (BAS). The IGFR 2015 estimated that 2014/15 provincial expenditure on medicines was about R10.8 billion, and projected expenditure of R13.2 billion in 2016/17. Growth in medicines expenditure has largely been driven by the antiretroviral treatment programme. In this regard, the Auditor-General's comment that "pharmaceutical budgets were not always aligned with the health care needs of the uninsured population" needs to be understood.[365] Strictly-speaking, there is no ring-fenced pharmaceutical budget, apart from the conditional grant for the antiretroviral treatment programme. The demand on the provincial budgets has been under pressure not only from the introduction of new, costly vaccines, but also from the increasing burden of non-communicable diseases requiring lifelong treatment. By 2020, the comprehensive HIV, AIDS and TB conditional grant is expected to total R22.039 billion, of which R1 billion has been ear-marked to enable application of a universal test-and-treat approach. Nonetheless, it must be recognised that the greatest pressure on provincial health budgets remains that of staff costs.

The Sustainable Development Goals have reinvigorated interest in the financing of universal health coverage, and the extent to which financial protection against catastrophic health expenditure can be extended to all citizens. The Institute for Health Metrics and Evaluation issued its seventh update report on the subject, "Financing Global

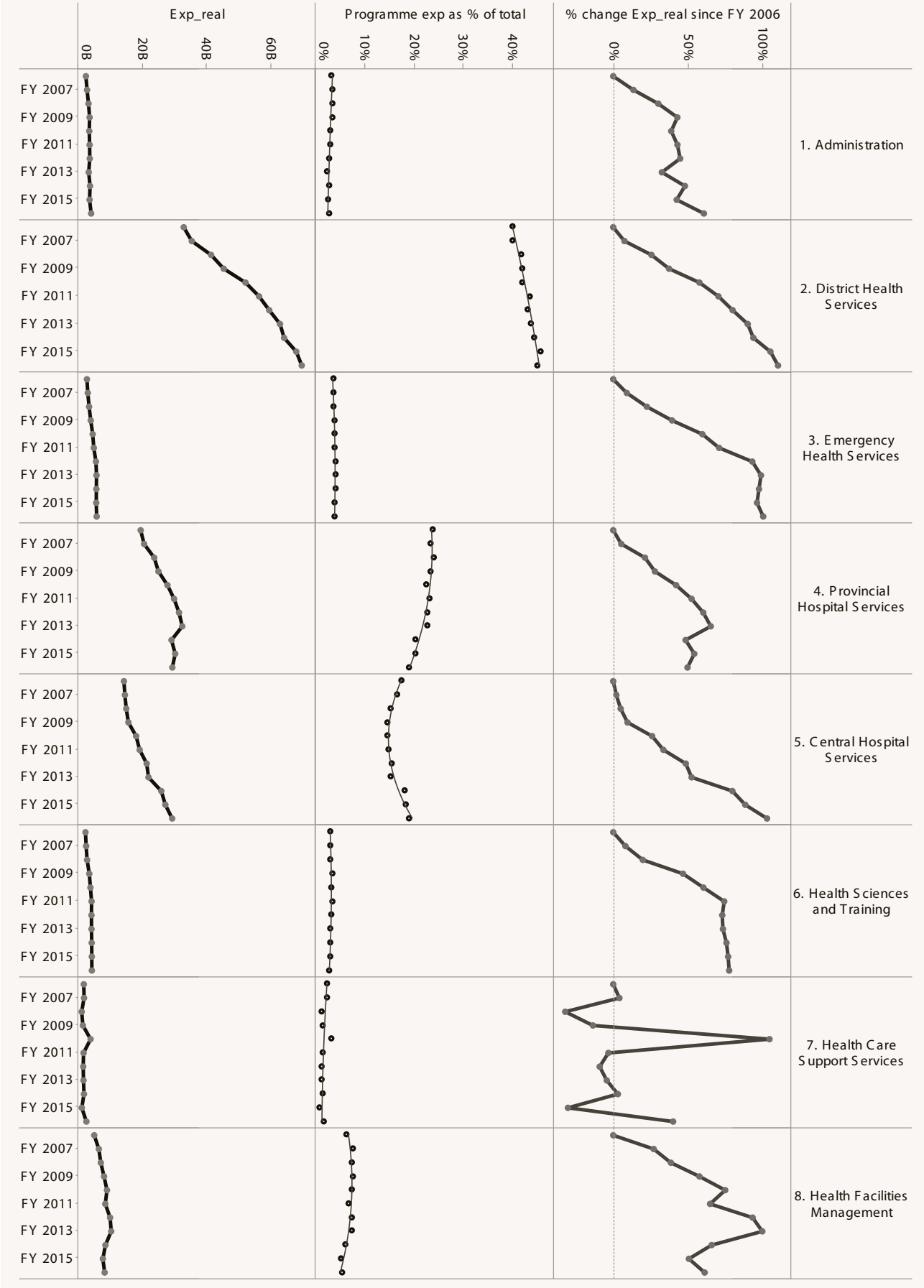
Health 2015", noting a plateau in development aid for health.[391] In 2015, 64.5% of all such aid was contributed by the governments of 10 high-income countries, and amounted to between $7 and $144 per person in recipient countries. However, the major focus areas for such development aid are shifting away from HIV/AIDS, malaria, and tuberculosis, and towards non-communicable diseases and other infectious diseases.[392] As an upper middle-income country, South Africa is not a major recipient of development aid for health. In 2016/17, donor funds were expected to total R6.794 billion (1.8% of total health expenditure, or 3.8% of public sector expenditure).[390] Drawing on lessons from Thailand, it has been argued that "the progressive alignment and ultimate integration of funding pools into a single fund …will remain a key agenda" in South Africa.[393] One of the key building blocks that is still missing in South Africa is a robust health technology assessment institution, akin to the Health Intervention and Technology Assessment Program (HITAP) in Thailand.

Figure 21: Medical scheme coverage trends per province by source, 1995–2015



Source: Compiled from multiple sources.

Figure 22: Trends in provincial health expenditure by programme (Rand billion, real 2015/16 prices), programme expenditure as % of total and percentage change since 2005/06, 2005/06–2015/16



Source: National Treasury databases.

Table 50: Health financing indicators by province

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Claims ratio	1998	all ages med schemes										91.0	a
	2000	all ages med schemes										89.2	a
	2005	all ages med schemes										84.4	b
	2010	all ages med schemes										87.3	c
	2015	all ages med schemes										90.8	d
Expenditure per patient day equivalent (district hospitals)	2005	2005/06	1 385.6	1 508.8	1 878.9	1 253.8	1 545.9	1 736.9	1 373.9		818.6	1 375.3	e
	2010	2010/11	1 942.0	2 131.5	2 490.6	1 692.1	2 286.5	2 276.9	1 933.6	2 166.9	2 052.7	2 023.1	e
	2015	2015/16	2 217.4	2 310.6	2 656.1	2 240.9	2 790.6	2 180.0	2 208.8	2 604.4	2 059.6	2 342.2	e
Headcount ratio of catastrophic health expenditure	2006	2005/06 IES	49.3	37.6	35.7	59.0	32.6	48.2	57.7	36.1	30.6	42.0	f
	2007	50+ years SAGE										23.5	g
Headcount ratio of impoverishing health expenditure	2006	2005/06 IES	78.3	98.8	53.4	96.5	109.9	51.1	29.4	60.4	19.3	72.0	f
Health as percentage of total expenditure	1997	actual	18.8	24.2	34.0	25.0	17.0	17.4	15.9	17.8	27.7	23.4	h
	2000	estimated	20.9	24.2	32.7	26.7	17.8	15.9	16.7	17.0	30.0	24.0	h
	2005											12.3	i
	2015	medium-term estimate										15.0	j
Medical scheme beneficiaries	1992	all ages med schemes										6 053 967	a
	1995	all ages med schemes										6 780 145	a
	2000	all ages med schemes										7 004 636	a
	2005	all ages med schemes	601 154	326 151	2 535 991	1 038 174	261 955	468 066	143 971	334 919	1 119 247	6 835 621	b
	2010	all ages med schemes	708 097	388 514	3 010 299	1 287 219	407 410	576 026	175 318	461 521	1 294 088	8 315 718	c
	2015	all ages med schemes	643 620	385 224	3 381 051	1 244 568	405 353	559 573	181 608	480 496	1 297 359	8 809 523	d
Medical scheme coverage	1995	both sexes all ages OHS	8.1	17.7	40.3	13.1	7.6	14.0	20.9	13.6	28.5	18.1	h
	2005	both sexes all ages GHS	10.1	13.7	22.3	10.1	7.3	10.1	13.3	12.4	22.2	14.0	k
		both sexes all ages med schemes	9.1	11.5	26.0	10.4	5.1	13.4	12.9	10.1	22.5	14.5	b
	2010	both sexes all ages GHS	12.1	16.8	26.5	15.7	8.6	14.6	13.6	14.7	24.4	17.6	l
		both sexes all ages med schemes	10.5	13.8	26.9	12.1	7.5	15.9	15.9	14.4	24.8	16.6	c
	2014	both sexes <18 years GHS rural										4.6	m
		both sexes <18 years GHS total										15.1	m
		both sexes <18 years GHS urban										23.5	m
		both sexes all ages GHS	10.5	17.9	28.2	12.8	8.6	14.9	19.8	14.8	26.3	18.1	n
		both sexes all ages med schemes	10.2	14.4	23.0	12.1	7.8	14.0	16.4	14.4	21.5	16.3	o
	2015	both sexes 65+ years NiDS										19.4	p
		both sexes all ages GHS	10.7	16.2	27.7	11.9	8.5	15.5	17.6	15.0	24.2	17.5	q
		both sexes all ages med schemes	9.1	13.5	25.0	11.2	7.0	12.9	15.2	12.7	20.6	15.8	d
		both sexes all ages NiDS	8.9	16.9	21.5	11.6	13.1	12.7	15.9	17.9	20.3	15.8	p
		female all ages NiDS										15.2	p
		male all ages NiDS										16.5	p
Pensioner ratio	2001	both sexes 65+ years med schemes										5.9	a
	2005	both sexes 65+ years med schemes										6.4	b
	2010	both sexes 65+ years med schemes										6.5	c
	2015	both sexes 65+ years med schemes										7.7	d
		female 65+ years med schemes										8.5	d
		male 65+ years med schemes										6.7	d

Indicator	Year	Subgroup	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA	Ref
Per capita health expenditure	1998	private sector total										3 099.0	q
		public sector total	506.0	762.0	1 234.0	598.0	420.0	298.0	453.0	659.0	1 024.0	670.0	r
	2000	private sector total										3 868.0	s
		public sector	670.0	792.0	1 107.0	786.0	570.0	465.0	644.0	535.0	1 235.0	779.0	h
	2005	2005/06 public	955.0	1 238.0	1 496.0	1 211.0	915.0	944.0	1 415.0	878.0	1 670.0	1 191.0	t
		private sector total										6 766.8	b
	2010	med schemes										10 279.2	c
		public sector provincial expenditure	2 241.2	2 565.2	2 490.3	2 304.2	2 114.3	2 113.2	2 690.7	2 094.2	3 138.1	2 383.8	u
		public sector total										2 650.0	v
	2015	med schemes										15 823.0	w
		public sector provincial expenditure	3304.4	3762.2	3903.2	3623.1	2957.7	2763.3	4418.8	2884.7	4242.5	3530.4	v
Provincial and LG PHC expenditure per capita (uninsured)	2005	2005/06 real 2015/16 prices	446.9	474.0	505.0	526.7	367.4	317.4	473.9	468.3	602.5	474.1	e
	2010	2010/11 real 2015/16 prices	828.0	827.2	865.7	777.6	680.5	617.1	965.1	861.2	925.8	805.6	e
	2015	2015/16 real 2015/16 prices	848.0	1 020.8	1 107.4	1 085.9	827.1	826.1	1 071.5	983.0	1 051.2	992.6	e
Ratio of private to public sector per capita health expenditure	1997	1997/98										4.5	x
	2000	2000/01										6.1	x
	2005	2005/06										5.9	i
	2009	2009/10										5.4	i
	2015											4.5	y
Total current expenditure on health as percentage of gross domestic product	1998	Treasury public sector										4.1	z
	2005	Treasury private sector										5.2	i
		Treasury public sector										3.4	i
		Treasury total										8.7	i
	2010	Treasury private sector										4.6	j
		Treasury public sector										4.1	j
		Treasury total										8.7	j
	2015	Treasury private sector										4.3	j
		Treasury public sector										4.2	j
		Treasury total										8.5	j

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Medical Schemes 2002–3.[394]
b Medical Schemes 2005–6.[395]
c Medical Schemes 2010–11.[396]
d Medical Schemes 2015–16.[41]
e DHB 2015/16.[136]
f Ataguba et al. 2014.[397] Based on analysis of the Stats SA Income and Expenditure Survey.
g Goeppel et al. 2016.[307]
h Fiscal Review 2001.[35]
i Fiscal Review 2009.[398]
j Fiscal Review 2015.[390]
k Stats SA GHS 2009.[36]
l Stats SA GHS 2010.[38]
m Vulnerable Groups 2014.[57]
n Stats SA GHS 2014.[45]
o Medical Schemes 2014–15.[325] Calculated from Medical Schemes beneficiaries per population from Stats SA mid-year estimates for 2014.
p NiDS Wave 4 v1.1.[205]
q Medical Schemes 1999.[399] Calculated from all benefits paid divided by total beneficiaries (all types of medical schemes).
r National Health Accounts Public 2000.[400] Calculated from Line Item expenditures and public sector dependent population. Figures in 99/00 Rands. Figures are for total recurrent expenditure (excludes capital expenditure) and includes expenditure on personnel, medicine, transport, laboratory services, maintenance and other recurrent costs.
s Medical Schemes 2000.[401] Calculated from all benefits paid divided by total beneficiaries (all types of medical schemes).
t Fiscal Review 2007.[402]
u SAHR 2011 Ch11.[403] Calculated from provincial expenditure (National Treasury, NW) per uninsured population. For 2010/11 financial year.
v National Treasury.[132] Calculated from provincial expenditure (National Treasury) per uninsured population.
w Medical Schemes 2015–16.[41] Average benefits paid per beneficiary per annum.
x SAHR 2003/04 Ch20.[404]
y Calculated from Medical Schemes Council and National Treasury data.
z National Health Accounts Public 2000.[400]

Table 51: Medical scheme coverage by population group

Indicator	Year	Subgroup	African/Black	Coloured	Indian/Asian	White	Ref
Medical scheme coverage	1996	both sexes all ages OHS	10.0	21.7	29.5	68.8	a
	1999	both sexes all ages OHS	8.4	21.3	28.9	67.8	b
	2005	both sexes all ages GHS	7.1	18.1	32.4	64.2	c
	2010	both sexes all ages GHS	10.3	21.8	46.8	70.9	d
	2015	both sexes all ages GHS	10.6	19.3	44.5	73.3	e
		both sexes all ages NiDS	9.7	15.3	40.3	61.6	f

Reference notes (indicator definitions from page 319 and bibliography of reference sources from page 328):

a Stats SA OHS 1995–9.[405]
b Fiscal Review 2001.[35]
c Stats SA GHS 2009.[36]
d Stats SA GHS 2010.[38]
e Stats SA GHS 2015.[40]
f NiDS Wave 4 v1.1.[205]

Table 52: Trends in overall provincial and local government health expenditure by programme (Rand million, real 2015/16 prices), 2005/06 – 2015/16

Rand million	Financial Year										
Programme	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
1. Administration	2 679	3 042	3 491	3 834	3 724	3 836	3 885	3 555	3 971	3 822	4 313
2. District Health Services	33 126	35 630	41 643	45 572	52 336	56 574	59 735	63 096	64 358	68 160	69 854
3. Emergency Health Services	2 999	3 273	3 677	4 186	4 796	5 137	5 806	5 980	5 940	5 900	6 025
4. Provincial Hospital Services	19 721	20 790	23 938	25 253	28 062	30 116	31 665	32 665	29 321	30 473	29 576
5. Central Hospital Services	14 512	14 813	15 235	15 907	18 310	19 409	21 596	22 163	26 145	27 404	29 529
6. Health Sciences and Training	2 544	2 753	3 050	3 738	4 088	4 444	4 410	4 422	4 483	4 511	4 529
7. Health Care Support Services	2 020	2 104	1 368	1 744	4 143	1 954	1 835	1 932	2 083	1 404	2 834
8. Health Facilities Management	5 271	6 706	7 316	8 328	9 243	8 706	10 214	10 559	8 762	7 955	8 514
Local government expenditure	2 167	2 537	2 089	2 034	2 112	3 148	2 989	3 366	3 184	3 599	3 730
Other	-67	-67	-61	-27	-50	-18	3	5	0	0	0
Total	84 971	91 580	101 745	110 569	126 764	133 306	142 139	147 743	148 247	153 229	158 903

Source: National Treasury databases.

Note: 'Other' includes any other expenditure no indicated as being allocated to any of the above budget programmes.

Table 53: Provincial and local government health expenditure per province by programme (Rand million, real 2015/16 prices), 2015/16

Rand million	Financial Year 2015/16									
Programme	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA
1. Administration	668	303	807	847	265	297	211	297	616	4 313
2. District Health Services	9 516	3 720	10 841	16 008	9 850	6 175	1 697	4 693	7 354	69 854
3. Emergency Health Services	946	534	940	1 174	645	310	271	273	931	6 025
4. Provincial Hospital Services	4 928	1 199	6 406	9 214	2 011	1 174	340	1 349	2 955	29 576
5. Central Hospital Services	823	2 053	12 582	4 125	1 467	992	879	1 247	5 360	29 529
6. Health Sciences and Training	783	164	939	1 059	485	369	91	320	320	4 529
7. Health Care Support Services	1 399	113	223	203	107	123	120	122	423	2 834
8. Health Facilities Management	1 200	610	1 865	1 518	602	639	559	742	780	8 514
Local government expenditure	191	9	2 391	350	49	-7	33	68	646	3 730
Grand Total	20 454	8 704	36 994	34 497	15 481	10 074	4 202	9 111	19 386	158 903

Source: National Treasury databases.

Table 54: Provincial health expenditure on district health services per province by sub-programme (Rand million, real 2015/16 prices), 2015/16

	Financial Year 2015/16									
Rand million	2. District Health Services									
Subprogramme	EC	FS	GP	KZN	LP	MP	NC	NW	WC	SA
2.1 District Management	730	105	451	249	700	350	173	427	318	3 502
2.2 Community Health Clinics	1 874	910	1 925	3 501	2 333	1 246	383	855	1 079	14 107
2.3 Community Health Centres	905	80	1 429	1 366	446	754	236	982	1 680	7 878
2.4 Community-based Services	409	346	1 459	16	270	90	0	13	197	2 800
2.5 Other Community Services	40	0	0	1 104	101	0	56	225	0	1 526
2.6 HIV/AIDS	1 583	969	3 003	3 814	1 066	936	361	1 014	1 209	13 955
2.7 Nutrition	28	11	49	44	4	13	3	5	41	199
2.8 Coroner Services	81	36	184	172	0	0	0	42	0	515
2.9 District Hospitals	3 867	1 263	2 341	5 742	4 930	2 787	484	1 130	2 736	25 280
2. Other*	0	0	0	0	0	0	0	0	93	93
Grand Total	9 516	3 720	10 841	16 008	9 850	6 175	1 697	4 693	7 354	69 854

Source: National Treasury databases.

Conclusion

This chapter has focused on contrasting the situation with regard to health and related indicators over the entire period during which the *Review* has been published, coinciding with a period of intense health systems reform. Where possible, baseline, mid-point and most recent figures have been provided. As always, caution must be exercised when comparing figures over time, as the definitions and sources may have changed. The next phase of health systems reform will be dominated by the implementation of National Health Insurance, as the provision of universal health coverage is termed in South Africa. This is a key goal of the Sustainable Development Goals (SDGs), to which South Africa is committed. As has been noted before, the range of data sources continues to expand, allowing greater opportunities for triangulation of data and attention to issues of data quality, reliability and timeliness, but systematic inclusion of data from the private sector remains patchy and incomplete.

Acknowledgements

As in previous years, this chapter is very much the product of collective efforts at all levels of the health system over many years. In particular we acknowledge the national and provincial Departments of Health for the use of data from the District Health Information System and various other databases and publications. Other people and institutions have also contributed significantly. Thanks are due to Muchiri Wandai for data analysis and capture, and to Noluthando Ndlovu for extensive assistance with data capture, analysis, layout, editing and referencing. Naomi Massyn provided input on the National Indicator Data Set. We also appreciate the perceptive review comments and strategic inputs of the team of reviewers.

Appendices

Indicator definitions for data tables presented in this chapter

Demographic	Population	Adolescent fertility rate (per 1 000 girls aged 15–19 years)	Annual number of births to women aged 15–19 years per 1000 women in that age group. It is also referred to as the age-specific fertility rate for women aged 15–19 years.
		Ageing index	Ratio of the number of people 65+ to the number under 15 years. i.e. a value of 16 means there are 16 people aged 65 and over for every 100 under 15 years of age. Calculated as ([65+/0–14]*100)
		Annual population growth rate	The rate at which the population is increasing or decreasing in a given year expressed as a percentage of the base population size. It takes into consideration all the components of population growth, namely births, deaths and migration.
		Area (square km)	Land area covered by geographic entity.
		Area as a % of total area of South Africa	Area of province divided by total area of country (South Africa).
		Average household size	Average number of people living in each household where household is defined as a person, or a group of persons, who occupy a common dwelling (or part of it) for at least four days a week and who provide themselves jointly with food and other essentials for living. In other words, they live together as a unit. People who occupy the same dwelling, but who do not share food or other essentials, are enumerated as separate households.
		Crude death rate (deaths per 1 000 population)	Number of deaths in a year per 1 000 population.
		Live birth occurrences registered	The number of live birth occurrences registered.
		Population	Total number of people.
		Population % by population group	Proportion of South African population in each population (ethnic) group (calculated from number of people per population group and population for whole of South Africa).
		Population % by province	Proportion of South African population in each province (calculated from population per province and population for whole of South Africa).
		Population density	The number of people per square kilometre.
		Public sector dependent population	This is an adjustment of the total population to the number assumed to be dependent on services in the public health sector based on medical scheme coverage. It is calculated by subtracting the number of people with medical scheme cover (determined from medical scheme membership reports, or surveys indicating percentage of population on medical schemes) from the total population.
		Total fertility rate	The average number of children that a woman gives birth to in her lifetime, assuming that the prevailing rates remain unchanged.
Socio-economic and risk factors	Development	Human development index	The HDI is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development. A high value for the HDI represents better human development.
		Poverty prevalence	Proportion of people/households living in poverty. Depending on the poverty line and the methodology used there are various estimates of the extent of poverty, therefore caution should be observed in comparing estimates from different sources, and comparative reliability can be assessed from the rank order correlation between different sets of estimates.
	Education	Education level: percentage of population with no schooling	Data are presented for the percentage of population aged 20 years and above with no schooling.
		Literacy rate	People aged 20 years and more with no schooling or with some primary schooling are assumed to be illiterate. People with more schooling are therefore assumed to be literate.
	Employment Environmental risks	Unemployment rate (official definition)	The official definition of the unemployed is that they are those people within the economically active population (aged 15–65) who (a) did not have a job or business during the 7 days prior to the interview, (b) want to work and are available to work within two weeks of the interview, and (c) have taken active steps to look for work or to start some form of self-employment in the 4 weeks prior to the interview. Note that the census produces lower estimates of labour force participation because there are less prompts to identify employed people, and the Labour Force Survey provides the official labour market statistics.
		Air pollution level in cities (particulate matter [PM])	Annual mean concentration of particulate matter of less than 2.5 microns of diameter (PM2.5) [ug/m3] (or of less than 10 microns [PM10] if PM2.5 is not available) in cities.
		Drinking Water System (Blue Drop) Performance Rating	Composite score measuring compliance of water suppliers with water quality management requirements. Includes microbiological, chemical and physical compliance criteria.
	Household Facilities	Percentage of households by type of housing	Percentage of households that are categorised as formal, informal, traditional or other.
		Percentage of households using electricity for cooking	Percentage of households using electricity as their main energy source for cooking.
		Percentage of households with access to piped water	Includes households with piped water in dwelling, piped water inside yard or piped water on a community stand (< 200m away or further).
		Percentage of households with no toilet / bucket toilet	Percentage of households that have no toilet, or were using a bucket toilet.
		Percentage of households with refuse removal	Percentage of households that have refuse removal by the local authority at least once a week.
		Percentage of households with telephone (telephone in dwelling or cell phone)	Percentage of households with a telephone in the dwelling or a cellular telephone.

	Household Facilities (continued)	Population using safely managed sanitation services	Population using a basic sanitation facility (flush or pour-flush toilets to sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, pit latrines with a slab, and composting toilets) which is not shared with other households and where excreta are safely disposed in situ (e.g. in a sealed latrine pit until they are safe to handle and re-use, such as an agricultural input) or transported to a designated place for safe disposal or treatment (e.g. treatment facility or hygienically collected from septic tanks or pit latrines by a suction truck or similar equipment that limits human contact and thereafter transported to a designated location such as a treatment facility or solid waste collection site).
		Proportion of population with sustainable access to an improved water source	'Improved' water supply technologies are: household connection, public standpipe, borehole, protected dug well, protected spring, rainwater collection. 'Not improved' are: unprotected well, unprotected spring, vendor-provided water, bottled water (based on concerns about the quantity of supplied water, not concerns over the water quality), tanker truck provided water. It is assumed that if the user has access to an 'improved source' then such source would be likely to provide 20 litres per capita per day at a distance no longer than 1 000 metres.
Mortality	Mortality	Adult mortality (45q15 – probability of dying between 15–60 years of age)	The probability of dying between the ages of 15 and 60 years of age (percentage of 15-year-olds who die before their 60th birthday).
		Healthy life expectancy (HALE)	Healthy life expectancy or health-adjusted life expectancy is based on life expectancy at birth but includes an adjustment for time spent in poor health. It is most easily understood as the equivalent number of years in full health that a newborn can expect to live based on current rates of ill-health and mortality.
		Life expectancy at birth	The average number of additional years a person could expect to live if current mortality trends were to continue for the rest of that person's life.
Disability	Disability	Cataract surgery rate	Cataract operation per million of the population.
		Prevalence of disability	Percentage of people reporting moderate to severe disability in a survey where disability is defined as a limitation in one or more activities of daily living (seeing, hearing, communication, moving, getting around, daily life activities, learning, intellectual and emotional). In the Community Survey 2007 and Census 2001, disability is defined as a physical or mental handicap which has lasted for six months or more, or is expected to last at least six months, which prevents the person from carrying out daily activities independently, or from participating fully in educational, economic or social activities. The definition of disability used in Census 2001 is not comparable with that used in Census 1996. More recent surveys use the International Classification of Functioning, Disability and Health (ICF) approach where respondents are asked about 'difficulty' with various activities rather than disability, with a continuum from 'no difficulty' to 'not able'. Since the 2009 GHS (revised in 2011), Stats SA have also excluded data on children under 5 years old, since it was thought that these are often categorised as being unable to do the various activities, when this is in fact due to their level of development rather than any innate disabilities.
		Prevalence of hearing disability	In the census questionnaire, respondents were asked to indicate whether or not there were any people with serious visual, hearing, physical or mental disabilities in the household. The seriousness of the disability was not clearly defined. Rather, the respondent's perceptions of seriousness were relied on.
		Prevalence of physical disability	In the census questionnaire, respondents were asked to indicate whether or not there were any people with serious visual, hearing, physical or mental disabilities in the household. The seriousness of the disability was not clearly defined. Rather, the respondent's perceptions of seriousness were relied on.
		Prevalence of sight disability	In the census questionnaire, respondents were asked to indicate whether or not there were any people with serious visual, hearing, physical or mental disabilities in the household. The seriousness of the disability was not clearly defined. Rather, the respondent's perceptions of seriousness were relied on.
Infectious Disease	Infectious Disease Malaria	Reported cases of cholera	The number of cases of cholera reported to the Department of Health. Since case reporting of notifiable diseases has been incomplete and delayed for several years, the number of laboratory-confirmed cases from NHLS has been included where available, although these would be expected to include only a subset of the total number of notified cases.
		Reported cases of measles	Number of cases of measles reported to the National Department of Health per year. Since case reporting of notifiable diseases has been so incomplete and delayed for several years, the number of laboratory confirmed cases from NHLS has been included where available, although these would be expected to include only a subset of the total number of notified cases.
		Reported cases of rabies	Number of cases of rabies reported per year. Since case reporting of notifiable diseases has been incomplete and delayed for several years, the number of laboratory-confirmed cases from NHLS has been included where available, although these would be expected to include only a subset of the total number of notified cases.
		Syphilis prevalence rate (antenatal)	Percentage of women surveyed testing positive for syphilis.
		Case fatality rate: malaria	Number of deaths divided by number of cases expressed as a percentage.
		Malaria mortality rate (per 100 000 population)	Number of adults and children who have died due to malaria in a specific year, expressed as a rate per 100 000 population.
		Reported cases of malaria	The number of cases of malaria reported to the Department of Health.
		Reported cases of malaria (per 100 000)	The number of cases of malaria reported to the Department of Health per 100 000 population (for the relevant year). Also known as incidence of malaria.
		Reported deaths from malaria	The number of deaths from malaria reported to the Department of Health or recorded in vital registration (ICD-10 codes B50-B54) .

Tuberculosis (TB)	Case finding	Incidence (diagnosed cases) of TB – new PTB sm+	New TB cases diagnosed (pulmonary sm+) per 100 000 people in the catchment population.
		Incidence (diagnosed cases) of TB (ETR.net)	TB cases diagnosed (all TB in ETR.net) per 100 000 people in the catchment population.
		Incidence of TB (all types) (per 100 000)	Estimated number of cases of tuberculosis (all types) per 100 000 population (for the year). Adjusted for estimated under-reporting of TB cases and other factors.
		MDR-TB started on treatment	Number of MDR-TB patients who started treatment.
		Number of TB cases reported (ETR.net)	Number of TB cases reported (all TB) in ETR.net.
		Prevalence of multidrug resistance among new TB cases	Estimated percentage of new cases of TB which are multidrug resistant.
		Reported cases of MDR-TB	Number of laboratory-diagnosed cases of MDR-TB. MDR-TB is defined as resistance to rifampicin and isoniazid, with or without resistance to other first-line anti-TB drugs.
		Reported cases of XDR-TB	Number of laboratory-diagnosed cases of XDR-TB. XDR-TB is defined as resistance to rifampicin, isoniazid, any fluoroquinolone and resistance to one or more of the following injectable anti-TB drugs: kanamycin, amikacin, and capreomycin.
		Smear positivity (% of PTB cases which are new Sm+)	Number of new smear positive PTB cases divided by number of PTB cases.
		TB Rifampicin resistance confirmed client rate	Percentage of positive TB tests that are RIF resistant (based only on tests done using GeneXpert technology).
		XDR-TB started on treatment	Number of XDR-TB patients who started treatment.
	Programme Management	Case detection rate (all forms)	Proportion of incident cases of TB (all types) that were notified. For a given country, it is calculated as the number of notified cases of TB in one year divided by the number of estimated incident cases of TB in the same year, and expressed as a percentage.
		HIV prevalence in TB incident cases	Percentage of new TB cases that are HIV positive.
		Tuberculosis death rate per 100 000 (in HIV-positive people)	Number of deaths due to TB in HIV-positive people per 100 000 population. Note that these deaths are officially classified as being caused by HIV/AIDS according to the International Classification of Diseases.
		Tuberculosis mortality rate per 100 000	Number of deaths due to tuberculosis (all types) reported per 100 000 population (for the year). Note that the estimates calculated from the Stats SA cause of death data are not corrected for under-reporting or ill-defined coding, and are thus not an accurate of mortality due to TB. In addition many deaths in HIV-positive TB cases are misattributed to TB rather than HIV (according to the ICD-10 rules).
		Tuberculosis mortality rate per 100 000 (excluding HIV)	Number of deaths due to tuberculosis (all types) reported per 100 000 population (for the year). The reported TB mortality excludes deaths occurring in HIV-positive TB cases, in accordance with the definition used in ICD-10.
	Treatment outcomes	New smear positive pulmonary TB loss to follow up rate	New smear positive pulmonary TB clients lost to follow up as a proportion of new smear positive pulmonary TB clients started on treatment. Previously called TB defaulter rate (new sm+).
		TB client lost to follow up rate (ETR.net)	The percentage of TB clients (all types of TB) who defaulted treatment.
		TB cure rate (new sm+)	The proportion of new smear-positive PTB patients who completed treatment and were proven to be cured (which means that they had two negative smears on separate occasions at least 30 days apart).
		TB death rate (ETR.net)	The percentage of TB clients (all types of TB registered in ETR.net) who died.
		TB MDR treatment success rate (EDRWeb)	The percentage of TB clients (MDR TB) cured plus those who completed treatment.
		TB treatment failure (ETR.net)	The percentage of TB clients (all types of TB) who failed treatment.
		TB treatment success rate (ETR.net)	The percentage of TB clients (all types registered in ETR.net) cured plus those who completed treatment.
HIV and AIDS	HIV and AIDS	Antiretroviral coverage	The number of patients receiving ART, divided by the number needing treatment. The denominator has changed over time, due to changes in treatment guidelines affecting the criteria for treatment eligibility. The latest definition is that all HIV-infected patients should be on ART.
		Antiretroviral treatment exposure	Percentage of people living with HIV on ART. Measured by laboratory testing for antiretroviral drugs in HIV-positive samples.
		HIV testing coverage	Percentage of target population who have been tested for HIV.
		HIV testing coverage (including ANC)	Clients HIV tested (ANC and other) as proportion of population 15–49 years.
		HIV viral load suppression	Percentage of people on ART who are virologically suppressed (VL level <= 1000 copies/mL).
		Male circumcision (% of men who are circumcised)	The percentage of men (15–59 years, unless otherwise specified) who have been circumcised.
		Number of patients receiving ART	Number of patients receiving ART.
		People living with HIV	The number of people who are HIV-positive.
		Percentage of deaths due to AIDS	Percentage of total deaths attributed to AIDS related causes.
		Percentage of people living with HIV (PLHIV) who know their status	Percentage of people living with HIV who know their HIV status.
		Percentage of TB cases with known HIV status (ETR.net)	Percentage of TB cases (all TB) with known HIV status (positive or negative).
		TB/HIV co-infected client on ART rate (ETR.net)	Percentage of HIV-positive TB cases (all TB) who are recorded as being on ART.
	Incidence and prevalence	HIV incidence	The HIV incidence rate is the percentage of people who are uninfected at the beginning of the period who will become infected over the twelve months.
		HIV prevalence (age 15–49)	Percentage of population (age 15–49) estimated to be HIV-positive.
		HIV prevalence (antenatal)	Percentage of women surveyed testing positive for HIV.
		HIV prevalence (total population)	Percentage of population estimated to be HIV-positive.

Maternal and reproductive health	PMTCT	Antenatal client initiated on ART rate	Antenatal clients on ART as a proportion of the total number of antenatal clients who are HIV-positive and not previously on ART.
		Antenatal client tested for HIV	Proportion of women coming for their first antenatal visit who are tested for HIV.
		HIV PCR birth testing coverage	The percentage of infants born to HIV-positive mothers who receive a PCR test within 7 days of birth.
		Percentage PCR tests positive within 6 days	The percentage of PCR tests that are positive for HIV (in infants within 7 days of birth).
		Targeted birth PCR test positive rate	High risk birth PCR test positive as a proportion of high risk birth PCR tests.
	Maternal Health	ANC coverage	Proportion of pregnant women receiving some antenatal care. DHIS data source: Estimated from the number of first ANC visits divided by the population under 1 year x 1.15 (as a proxy for the number of pregnant women).
		Antenatal 1st visit before 20 weeks rate	Women who have a booking visit (first visit) before they are 20 weeks (about half way) into their pregnancy as a proportion of all antenatal 1st visits.
		Delivery by Caesarean section rate	Percentage of births that are by Caesarean section.
		Delivery in facility under 18 years rate	The proportion of pregnant women under 18 years at delivery.
		Maternal mortality in facility ratio	Women who die as a result of childbearing, during pregnancy or within 42 days of delivery or termination of pregnancy, per 100 000 live births, and where the death occurs in a health facility.
		Maternal mortality ratio (MMR)	The number of women who die as a result of childbearing, during the pregnancy or within 42 days of delivery or termination of pregnancy in one year, per 100 000 live births during that year.
		Maternal mortality ratio institutional	Women who die as a result of childbearing, during pregnancy or within 42 days of delivery or termination of pregnancy, per 100 000 live births, and where the death occurs in a health facility.
		Mother postnatal visit within 6 days rate	Mothers who receive postnatal care within 6 days of delivery after discharge from place of delivery as proportion of all deliveries in facility.
		Number of maternal deaths	The number of women who die as a result of childbearing, during the pregnancy or within 42 days of delivery or termination of pregnancy in one year. In the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, 1992 (ICD-10), WHO defines maternal death as: The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. For countries using ICD-10 coding for registered deaths, all deaths coded to the maternal chapter (O codes) and A34 (maternal tetanus) were counted as maternal deaths. Note that the system of Confidential Enquiries into Maternal Deaths (NCCEMD) only captures institutional deaths, and thus is known to miss deaths occurring at home. The confidential enquiry system is ideally suited to identifying the most common causes of death and being able to rank the causes of death according to priority.
		PM (proportion of deaths among women of reproductive age that are due to maternal causes)	An alternative measure of maternal mortality, the proportion of deaths among females of reproductive age (PMDF) that are due to maternal causes, is calculated as the number of maternal deaths divided by the total deaths among females aged 15–49 years.
	Neonatal	Inpatient early neonatal death rate	Inpatient deaths within the first 7 days of life per 1 000 live births.
		Live birth under 2500g in facility rate	Percentage of live births under 2 500g. Was previously called 'Low birth weight rate' in DHIS.
		Neonatal mortality in facility rate	Inpatient deaths within the first 28 days of life per 1 000 estimated live births. Estimated live births in population is calculated by multiplying estimated population under 1 year by 1.03 to compensate for infant mortality.
		Neonatal mortality rate (NNMR) (deaths <28 days old per 1 000 live births)	Number of deaths within the first 28 days of life, in a year, per 1 000 live births during that year.
		Perinatal mortality rate (stillbirths plus deaths <8 days old per 1 000 total births)	The number of perinatal deaths per 1 000 births. The perinatal period starts as the beginning of foetal viability (28 weeks gestation or 1 000g) and ends at the end of the 7th day after delivery. Perinatal deaths are the sum of stillbirths plus early neonatal deaths. These are divided by total births (live births plus stillbirths).
		Stillbirth in facility rate	Stillbirths in facility per 1 000 total births in a facility.
		Stillbirth rate (per 1 000 total births)	Number of stillbirths per 1 000 total births.
	Reproductive Health	Age of first sex under 15 years (% having first had sex at age 14 or younger)	Percentage of people surveyed (of various age groups) who report having first had sexual intercourse at age 14 years or younger. The age cut-off varies slightly between surveys with the HSRC HIV Household survey including 'under 15 years' compared to the NYRBS which includes 'under 14 years'.
		Cervical cancer screening coverage	Women 30 years and older with a cervical (pap) smear done for screening purposes according to the national policy of screening all women in this age category every 10 years, as the proportion of all women 30 years and older in the target population.
		Condom use at last sex	Percentage of those, who reported ever having had sex, who used a condom the last time they had sex. Note that the precise definition of this indicator varies between surveys.
		Condom use at the last high-risk sex	Percentage who say they used a condom the last time they had sex with a non-marital/non-cohabiting partner, of those who were sexually active in the last 12 months.
		Couple year protection rate	Women protected against pregnancy by using modern contraceptive methods, including sterilisations, as proportion of female population 15–49 years. Contraceptive years are the total of (Oral pill cycles / 13) + (Medroxyprogesterone injection / 4) + (Norethisterone enanthate injection / 6) + (IUCD x 4) + (Male condoms distributed / 200) + (Male sterilisation x 20) + (Female sterilisation x 10). Although only officially included in the definition from 2017, in practice subdermal implants were also included in the calculation since they were available in the public sector.
		Ever had sex	Percentage of people who report that they have ever had sexual intercourse.
		HIV knowledge: correct knowledge about prevention and rejection of major misconceptions	The percentage of people who correctly answer a composite measure of accurate knowledge of two questions related to HIV prevention in combination with rejecting four myths and misconceptions about the disease. The two questions on prevention of HIV transmission were 'To prevent HIV infection, a condom must be used for every round of sex' and 'One can reduce the risk of HIV by having fewer sexual partners' while the four questions about myths and misconceptions were 'There is a cure for AIDS', 'AIDS is caused by witchcraft', 'HIV causes AIDS', and 'AIDS is cured by having sex with a virgin'.

	Reproductive Health (continued)	Male condom distribution coverage	Number of male condoms distributed to clients via the facility or via factories, offices, restaurants, NGOs or other outlets – per male 15 years and older.
		Male condoms distributed (thousands)	Number of male condoms distributed. Data should be interpreted with caution depending on what distribution channel it is for – i.e. condoms distributed by national to provinces, or number distributed through PHC facilities (since some condoms are distributed to provinces, that are then distributed through several channels including PHC facilities).
		Teenage pregnancy	Percentage of women aged 15–19 who are mothers or who have ever been pregnant. The percentage of women who are mothers at the time of the survey is a more restrictive definition. Note that some of the surveys report this indicator as the percentage who have ever been pregnant of those WHO HAVE EVER HAD SEX. This is a different denominator to that used by the Demographic and Health Surveys, and the data can therefore not be directly compared.
	STI	STI treated new episode incidence (per 1 000)	The number of people per 1 000 population 15 years and older who have been treated for a new STI episode. (previously reported as %)
	Termination of Pregnancy	ToP rate	Percentage of pregnant women who have had an abortion. DHIS definition: Termination of pregnancies performed in a health facility as the proportion of all expected pregnancies in the catchment population.
		ToPs (Terminations of Pregnancy)	The number of terminations of pregnancy.
Child Health	Child Health	Child under 5 years diarrhoea with dehydration incidence	Children under 5 years newly diagnosed with diarrhoea with dehydration per 1 000 children under 5 years in the population.
		Child under 5 years pneumonia incidence	Children under 5 years newly diagnosed with pneumonia per 1 000 children under 5 years in the population.
		Child under 5 years severe acute malnutrition incidence	Children under 5 years newly diagnosed with severe acute malnutrition per 1 000 children under 5 years in the population.
		Children living far from their usual health facility	This indicator reflects the distance from a child's household to the health facility they normally attend. Distance is measured through a proxy indicator: length of time travelled to reach the nearest health facility, by whatever form of transport is usually used. The health facility is regarded as 'far' if a child would have to travel more than 30 minutes to reach it, irrespective of mode of transport.
		School Grade 1 screening coverage	Proportion of Grade 1 learners screened by a nurse in line with the ISHP service package.
	Child mortality and related	Child mortality (deaths between 1–4 years per 1 000 live births)	The number of children aged 12 months to 5 years (i.e. to the end of the 4th year) who die in a year, per 1 000 live births.
		Infant mortality rate (deaths under 1 year per 1 000 live births)	The number of children less than one year old who die in a year, per 1 000 live births during that year.
		Number of under-5 deaths	The estimated number of deaths in children younger than 5 years.
		Post-neonatal mortality rate (deaths 28–365 days age per 1 000 live births)	Number of deaths occurring between 28 and 365 days after birth per 1 000 live births in the same period.
		Under 5 mortality rate (deaths under 5 years per 1 000 live births)	The number of children under 5 years who die in a year, per 1 000 live births during the year. It is a combination of the infant mortality rate, plus the age 1–4 mortality rate.
	Immunisation	BCG coverage	The proportion of expected live born babies that received BCG under 1 year of age. (note: usually given immediately after birth)
		DTP3 coverage	Currently called 'DTaP-IPV/Hib 3rd dose coverage (annualised)' in DHIS. The proportion of children who received their third DTP-Hib doses (normally at 14 weeks). From approximately 2009 when the immunisation schedule changed, this is defined as: The proportion of children under 1 year who received their DTaP-IPV/Hib (Pentaxim) 3rd dose, normally at 14 weeks – annualised.
		Immunisation coverage of children 12–23 months	Proportion of children aged 12 to 23 months who had received BCG, 3 doses of DTP and polio, and Measles vaccine, but not necessarily Hepatitis B.
		Immunisation coverage under 1 year	The proportion of all children in the target area under one year who complete their primary course of immunisation. A Primary Course includes BCG, OPV 1,2 & 3, DTP-Hib 1,2 & 3, HepB 1,2 & 3, and 1st measles (usually at 9 months).
		Measles 1st dose under 1 year coverage	The proportion of children who received their 1st measles dose (normally at 9 months) – annualised.
		Measles 2nd dose coverage	The proportion of children who received their 2nd measles dose (around 18 months) – annualised.
		OPV 1st dose coverage	The proportion of children under 1 immunised with OPV dose 1.
		PCV 3rd dose coverage	The proportion of children who received their third PCV dose (around 9 months) – annualised.
		RV 2nd dose coverage	The proportion of children who received their second RV dose (around 14 weeks) – annualised.
	Orphans	Number of orphans	Number of children under 18 years whose biological mother, biological father or both parents have died. Different kinds of orphans are defined as: maternal orphans – a child whose mother has died, or whose living status is not known, but whose father is alive. paternal orphans – a child whose father has died, or whose living status is not known, but whose mother is alive. double/dual orphan – a child whose mother and father have both died, or whereabouts are unknown.
		Orphanhood	Proportion of children under 18 years whose biological mother, biological father or both parents have died.

Nutrition	Breast-feeding	Exclusive breastfeeding rate	Proportion of living children receiving only breast milk from birth to various ages.
	Nutrients	Age-standardised mean population intake of salt (sodium chloride) per day in grams	Age-standardised mean population intake of salt (sodium chloride) per day in grams in persons aged 18+ years. Numerator: The sum of sodium excretion in urine samples from all respondents aged 18+ years. The gold standard for estimating salt intake is through 24-hour urine collection. However, other methods such as spot urine and food frequency surveys may be more feasible to administer at the population level. Denominator: All respondents of the survey aged 18+ years.
		Anaemia prevalence in children	Proportion of children with Hb <11g/dl.
		Anaemia prevalence in women of reproductive age	Percentage of women aged 15–49 years with a haemoglobin level less than 120 g/L for non-pregnant women and lactating women, and less than 110 g/L for pregnant women, adjusted for altitude and smoking.
		Iodine deficiency	Indicator may be reported using a number of definitions: Iodine deficient school (comprehensive definition) = median urinary iodine concentration < 100mcg/litre or >= 20% of children with urinary iodine < 50mcg/litre Iodine deficient child = urinary iodine concentration < 100mcg/litre Indicator reported as proportion of schools or proportion of children as appropriate.
		Iodised salt consumption	Proportion of households' salt samples with specified iodine concentrations. The legal concentration at packaging is 40–60mg/kg. A concentration <10mg/kg is probably insufficient to prevent iodine deficiency disorder.
		Iron deficiency anaemia prevalence	Proportion of children with Hb <11g/dl and ferritin <12mcg/l.
		Iron deficiency prevalence	Proportion of children with ferritin <12mcg/l.
		Vitamin A coverage children 12–59 months	Proportion of children 12–60 months receiving vitamin A 200 000 units twice a year. The denominator is thus the target population 1–4 years multiplied by 2. For surveys this indicator is usually given as the percentage of children who received Vitamin A supplements in the preceding 6 months.
		Vitamin A deficiency	Proportion of children with serum retinol <20mcg/dl.
		Vitamin A dose 12–59 months coverage	Proportion of children 12–59 months who received vitamin A 200 000 units, preferably every six months. The denominator is therefore the target population 1–4 years multiplied by 2.
	Risk factors	Obesity	Percentage of people with a body mass index (BMI) (body mass in kg divided by the square of the height in m) equal to or more than 30kg/m^2.
		Stunting	Proportion of children with height for age under 2 standard deviations from the norm (reference population median).
		Waist-hip ratio (WHR) above cut-off	Proportion of people with the ratio of waist / hip circumference >= 1.0 (for men) or >=0.85 (for women).
		Wasting	Proportion of children with weight for height under 2 standard deviations from the norm (reference population median).
Non-communicable disease	Cancer	Cancer incidence rate, by type of cancer (per 100 000 population)	Number of new cancers of a specific site/type occurring per 100 000 population. Numerator: Number of new cancer cases diagnosed in a specific year. This may include multiple primary cancers occurring in one patient. The primary site reported is the site of origin and not the metastatic site. In general, the incidence rate would not include recurrences. Denominator: The at-risk population for the given category of cancer. The population used depends on the rate to be calculated. For cancer sites that occur only in one sex, the sex-specific population (e.g. females for cervical cancer) is used.
	Diabetes	Diabetes high risk cases incidence rate (annualised)	High risk diabetes cases expressed per 1000 population 40 years and older.
		Diabetes incidence	Newly diagnosed diabetes clients initiated on treatment per 1 000 population.
		Diabetes prevalence	Percentage of people with diabetes. Defined in SANHANES as those with HbA1c > 6.5% WHO Core indicator is: Age-standardised prevalence of raised blood glucose/diabetes among persons aged 18+ years or on medication for raised blood glucose Defined as: fasting plasma glucose value >= 7.0 mmol/L (126 mg/dL) or on medication for raised blood glucose among adults aged 18+ years.
		Diabetes prevalence (per 1 000)	Number of people with diabetes per 1 000 people in the target population.
	Hypertension	Hypertension prevalence	Percentage of people with hypertension, where hypertension is usually defined as individuals with systolic blood pressure >=140 m Hg and/or diastolic blood pressure >=90 mmHg and/or who reported the current use of antihypertensive medication.
		Hypertension prevalence (per 1 000)	Number of people with hypertension per 1 000 people in the target population. Data for the private sector are based on the number of people being TREATED for this condition.
		Hypertension prevalence rate (age-standardised)	Percentage of population 15 years and older with hypertension, age-standardised (Census 2011 population).
	Hypertension (continued	Hypertension treatment coverage	Percentage of people with hypertension who report being on treatment.
		Hypertensives controlled on treatment	Percentage of hypertensives on treatment who are controlled. (BP measurements below threshold)
		Prevalence of raised blood pressure	Percentage of people with systolic blood pressure >=140 mmHg or diastolic blood pressure >=90 mmHg. WHO Core indicator definitions is: Age-standardised prevalence of raised blood pressure among persons aged 18+ years (defined as systolic blood pressure >=140 mmHg and/or diastolic blood pressure >=90 mmHg), and mean systolic blood pressure.
	Mental Health	Prevalence of mental disorders	Percentage of the population suffering from any common mental disorders.
		Suicide rate (per 100 000 population)	Suicide rate per 100 000 population in a specified period (age-standardised).

	Other NCDs	Asthma prevalence (per 1 000)	Number of people with asthma per 1 000 people in the target population. Data for the private sector are based on the number of people being TREATED for this condition. Data for the total population from SADHS are based on the number of adults 15 years and older who were told by a doctor, nurse or health worker that they have this chronic health condition.
		Hyperlipidaemia prevalence (per 1 000)	Number of people with hyperlipidaemia per 1 000 people in the target population. Data for the private sector are based on the number of people being TREATED for this condition. Data for the total population from SADHS are based on the number of adults 15 years and older who were told by a doctor, nurse or health worker that they have this chronic health condition.
		Mortality between 30–70 years from cardiovascular, cancer, diabetes or chronic respiratory disease	Unconditional probability of dying between exact ages 30 and 70 from any of cardiovascular disease, cancer, diabetes, or chronic respiratory disease. Deaths from these four causes will be based on the following ICD codes: I00–I99, COO–C97, E10–E14 and J30–J98. According to WHO Core indicators: Modelling, using multiple inputs, is often used if no complete and accurate data are available. Age standardisation is done for comparability over time and between populations.
		Prevalence of abnormal lipid profiles	Percentage of people with raised cholesterol or other abnormal lipid profiles.
Risk behaviour	Alcohol Drug use	Currently drink alcohol	Proportion of people who currently drink alcohol.
		Ever drank alcohol	Proportion of people who ever drank alcohol.
		Number of admissions for alcohol and other drug abuse	Number of patients admitted for treatment by treatment centres who are part of the SACENDU Project Sentinel Surveillance System.
		Primary drug of abuse as % of all drugs of abuse	Percentage breakdown of the primary drug of abuse reported by patients admitted to treatment centres that are part of the SACENDU sentinel surveillance system.
	Inactivity	Percentage participating in insufficient physical activity	Proportion of those surveyed who did not participate in either vigorous or moderate physical activity that would have been sufficient to gain any health benefit, in the 7 days preceding the survey. Vigorous activity is defined as activities for 20 or more minutes on 3 or more of the 7 days preceding the survey such as soccer, netball, rugby or basketball. Moderate activity is defined as 30 or more minutes on 5 or more of the 7 days preceding the survey such as fast walking, slow bicycling, skating, mopping or sweeping floors.
	Smoking	Ever smoked cigarettes	Proportion of people who have ever smoked a cigarette, even one or two puffs.
		Frequent smokers	Proportion of people who smoked (cigarettes) on 20 or more days of the past 30 days.
		Prevalence of smoking	Proportion of population who currently smoke. This indicator is also known as 'Current smokers (%)' Note that the indicator may be given just for cigarettes or for other tobacco products.
Injuries	Injuries	Always wear a seat belt when driven by someone else	Proportion of people who always wear a seat belt when driven in a car by someone else.
		Drove after drinking alcohol	Proportion of people who drove after drinking alcohol (in the month preceding the survey, of those who indicated they drive a vehicle).
		Intimate partner violence prevalence (%)	Percentage of currently partnered girls and women aged 15–49 years who have experienced physical and/or sexual violence by their current intimate partner in the last 12 months.
		Percentage adults experienced work related illness/injuries	Proportion of working adults (adults = 15+ years) who reported suffering from a work-related illness or injury.
		Road accident fatalities per 100 000 population	Number of fatalities due to road accidents per 100 000 population.
Health Services	Health Facilities	Number of health facilities	Number of health facilities
	Health Services	Percentage of users of private health services very satisfied with the service received	Percentage of users of private health services highly satisfied with the service received.
		Percentage of users of public health services very satisfied with the service received	Percentage of users of public health services highly satisfied with the service received.
	Information Systems	Birth registration coverage	Percentage of births that are registered within one month of age in a civil registration system.
		Death registration coverage	Percentage of deaths that are registered (with age and sex).

	Management Inpatients	Average length of stay – total	The average number of patients days that an admitted patients spends in hospital before separation.
		Hospital bed density (beds per 1 000 target population)	The number of usable beds divided by the population x 1 000. Where this is calculated for public health sector beds, the population used is the public sector dependent (uninsured) population.
		Inpatient bed utilisation rate – total	A measure of the average number of beds that are occupied – expressed as the proportion of all available bed days, which is calculated as the number of actual beds multiplied by the average number of days in a month (30.42).
		Inpatient crude death rate	Proportion of admitted clients/separations who died during hospital stay. Inpatient separations is the total of day clients, inpatient discharges, Inpatient deaths and Inpatient transfer outs.
		Number of beds	Total number of hospital beds.
		Usable beds per 1 000 total population	Number of usable beds in hospitals per 1 000 total population.
	Management PHC	Any ARV and/or TB drug stock out rate	The proportion of all fixed facilities that had stock-out of any ARV or TB drug.
		PHC doctor clinical work load	Average number of clients seen per doctor per clinical work day. This includes doctors employed in the public and private sector.
		PHC professional nurse clinical work load	Average number of clients seen per professional nurse per professional nurse clinical work day
		PHC utilisation rate	Average number of PHC visits per person per year in the population.
		PHC utilisation rate under 5 years	Average number of PHC visits per year per person under 5 years of age in the population.
		Tracer items stock-out rate (fixed clinic/ CHC/CDC)	The proportion of all fixed clinics, CHCs and CDCs that had stock out of ANY tracer item for any period.
Human Resources	Community Service	Number of CS pharmacists	Number of community service pharmacists.
	Health Personnel	Number of (health professionals)	Number of this category of health professional working in the specified sector.
		Number of (health professionals) registered	Number of this category of health professional registered with the relevant professional council. This number includes those working in the public or private sector as well as those registered but not working or overseas.
	Personnel per population	(Health professionals) per 100 000 population	Ratio of the number of personnel to the population (per 100 000). Note that the measure of the number of personnel may differ for the public and private sectors and also that the population may be adjusted to be the population assumed to be dependent on that sector.
Finance	Finance	Claims ratio	Proportion of member contributions that has been utilised for the payment of benefits claimed by members of medical schemes, as opposed to allocation of contributions for non-health benefits and the building of reserves.
		Expenditure per patient day equivalent (district hospitals)	Average cost per patient per day seen in a hospital. (expressed as Rand per patient day equivalent)
		Headcount ratio of catastrophic health expenditure	Proportion of the population (or sub-population) facing catastrophic health expenditures. Headcount ratios are the estimated total number of households facing catastrophic health expenditures over the total number of households. A household is identified as facing catastrophic health expenditures when its out-of-pocket health expenditures represent 40% or more of its capacity-to-pay. Capacity-to-pay is estimated as total expenditure net of a subsistence level of food expenditure. The latter is calculated as the average food expenditure per equivalent adults of households in the 45th–55th food budget share distribution. When actual food spending falls below this amount, capacity-to-pay is defined as total expenditures net of actual food spending.
		Headcount ratio of impoverishing health expenditure	Proportion of the population (or sub-population) facing impoverishing health expenditures. Headcount ratios are the estimated total number of households facing impoverishing health expenditures over the total number of households. A household is identified as facing impoverishing health expenditures when its out-of-pocket health expenditures push it below a poverty line (i.e. a household is above the poverty line when taking its total expenditure gross of out-of-pocket payments but below the poverty line when taking total expenditure net of out-of-pocket payments). The poverty line is defined as subsistence level food expenditure estimated as the average food expenditure per equivalent adults of households in the 45th–55th food budget share distribution. When actual food spending falls below this amount, then capacity-to-pay is defined as total expenditures net of actual food spending.
		Health as percentage of total expenditure	Proportion of total (government) expenditure on health. Provinces with central hospitals have a higher share.
		Medical scheme beneficiaries	Number of medical scheme beneficiaries, as reported by the Medical Schemes Council.
		Medical scheme coverage	Proportion of population covered by medical schemes.
		Pensioner ratio	Proportion of members of medical schemes who are 65 years or older, in registered medical schemes.

	Finance (continued)	Per capita health expenditure	Amount spent on health per person. (in Rand) For the public sector, this is often calculated for the population without medical aid coverage (public sector dependent population). For the private sector this is usually calculated for the number of medical schemes beneficiaries. Note that attention should be given to the notes for each data item, since financial indicators are affected by inflation, and expenditure may be reported according to currency value for a particular year to facilitate comparison of real differences.
		Provincial and LG PHC expenditure per capita (uninsured)	Provincial expenditure on sub-programmes of DHS (2.2 – 2.7) plus net local government expenditure on PHC per uninsured population.
		Ratio of private to public sector per capita health expenditure	Total private per capita expenditure divided by total public sector per capita expenditure. Public health sector expenditure is divided by the population covered. (public sector dependent population) Private sector is total medical scheme expenditure divided by number of beneficiaries.
		Total current expenditure on health as percentage of Gross Domestic Product	Proportion of national Gross Domestic Product that is spent on healthcare.

References

1 World Health Organization. World Health Statistics 2016. Monitoring health for the SDGs. Geneva: World Health Organization; 2016.

2 Hosseinpoor AR, Bergen N. Area-based units of analysis for strengthening health inequality monitoring. Bull World Health Organ. 2016;94(11):856–8.

3 Stevens GA, Alkema L, Black RE, Boerma JT, Collins GS, Ezzati M, et al. Guidelines for Accurate and Transparent Health Estimates Reporting: the GATHER statement. PLoS Med. 2016;13(6):e1002056.

4 World Health Organization. The Innov8 approach for reviewing national health programmes to leave no one behind: technical handbook. Geneva: World Health Organization; 2016.

5 Schmets G, Rajan D, Kadandale S, editors. Strategizing national health in the 21st century: A handbook. Geneva: World Health Organization; 2016.

6 National Health Laboratory Service. National Health Laboratory Service: Annual Report 2015/16. Pretoria: National Health Laboratory Service; 2016.

7 Hanney SR, Gonzalez-Block MA. Building health research systems: WHO is generating global perspectives, and who's celebrating national successes? Health Res Policy Syst. 2016;14(1):90.

8 World Health Organization. Global Reference List of 100 Core Health Indicators, 2015. Geneva: World Health Organization; 2015.

9 High-level Group for Partnership Coordination and Capacity-Building for statistics for the 2030 Agenda for Sustainable Development (HLG-PCCB), editor. Cape Town Global Action Plan for Sustainable Development Data. UN World Data Forum; 2017 15 January; Cape Town: United Nations.

10 Pisani E, Aaby P, Breugelmans JG, Carr D, Groves T, Helinski M, et al. Beyond open data: realising the health benefits of sharing data. BMJ. 2016;355:i5295.

11 South African National Department of Health. NIDS Indicator Data Set: Data Element Definitions: April 2017 to March 2019. Pretoria: National Department of Health; 2016.

12 Roomaney RA, Pillay-van Wyk V, Awotiwon OF, Nicol E, Joubert JD, Bradshaw D, et al. Availability and quality of routine morbidity data: review of studies in South Africa. J Am Med Inform Assoc. 2017;24(e1):e194–e206.

13 Ataguba JE, Ingabire MG. Universal Health Coverage: Assessing Service Coverage and Financial Protection for All. Am J Public Health. 2016;106(10):1780–1.

14 GBD 2015 SDG Collaborators. Measuring the health-related Sustainable Development Goals in 188 countries: A baseline analysis from the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1813–50.

15 AbouZahr C, Adjei S, Kanchanachitra C. From data to policy: good practices and cautionary tales. Lancet. 2007;369(9566):1039–46.

16 Statistics South Africa. Mid-year population estimates 2016. Statistical release P0302. Pretoria: Statistics SA; 2016.

17 He W, Goodkind D, Kowal P. An Aging World: 2015. International Population Reports, P95/16–1. Washington, D.C.: United States Census Bureau; 2016.

18 Statistics South Africa. Recorded live births 2013–2015. Statistical release P0305. Pretoria: Statistics SA; 2016.

19 United National Children's Fund (UNICEF). Unprooted: The Growing Crisis for Refugee and Migrant Children. New York: UNICEF; 2016.

20 Statistics South Africa. Census in Brief. The people of South Africa population census 1996. Pretoria: Statistics SA; 1998.

21 Statistics South Africa. Community Survey 2016 Statistical Release. P0301. Pretoria: Statistics SA; 2016.

22 Statistics South Africa. Census 2011: Fertility in South Africa. Report 03–01–63. Pretoria: Statistics SA; 2015.

23 Statistics South Africa. Mid-year population estimates. Statistical release P0302. Pretoria: Statistics SA; time series.

24 Statistics South Africa. Census 2011. Statistical release (Revised) P0301.4. Pretoria: Statistics SA; 2012.

25 Statistics South Africa. Census 2011 Municipal fact sheet. Report No. 03–01–58. Pretoria: Statistics SA; 2012.

26 Statistics South Africa. Mid-year population estimates 2015. Statistical release P0302. Pretoria: Statistics SA; 2015.

27 Statistics South Africa. Census 2001. Census in Brief. Pretoria: Statistics SA; 2003.

28 Statistics South Africa. Community Survey 2007. Various reports and online databases.

29 Statistics South Africa. Mortality and causes of death in South Africa, 2008: Findings from death notification. Statistical release P0309.3. Pretoria: Statistics SA; 2010.

30 Statistics South Africa. Mortality and causes of death in South Africa, 2013: Findings from death notification. Pretoria: Statistics SA; 2014.

31 Statistics South Africa. Mortality and causes of death in South Africa, 2015: Findings from death notification. Statistical Release P0309.3. Pretoria: Statistics SA; 2017.

32 Statistics South Africa. Statistical release P0305 Recorded live births. (various years).

33 South African National Department of Health DHIS Population Estimates 2002–2018 [database on the Internet]. National Department of Health. 2014.
URL: http://www.health.gov.za

34 MSF, RHAP, RuDASA, SA HIV Clinician's Society, SECTION27, TAC. Stock Outs in South Africa: A National Crisis. South Africa: South Africa: Monitoring Essential Medicines Consortium; 2013.

35 National Treasury. Intergovernmental Fiscal Review 2001. Pretoria: National Treasury; 2001.

36 Statistics South Africa. General Household Survey 2009. Statistical release P0318 (Revised version). Pretoria: Statistics SA; 2010.

37 Council for Medical Schemes. Annual Report 2006–7. Pretoria: Council for Medical Schemes; 2007.

38 Statistics South Africa. General Household Survey 2010. Statistical release P0318 (Revised version). Pretoria: Statistics SA; 2011.

39 Council for Medical Schemes. Annual Report 2011–2012. Pretoria: Council for Medical Schemes; 2012.

40 Statistics South Africa. General Household Survey 2015. Statistical release P0318. Pretoria: Statistics SA; 2016.

41 Council for Medical Schemes. Annual Report 2015/16. Pretoria: Council for Medical Schemes; 2016.

42 Johnson L. Thembisa version 2.5 [dataset]. Cape Town: Centre for Infectious Disease Epidemiology and Research, University of Cape Town; 2016.

43 Statistics South Africa. Estimation of fertility from the 2007 Community Survey of South Africa. Pretoria: Statistics SA; 2010.

44 Statistics South Africa. Census 2011. Statistical release P0301.4. Pretoria: Statistics SA; 2012.

45 Statistics South Africa. General Household Survey 2014. Statistical release P0318. Pretoria: Statistics SA; 2015.

46 World Health Organization. Implementing Rio: Monitoring action on the social determinants of health. Technical meeting for measuring and monitoring action on the social determinants of health. Ottawa, Canada: World Health Organization; 2016.

47 World Bank. World Development Report 2015. Mind, society, and behavior. Washington, D.C.: World Bank Group; 2015.

48 World Health Organization. Global Report on Urban Health: equitable, healthier cities for sustainable development. Geneva: World Health Organization and UN-Habitat; 2016.

49 World Bank. The cost of air pollution: strengthening the economic case for action. Washington D.C.: World Bank Group; 2016.

50 World Health Organization. Ambient air pollution: A global assessment of exposure and burden of disease. Geneva: World Health Organization; 2016.

51 United National Children's Fund (UNICEF). Clear the air for children. New York: UNICEF; 2016.

52 Suk WA, Ahanchian H, Asante KA, Carpenter DO, Diaz-Barriga F, Ha EH, et al. Environmental Pollution: An Under-recognized Threat to Children's Health, Especially in Low- and Middle-Income Countries. Environ Health Perspect. 2016;124(3):A41–5.

53 National Department of Water and Sanitation. 2014 Green Drop Progress Report. Pretoria: Department of Water and Sanitation; 2016.

54 Statistics South Africa. Quarterly Labour Force Survey. Quarter 3: 2016. Statistical release P0211. Pretoria: Statistics SA; 2016.

55 Statistics South Africa. Living Conditions of Households in South Africa. An analysis of household expenditure and income data using the LCS 2014/2015 Statistical Release P0310. Pretoria: Statistics SA; 2017.

56 Statistics South Africa. GHS Series Volume VIII: Water and Sanitation, in-depth analysis of the General Household Survey 2002–2015 and Community Survey 2016 data. Report-03–18–07(2002–2015). Pretoria: Statistics SA; 2016.

57 Statistics South Africa. Vulnerable Groups Indicator Report: 2014. Report–03–19–02. Pretoria: Statistics SA; 2016.

58 Braam T, editor. Barometer(7). Johannesburg: Reproductive Rights Alliance; 2001.

59 Department of Water Affairs. Blue Drop Report 2011. Pretoria: Department of Water Affairs; 2011.

60 Department of Water Affairs. Blue Drop Report 2012. Pretoria: Department of Water Affairs; 2012.

61 Department of Water Affairs. Blue Drop Report 2014. Pretoria: Department of Water Affairs; 2016.

62 Statistics South Africa. General Household Survey 2011. Statistical release P0318. Pretoria: Statistics SA; 2012.

63 Statistics South Africa. Human Development Index. Pretoria: Statistics SA; 2001.

64 United Nations Development Programme (UNDP). Africa Human Development Report 2016. Accelerating Gender Equality and Women's Empowerment in Africa. New York: UNDP; 2016.

65 Statistics South Africa. Gender Series Volume II: Education and Gender, 2004–2014. Report No. 03–10–12 (2004–2014). Pretoria: Statistics SA; 2015.

66 Statistics South Africa. General Household Survey 2006. P0318. Pretoria: Statistics SA; 2006.

67 Statistics South Africa. Vulnerable Groups Series I: The Social Profile of Youth, 2009–2014. Report–03–19–01. Pretoria: Statistics SA; 2016.

68 Statistics South Africa. Census 2011: Income dynamics and poverty status of households in South Africa. Report 03–10–10. Pretoria: Statistics SA; 2015.

69 Statistics South Africa. Poverty Trends in South Africa. An examination of absolute poverty between 2006 and 2011. Report No. 03–10–06. Pretoria: Statistics SA; 2014.

70 Statistics South Africa. Quarterly Labour Force Survey. Statistical release P0211. Pretoria: Statistics SA; time series.

71 Statistics South Africa. Quarterly Labour Force Survey. Quarter 4: 2016. Statistical release P0211. Pretoria: Statistics SA; 2017.

72 Statistics South Africa. Statistical Release PO317 October Household Survey. (various years).

73 GBD 2015 Mortality and Causes of Death Collaborators. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1459–544.

74 Pillay-van Wyk V, Msemburi W, Laubscher R, Dorrington RE, Groenewald P, Glass T, et al. Mortality trends and differentials in South Africa from 1997 to 2012: Second National Burden of Disease Study. Lancet Glob Health. 2016;4(9):e642–e53.

75 Oni T, Mayosi BM. Mortality trends in South Africa: progress in the shadow of HIV/AIDS and apartheid. Lancet Glob Health. 2016;4(9):e588–e9.

76 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for Free State, 1997–2012. Cape Town: South African Medical Research Council; 2016.

77 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for Eastern Cape, 1997–2012. Cape Town: South African Medical Research Council; 2016.

78 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for Western Cape, 1997–2012. Cape Town: South African Medical Research Council; 2016.

79 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for North West, 1997–2012. Cape Town: South African Medical Research Council; 2016.

80 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for Northern Cape, 1997–2012. Cape Town: South African Medical Research Council; 2016.

81 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for Mpumalanga, 1997–2012. Cape Town: South African Medical Research Council; 2016.

82 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for Limpopo, 1997–2012. Cape Town: South African Medical Research Council; 2016.

83 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for KwaZulu-Natal, 1997–2012. Cape Town: South African Medical Research Council; 2016.

84 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for Gauteng, 1997–2012. Cape Town: South African Medical Research Council; 2016.

85 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second National Burden of Disease Study for South Africa: Cause-of-death profile for South Africa, 1997–2012. Cape Town: South African Medical Research Council; 2016.

86 Morden E, Groenewald P, Zinyakatira N, Neethling I, Msemburi W, Daniels J, et al. Western Cape Mortality Profile 2013. Mortality trends 2009–2013. Cape Town: South African Medical Research Council; 2016.

87 Global Burden of Disease Study 2010 Group. Global Burden of Disease Study 2010 Mortality Results 1970–2010. Seattle: Institute for Health Metrics and Evaluation (IHME); 2012.

88 Bradshaw D, Nannan N, Laubscher R, Groenewald P, Joubert J, Nojilana B, et al. South African National Burden of Disease Study 2000: Estimates of Provincial Mortality. Cape Town: South African Medical Research Council; 2004.

89 Msemburi W, Pillay-van Wyk V, Dorrington R, Neethling I, Nannan N, Groenewald P, et al. Second national burden of disease study for South Africa: Cause-of-death profile for South Africa, 1997–2010. Cape Town: South African Medical Research Council; 2014.

90 Dorrington R, Bradshaw D, Laubscher R, Nannan N. Rapid mortality surveillance report 2014. Cape Town: South African Medical Research Council; 2015.

91 World Health Organization. The World Health Report 2002. Reducing Risks, Promoting Health Life. Geneva: World Health Organization; 2002.

92 GBD 2013 DALYs and HALE collaborators. Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition. Lancet. 2015;386(10009):2145–91.

93 GBD 2015 DALYs and HALE Collaborators. Global, regional, and national disability-adjusted life-years (DALYs) for 315 diseases and injuries and healthy life expectancy (HALE), 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1603–58.

94 GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1545–602.

95 Santosa A, Schroders J, Vaezghasemi M, Ng N. Inequality in disability-free life expectancies among older men and women in six countries with developing economies. J Epidemiol Community Health. 2016;70(9):855–61.

96 Richards NC, Gouda HN, Durham J, Rampatige R, Rodney A, Whittaker M. Disability, noncommunicable disease and health information. Bull World Health Organ. 2016;94(3):230–2.

97 National Department of Social Development. White Paper on the Rights of Persons with Disabilities. Pretoria: National Department of Social Development; 2016.

98 Statistics South Africa. General Household Survey 2012. Statistical release P0318. Pretoria: Statistics SA; 2013.

99 Shisana O, Labadarios D, Rehle T, Simbayi L, Zuma K, Dhansay A, et al. South African National Health and Nutrition Examination Survey (SANHANES–1). Cape Town: HSRC Press; 2013.

100 Molyneux DH, Savioli L, Engels D. Neglected tropical diseases: progress towards addressing the chronic pandemic. Lancet. 2017;389(10066):312–25.

101 National Institute for Communicable Diseases. GERMS-SA Annual Report 2015. Crowther-Gibson P, Quan V, editors. Johannesburg: National Institute for Communicable Diseases; 2015.

102 National Institute for Communicable Diseases. Communicable Diseases Communiqué. Volume 16(1), January 2017. Johannesburg: National Institute for Communicable Diseases; 2017.

103 Mutapi F, Maizels R, Fenwick A, Woolhouse M. Human schistosomiasis in the post mass drug administration era. Lancet Infect Dis. 2017;17(2):e42–e8.

104 Brodish PH, Singh K. Association Between Schistosoma haematobium Exposure and Human Immunodeficiency Virus Infection Among Females in Mozambique. Am J Trop Med Hyg. 2016.

105 Notification System [database on the Internet]. National Department of Health,.
URL: http://www.health.gov.za

106 Young South Africans, Broadcast media, and HIV/AIDS Awareness: Results of a National Survey: The Henry J. Kaiser Family Foundation; 2007.

107 South African National Department of Health. 2008 National Antenatal Sentinel HIV and Syphilis Prevalence Survey. Pretoria: National Department of Health; 2009.

108 South African National Department of Health. National HIV and syphilis prevalence survey in South Africa 2006. Pretoria: National Department of Health; 2007.

109 South African National Department of Health. The National Antenatal Sentinel HIV and Syphilis Prevalence Survey, South Africa, 2011. Pretoria: National Department of Health; 2012.

110 UCSF, Anova Health Institute, Wits Reproductive Health and HIV Research Institute. South African Health Monitoring Study (SAHMS), Final Report: The Integrated Biological and Behavioural Survey among Female Sex Workers, South Africa 2013–2014. San Francicso: University of California, San Francisco (UCSF); 2015.

111 World Health Organization. World Malaria Report 2016. Geneva: World Health Organization; 2016.

112 Gething PW, Casey DC, Weiss DJ, Bisanzio D, Bhatt S, Cameron E, et al. Mapping Plasmodium falciparum Mortality in Africa between 1990 and 2015. N Engl J Med. 2016;375(25):2435–45.

113 World Health Organization. Eliminating Malaria. Geneva: World Health Organization; 2016.

114 Tatem AJ, Jia P, Ordanovich D, Falkner M, Huang Z, Howes R, et al. The geography of imported malaria to non-endemic countries: a meta-analysis of nationally reported statistics. Lancet Infect Dis. 2017;17(1):98–107.

115 Murray CJ, Rosenfeld LC, Lim SS, Andrews KG, Foreman KJ, Haring D, et al. Global malaria mortality between 1980 and 2010: a systematic analysis. Lancet. 2012;379(9814):413–31.

116 Labadarios D, van Middelkook A, editors. Children aged 6–71 months in South Africa 1994: their anthropometric, vitamin A, iron and immunisation coverage and status. Johannesburg: The South African Vitamin A Consulting Group (SAVACG); 1995.

117 Statistics South Africa. Mortality and causes of death in South Africa, 2014: Findings from death notification. Statistical release P0309.3. Pretoria: Statistics SA; 2015.

118 Murray CJ, Ortblad KF, Guinovart C, Lim SS, Wolock TM, Roberts DA, et al. Global, regional, and national incidence and mortality for HIV, tuberculosis, and malaria during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2014;384(9947):1005–70.

119 Statistics South Africa. Mortality and causes of death in South Africa, 2005: Findings from death notification. Statistical release P0309.3. Pretoria: Statistics SA; 2005.

120 Statistics South Africa. Mortality and causes of death in South Africa, 2010: Findings from death notification. Statistical release P0309.3. Pretoria: Statistics SA; 2013.

121 Houben RM, Dodd PJ. The Global Burden of Latent Tuberculosis Infection: A Re-estimation Using Mathematical Modelling. PLoS Med. 2016;13(10):e1002152.

122 South African National Department of Health. National Strategic Plan on HIV, STIs and TB: 2017 – 2022. Zero Draft. Pretoria: National Department of Health; 2016.

123 National Institute for Communicable Diseases. South African Tuberculosis Drug Resistance Survey 2012–14. Johannesburg: National Institute for Communicable Diseases; 2016.

124 Shah NS, Auld SC, Brust JC, Mathema B, Ismail N, Moodley P, et al. Transmission of Extensively Drug-Resistant Tuberculosis in South Africa. N Engl J Med. 2017;376(3):243–53.

125 Budgell EP, Evans D, Schnippel K, Ive P, Long L, Rosen S. Outcomes of treatment of drug-susceptible tuberculosis at public sector primary healthcare clinics in Johannesburg, South Africa: A retrospective cohort study. S Afr Med J. 2016;106(10):1002–9.

126 Velen K, Lewis JJ, Charalambous S, Page-Shipp L, Popane F, Churchyard GJ, et al. Household HIV Testing Uptake among Contacts of TB Patients in South Africa. PloS One. 2016;11(5):e0155688.

127 Siroka A, Ponce NA, Lönnroth K. Association between spending on social protection and tuberculosis burden: a global analysis. Lancet Infect Dis. 2016;16(4):473–9.

128 Naidoo P, Simbayi L, Labadarios D, Ntsepe Y, Bikitsha N, Khan G, et al. Predictors of knowledge about tuberculosis: results from SANHANES–1, a national, cross-sectional household survey in South Africa. BMC Public Health. 2016;16:276.

129 World Health Organization. Global tuberculosis report 2015. Geneva: World Health Organization; 2015.

130 Reddy S, Panday S, Swart D, Jinabhai C, Amosun S, James S, et al. Umthenthe Uhlaba Usamila: The South African Youth Risk Behaviour Survey 2002. Cape Town: South African Medical Research Council; 2003.

131 Statistics South Africa. Mortality and causes of death in South Africa, 2012: Findings from death notification. Statistical release P0309.3. Pretoria: Statistics SA; 2014.

132 South African National Department of Health. TB Section. Pretoria: National Department of Health.

133 Ndjeka N. Multi-Drug Resistant Tuberculosis. Strategic Overview on MDR-TB Care in South Africa. South Africa: National Department of Health; 2014 [cited 27 March 2014].
URL: http://www.health-e.org.za/wp-content/uploads/2014/03/Strategic_overview_of_MDR_TB_RSA.pdf

134 Aziz M, Wright A, De Muynck A, Laszlo A. Anti-tuberculosis Drug Resistance in the World Report no. 3: The WHO/IUATLD Global Project on Anti-Tuberculosis Drug Resistance Surveillance 1999–2002. Geneva: World Health Organization; 2004.

135 Massyn N, Peer N, Padarath A, Barron P, Day C, editors. District Health Barometer 2014/15. Durban: Health Systems Trust; 2015.

136 Massyn N, Peer N, Padarath A, Barron P, Day C, editors. District Health Barometer 2015/16. Durban: Health Systems Trust; 2017.

137 World Health Organization. Consolidated strategic information guidelines for HIV in the health sector. Geneva: World Health Organization; 2015.

138 Joint United Nations Programme on HIV/AIDS (UNAIDS). Global AIDS Update 2016. Geneva: UNAIDS; 2016.

139 South African National AIDS Council (SANAC). The South African National Sex Worker HIV Plan, 2016 – 2019. Pretoria: SANAC; 2016.

140 Lane T, Osmand T, Marr A, Struthers H, McIntyre JA, Shade SB. High HIV Incidence in a South African Community of Men Who Have Sex With Men: Results From the Mpumalanga Men's Study, 2012–2015. J Acquir Immune Defic Syndr. 2016;73(5):609–11.

141 Ramjee G, Moonsamy S, Abbai NS, Wand H. Individual and Population Level Impact of Key HIV Risk Factors on HIV Incidence Rates in Durban, South Africa. PloS One. 2016;11(4):e0153969.

142 Platt L, Easterbrook P, Gower E, McDonald B, Sabin K, McGowan C, et al. Prevalence and burden of HCV co-infection in people living with HIV: a global systematic review and meta-analysis. Lancet Infect Dis. 2016;16(7):797–808.

143 Atun R, Chang AY, Ogbuoji O, Silva S, Resch S, Hontelez J, et al. Long-term financing needs for HIV control in sub-Saharan Africa in 2015–2050: A modelling study. BMJ Open. 2016;6(3):e009656.

144 GBD 2015 HIV Collaborators. Estimates of global, regional, and national incidence, prevalence, and mortality of HIV, 1980–2015: the Global Burden of Disease Study 2015. Lancet HIV. 2016;3(8):e361–87.

145 Joint United Nations Programme on HIV/AIDS (UNAIDS). Prevention Gap Report. Geneva: UNAIDS; 2016.

146 Morris BJ, Wamai RG, Henebeng EB, Tobian AA, Klausner JD, Banerjee J, et al. Estimation of country-specific and global prevalence of male circumcision. Popul Health Metr. 2016;14:4.

147 Maughan-Brown B, Lloyd N, Bor J, Venkataramani AS. Changes in self-reported HIV testing during South Africa's 2010/2011 national testing campaign: gains and shortfalls. J Int AIDS Soc. 2016;19(1):20658.

148 South African National Department of Health. National HIV Testing Services: Policy. Pretoria: National Department of Health; 2016.

149 United Nations Children's Fund (UNICEF). For Every Child, End AIDS – Seventh Stocktaking Report. New York: UNICEF; 2016.

150 Massyn N, Peer N, English R, Padarath A, Barron P, Day C, et al. District Health Barometer 2015/16. Durban: Health Systems Trust; 2016.

151 Moyo F, Chasela C, Brennan AT, Ebrahim O, Sanne IM, Long L, et al. Treatment outcomes of HIV-positive patients on first-line antiretroviral therapy in private versus public HIV clinics in Johannesburg, South Africa. Clin Epidemiol. 2016;8:37–47.

152 Bradshaw D, Msemburi W, Dorrington R, Pillay-van Wyk V, Laubscher R, Groenewald P, et al. HIV/AIDS in South Africa: how many people died from the disease between 1997 and 2010? AIDS. 2016;30(5):771–8.

153 Haber N, Tanser F, Bor J, Naidu K, Mutevedzi T, Herbst K, et al. From HIV infection to therapeutic response: a population-based longitudinal HIV cascade-of-care study in KwaZulu-Natal, South Africa. Lancet HIV. 2017;S2352–3018(16):30224–7.

154 Johnson LF, Chiu C, Myer L, Davies MA, Dorrington RE, Bekker LG, et al. Prospects for HIV control in South Africa: a model-based analysis. Glob Health Action. 2016;9:30314.

155 Johnson LF, Dorrington R, Moolla H. Modelling the impact of HIV in South Africa's provinces. Cape Town: Centre for Infectious Disease Epidemiology and Research; 2016.

156 Johnson LF. THEMBISA version 1.0: A model for evaluating the impact of HIV/AIDS in South Africa. Centre for Infectious Disease Epidemiology and Research Working Paper February 2014. Cape Town: University of Cape Town; 2014.

157 Rehle TM, Hallett TB, Shisana O, Pillay-van Wyk V, Zuma K, Carrara H, et al. A decline in new HIV infections in South Africa: estimating HIV incidence from three national HIV surveys in 2002, 2005 and 2008. PloS One. 2010;5(6):e11094.

158 Shisana O, Rehle T, Simbayi L, Parker W, Zuma K, Bhana A. South African National HIV Prevalence, HIV Incidence, Behaviour and Communication Survey, 2005. Cape Town: Human Sciences Research Council; 2005.

159 Shisana O, Rehle T, Simbayi L, Zuma K, Jooste S, Zungu N, et al. South African National HIV Prevalence, Incidence and Behavioural Survey, 2012. Pretoria: Human Sciences Research Council; 2014.

160 South African National AIDS Council (SANAC). Progress report on the National Strategic Plan for HIV, TB and STIs (2012 – 2016). Pretoria: SANAC; 2014.

161 AIDS Committee of the Actuarial Society of South Africa. ASSA2008 Model: ProvOutput. AIDS and Demographic Model. South Africa: Actuarial Society of South Africa (ASSA); 2011 [cited 26 March 2011]. URL: http://www.actuarialsociety.org.za/Societyactivities/CommitteeActivities/AidsCommittee/Models.aspx

162 South African National AIDS Council (SANAC). Let our actions count: Reflections on NSP 2012–2016 and moving forward to NSP 2017–2022. Pretoria: SANAC; 2016.

163 Shisana O, Simbayi L. Nelson Mandela/HSRC Study of HIV/AIDS – South African National HIV Prevalence, Behavioural Risks and Mass Media Household Survey 2002. Cape Town: Human Sciences Research Council; 2002.

164 Shisana O, Rehle T, Simbayi L, Zuma K, Jooste S, Pillay-van Wyk V, et al. South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2008. A Turning Tide Among Teenagers? Cape Town: Human Sciences Research Council; 2009.

165 Statistics South Africa. Mid-year population estimates 2013. Statistical release P0302. Pretoria: Statistics SA; 2013.

166 South African National Department of Health. The 2012 National Antenatal Sentinel HIV & Herpes Simplex Type-2 Prevalence Survey in South Africa. Pretoria: National Department of Health; 2014.

167 South African National Department of Health. National HIV and Syphilis antenatal sero-prevalence survey in South Africa 2002. Pretoria: National Department of Health; 2003.

168 South African National Department of Health. National HIV and Syphilis sero-prevalence survey of women attending public antenatal clinics in South Africa 2000. Pretoria: National Department of Health; 2001.

169 South African National Department of Health. National HIV and syphilis antenatal sero-prevalence survey in South Africa 2005. Pretoria: National Department of Health; 2006.

170 Shaikh N, Smith L. The 2005 HIV Antenatal Provincial and Area Surveys. Western Cape. Cape Town: Department of Health, Western Cape; 2006.

171 South African National Department of Health. The National Antenatal Sentinel HIV and Syphilis Prevalence Survey, South Africa, 2010. Pretoria: National Department of Health; 2011.

172 South African National Department of Health. The 2013 National Antenatal Sentinel HIV Prevalence Survey South Africa. Pretoria: National Department of Health; 2015.

173 Lutz W, Scherbov S, van Aardt C. South Africa's Uncertain Demographic Present and Future. Austria: International Institute for Applied Systems Analysis; 2001.

174 Adam M, Johnson L. Estimation of adult antiretroviral treatment coverage in South Africa. S Afr Med J. 2009;99:661 – 7.

175 World Health Organization. Global HIV/AIDS response: Epidemic update and health sector progress towards Universal Access: Progress Report 2011. Geneva: World Health Organization; 2011.

176 Maughan-Brown B, Lloyd N, Bor J, Venkataramani A. Increasing access to HIV testing: Impacts on equity of coverage and uptake from a national campaign in South Africa. Working Paper Number 145. Cape Town: Southern Africa Labour and Development Research Unit (SALDRU); 2015.

177 Department of Health, Medical Research Council, OrcMacro. South Africa Demographic and Health Survey 2003. Pretoria: National Department of Health; 2007.

178 Shisana O, Simbayi L, Rehle T, Zungu N, Zuma K, Ngogo N. South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2008: The health of our children. Pretoria: Human Sciences Research Council; 2010.

179 Key Findings of the Third South African National HIV Communication Survey, 2012. Third South African National HIV Communication Survey. South Africa: Johns Hopkins Health and Education in South Africa (JHHESA); 2012.

180 Johnson LF. Access to antiretroviral treatment in South Africa, 2004 – 2011. South Afr J HIV Med. 2012;13(1):22–7.

181 South African National Department of Health. The National Antenatal Sentinel HIV and Syphilis Prevalence Survey, South Africa, 2011. Pretoria: National Department of Health; 2012.

182 Statistics South Africa. Mid-year population estimates 2011. Statistical release P0302. Pretoria: Statistics SA; 2011.

183 Goga A, Jackson D, Singh M, Lombard C. Early (4–8 weeks postpartum) Population-level Effectiveness of WHO PMTCT Option A, South Africa, 2012–2013. 2012–2013 SAPMTCTE Report. South Africa: South African Medical Research Council and South African National Department of Health; 2015.

184 Rehle T, Shisana O, Pillay V, Zuma K, Puren A, Parker W. National HIV incidence measures – new insights into the South African epidemic. S Afr Med J. 2007;97(3):194–9.

185 Pettifor A, Rees H, Steffenson A, Hlongwa-Madikizela L, MacPhail C, Vermaak K. HIV and sexual behaviour among young South Africans: a national survey of 15–24 year olds. Johannesburg: Reproductive Health Research Unit; 2003.

186 Higher Education and Training HIV/AIDS Programme (HEAIDS). HIV prevalence and Related factors: Higher Education Sector Study South Africa 2008–2009. Pretoria: HEAIDS; 2010.

187 United Nations. Trends in Contraceptive Use Worldwide 2015. New York: United Nations; 2015.

188 Scoggins S, Bremner J. FP2020 Momentum at the Midpoint 2015–2016. Washington, D.C.: Family Planning 2020 and Track20; 2016.

189 Black RE, Levin C, Walker N, Chou D, Liu L, Temmerman M, et al. Reproductive, maternal, newborn, and child health: key messages from Disease Control Priorities 3rd Edition. Lancet. 2016;388(10061):2811–24.

190 Darroch JE, Woog V, Bankole A, Ashford LS. Adding It Up: Costs and Benefits of Meeting the Contraceptive Needs of Adolescents. New York: Guttmacher Institute; 2016.

191 Branson N, Byker T. Causes and Consequences of Teen Childbearing: Evidence from a Reproductive Health Intervention in South Africa. A Southern Africa Labour and Development Research Unit Working Paper Number 166. Cape Town: SALDRU, University of Cape Town; 2016.

192 Amnesty International. Barriers to Safe and Legal Abortion in South Africa. London: Amnesty International Publications; 2017.

193 Sedgh G, Bearak J, Singh S, Bankole A, Popinchalk A, Ganatra B, et al. Abortion incidence between 1990 and 2014: global, regional, and subregional levels and trends. Lancet. 2016;388(10041):258–67.

194 Reddy S, James S, Sewpaul R, Koopman F, Funani N, Sifunda S, et al. Umthente Uhlaba Usamila – The 2nd South African Youth Risk Behaviour Survey 2008. Cape Town: South African Medical Research Council; 2010.

195 Johnson S, Kincaid L, Laurence S, Chikwave F, Delate R, Mahlasela L. Second National HIV Communication Survey 2009. Pretoria: Johns Hopkins Health and Education in South Africa (JHHESA); 2010.

196 Omardien R, Reddy S, James S, Kambaran N, Sifunda S, Ellahebokus A, et al. Umthente Uhlaba Usamila – The 3rd South African National Youth Risk Behaviour Survey 2011. Cape Town: South African Medical Research Council; 2013.

197 Higher Education and Training HIV/AIDS Programme (HEAIDS) and Networking HIV/AIDS Community of South Africa (NACOSA). National Student Sexual Health HIV Knowledge, Attitude and Behavious Survey: Focusing on Student Men who have Sex with Men at 14 Higher Education Institutions in South Africa. Pretoria: HEAIDS, NACOSA; 2014.

198 Department of Health, Medical Research Council, and Macro International. South Africa Demographic and Health Survey 1998. Full report. Pretoria: National Department of Health; 2002.

199 Hogan M, Foreman K, Naghavi M, Ahn S, Wang M, Makela S, et al. Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5. Lancet. 2010;6736(10):1–15.

200 South African National Department of Health. Annual Health Statistics 2012. Pretoria: National Department of Health; 2013.

201 Southern Africa Labour and Development Research Unit. National Income Dynamics Study 2008, Wave 1 [dataset]. In: Southern Africa Labour and Development Research Unit (SALDRU), editor. Version 5.2 ed. Cape Town: DataFirst; 2014.

202 Southern Africa Labour and Development Research Unit. National Income Dynamics Study 2010–11, Wave 2 [dataset]. In: Southern Africa Labour and Development Research Unit (SALDRU), editor. Version 2.2 ed. Cape Town: DataFirst; 2014.

203 McHunu G, Peltzer K, Tutshana B, Seutlwadi L. Adolescent pregnancy and associated factors in South African youth. African Health Sciences. 2012;12(4):426–34.

204 Southern Africa Labour and Development Research Unit. National Income Dynamics Study 2012, Wave 3 [dataset]. In: Southern Africa Labour and Development Research Unit (SALDRU), editor. Version 1.2 ed. Cape Town: DataFirst; 2014.

205 Southern Africa Labour and Development Research Unit. National Income Dynamics Study 2014–2015, Wave 4 [dataset]. In: Southern Africa Labour and Development Research Unit (SALDRU), editor. Version 1.1. ed. Cape Town: DataFirst; 2016.

206 Ramkissoon A, Kleinschmidt I, Beksinka M, Smit J, Hlazo J, Mabude Z. National Baseline Assessment of Sexually Transmitted Infection and HIV services in South African public health sector facilities 2002/2003: Summary Report 2004. Pretoria: National Department of Health; 2004.

207 McDougall L, Campbell OMR, Graham W. Maternal Health. An Executive Summary for The Lancet's Series. Lancet. 2016;388.

208 Campbell OMR, Calvert C, Testa A, Strehlow M, Benova L, Keyes E, et al. The scale, scope, coverage, and capability of childbirth care. Lancet. 2016;388(10056):2193–208.

209 GBD 2015 Maternal Mortality Collaborators. Global, regional, and national levels of maternal mortality, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1775–812.

210 Pattinson R, Fawcus S, Moodley J. Saving Mothers 2014. Pretoria: National Committee on Confidential Enquiries into Maternal Deaths; 2015.

211 Fawcus S, Pattinson RC, Moodley J, Moran NF, Schoon MG, Mhlanga RE, et al. Maternal deaths from bleeding associated with caesarean delivery: A national emergency. S Afr Med J. 2016;106(5):472–6.

212 Hofmeyr GJ. Maternal deaths from bleeding associated with caesarean delivery: A national emergency. S Afr Med J. 2016;106(5):22.

213 Statistics South Africa. Perinatal deaths in South Africa 2014. Statisitcal Releaase P0309.4. Pretoria: Statistics SA; 2016.

214 Risk Equalisation Fund – Council for Medical Schemes. Databases, reports and other publications.

215 Pattinson R, editor. Saving Babies 2002: Third Perinatal Care Survey of South Africa. Pretoria: National Department of Health; 2003.

216 National Committee for Confidential Enquiries into Maternal Deaths. Saving Mothers 2005–2007: Fourth Report on Confidential Enquiries into Maternal Deaths in South Africa. Pretoria: National Department of Health; 2008.

217 Pattinson R, Fawcus S, Moodley J. Tenth interim report on Confidential Enquiries into Maternal Deaths in South Africa. Pretoria: National Department of Health; 2013.

218 Kassebaum NJ, Bertozzi-Villa A, Coggeshall MS, Shackelford KA, Steiner C, Heuton KR, et al. Global, regional, and national levels and causes of maternal mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2014;384(9947):980–1004.

219 The Maternal Mortality Estimation Inter-Agency Group (MMEIG), Alkema L, Gemmill A. Trends in maternal mortality: 1990 to 2015. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2015.

220 Dorrington R, Moultrie T, Timaeus I. Estimation of mortality using the South African Census 2001 data. CARe Monograph No. 11. Cape Town: Centre for Acturial Research; 2004.

221 Lozano R, Wang H, Foreman KJ, Rajaratnam JK, Naghavi M, Marcus JR, et al. Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. Lancet. 2011;378(9797):1139–65.

222 Hill K, Thomas K, AbouZahr C, Walker N, Say L, Inoue M, et al. Estimates of maternal mortality worldwide between 1990 and 2005: an assessment of available data. Lancet. 2007;370:1311–19.

223 Bradshaw D, Dorrington R, Laubscher R. Rapid mortality surveillance report 2011. Cape Town: South African Medical Research Council; 2012.

224 Hogan M, Lopez A, Lozano R, Murray C, Naghavi M, Rajaratnam J. Building Momentum: Global Progress toward reducing maternal and child mortality. Seattle: Institute for Health Metrics and Evaluation; 2010.

225 You D, Hug L, Ejdemyr S, Beise J. Levels and Trends in Child Mortality: Report 2015. New York: United Nations Children's Fund (UNICEF); 2015.

226 You D, Bastian P, Wu J, Wardlaw T. Levels and Trends in Child Mortality: Report 2013. New York: United Nations Children's Fund (UNICEF); 2013.

227 Nannan N, Dorrington R, Laubscher R, Zinyakatira N, Prinsloo M, Darikwa T, et al. Under-5 mortality statistics in South Africa: shedding some light on the trends and causes 1997–2007. Cape Town: South African Medical Research Council; 2012.

228 National Perinatal Morbidity and Mortality Committee. National Perinatal Mortality and Morbidity Committee (NaPeMMCo) Interim Report 2012 (2010–2011 data). Pretoria: National Department of Health; 2012.

229 GBD 2015 Child Mortality Collaborators. Global, regional, national, and selected subnational levels of stillbirths, neonatal, infant, and under-5 mortality, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1725–74.

230 National Committee for Confidential Enquiries into Maternal Deaths. Third Interim Report on Confidential Enquiries into Maternal Deaths in South Africa: Changing Patterns in Maternal Deaths 1998–2000. Pretoria: National Department of Health; 2001.

231 Pattinson B, editor. Saving Mothers: Second Report on Confidential Enquiries into Maternal Deaths in South Africa 1999–2001. Pretoria: National Department of Health; 2002.

232 National Committee for Confidential Enquiries into Maternal Deaths. Saving Mothers 2008–2010: Fifth report on Confidential Enquiries into Maternal Deaths in South Africa (summary). Pretoria: National Department of Health; 2012.

233 Statistics South Africa. Recorded live births 2014. Statistical release P0305. Pretoria: Statistics SA; 2015.

234 National Perinatal Morbidity and Mortality Committee. National Perinatal Morbidity and Mortality Committee (NaPeMMCo) Short Report 2014. (Showing data for 2010–2013). Pretoria: National Department of Health; 2015.

235 Patton GC, Sawyer SM, Santelli JS, Ross DA, Afifi R, Allen NB, et al. Our future: a Lancet commission on adolescent health and wellbeing. Lancet. 2016;387(10036):2423–78.

236 United National Children's Fund (UNICEF). The State of the World's Children 2016: A fair chance for every child. New York: UNICEF; 2016.

237 Kleinert S, Horton R. Adolescent health and wellbeing: a key to a sustainable future. Lancet. 2016;387(10036):2355–6.

238 Mokdad AH, Forouzanfar MH, Daoud F, Mokdad AA, El Bcheraoui C, Moradi-Lakeh M, et al. Global burden of diseases, injuries, and risk factors for young people's health during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet. 2016;387(10036):2383–401.

239 South African Human Rights Commission and UNICEF South Africa. Global goals for every child: Progress and disparities among children in South Africa. Pretoria: UNICEF; 2016.

240 Delany A, Jehoma S, Lake L. South African Child Gauge 2016. Cape Town: Children's Institute: University of Cape Town; 2016.

241 Hall K, Sambu W, Berry L, Giese S, Almeleh C, S. R. South African Early Childhood Review 2016. Cape Town: Children's Institute, University of Cape Town; 2016.

242 Black MM, Walker SP, Fernald LCH, Andersen CT, DiGirolamo AM, Lu C, et al. Early childhood development coming of age: science through the life course. Lancet. 2017;389(10064):77–90.

243 Ford ND, Stein AD. Risk factors affecting child cognitive development: a summary of nutrition, environment, and maternal-child interaction indicators for sub-Saharan Africa. J Dev Orig Health Dis. 2016;7(2):197–217.

244 Lu C, Black MM, Richter LM. Risk of poor development in young children in low-income and middle-income countries: an estimation and analysis at the global, regional, and country level. Lancet Glob Health. 2016;4(12):e916–e22.

245 Zembe-Mkabile W, Ramokolo V, Sanders D, Jackson D, Doherty T. The dynamic relationship between cash transfers and child health: can the child support grant in South Africa make a difference to child nutrition? Public Health Nutr. 2016;19(2):356–62.

246 World Health Organization. State of inequality: childhood immunization. Geneva: World Health Organization; 2016.

247 Bateman C. Vaccines: SA's immunisation program debunked. S Afr Med J. 2016;106(4):318.

248 Awotiwon OF, Pillay-van Wyk V, Dhansay A, Day C, Bradshaw D. Diarrhoea in children under five years of age in South Africa (1997–2014). Trop Med Int Health. 2016;21(9):1060–70.

249 Children's Institute. Children Count – Abantwana Babalulekile site. Children's Institute, University of Cape Town. URL: http://www.childrencount.ci.org.za/

250 Monson J, Hall K, Smith C, Sung-King M, editors. South African Child Gauge 2006. Cape Town: Children's Institute, University of Cape Town; 2006.

251 Mathews S, Jamieson L, Lake L, Smith C. South African Child Gauge 2014. Cape Town: Children's Institute, University of Cape Town; 2014.

252 Kibel M, Lake L, Pendlebury S, Smith C, editors. South African Child Gauge 2009/2010. Cape Town: Children's Institute, University of Cape Town; 2010.

253 South Africa Demographic and Health Survey 2003. Preliminary Report. Pretoria: National Department of Health; 2004.

254 Bradshaw D, Masiteng K, Nannan N. Health Status and Determinants. In: Ntuli A, Crisp N, Clarke E, Barron P, editors. South African Health Review 2000. Durban: Health Systems Trust; 2001.

255 Dorrington R, Bradshaw D, Laubscher R. Rapid mortality surveillance report 2012. Cape Town: South African Medical Research Council; 2014.

256 Murray C, Laakso T, Shibuya K, Lopez A. Can we achieve Millennium Development Goal 4? New analysis of country trends and forecasts of under-5 mortality to 2015. Lancet. 2007;370:1040–54.

257 Immunization Summary: A statistical reference containing data through 2011. New York: UNICEF and WHO; 2012.

258 World Health Organization, United National Children's Fund (UNICEF). WHO and UNICEF estimates of national immunization coverage: 2015 revision. Geneva: WHO & UNICEF; 2016.

259 Institute IFPR. Global Nutrition Report 2016: From Promise to Impact: Ending Malnutrition by 2030. Washington, D.C.: International Food Policy Research Institute; 2016.

260 The Global BMI Mortality Collaboration. Body-mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents. Lancet. 2016;388(10046):776–86.

261 Aune D, Sen A, Prasad M, Norat T, Janszky I, Tonstad S, et al. BMI and all cause mortality: systematic review and non-linear dose-response meta-analysis of 230 cohort studies with 3.74 million deaths among 30.3 million participants. BMJ. 2016;353:i2156.

262 Wild SH, Byrne CD. Body mass index and mortality: understanding the patterns and paradoxes. BMJ. 2016;353:i2433.

263 NCD Risk Factor Collaboration. Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants. Lancet. 2016;387(10026):1377–96.

264 McHiza ZJ, Parker WA, Makoae M, Sewpaul R, Kupamupindi T, Labadarios D. Body image and weight control in South Africans 15 years or older: SANHANES–1. BMC Public Health. 2015;15(1):992.

265 World Health Organization. WHO estimates of the global burden of foodbourne diseases: Foodbourne disease burden epidemiology reference group 2007–2015. Geneva: World Health Organization; 2015.

266 Watkins DA, Olson ZD, Verguet S, Nugent RA, Jamison DT. Cardiovascular disease and impoverishment averted due to a salt reduction policy in South Africa: an extended cost-effectiveness analysis. Health Policy Plan. 2016;31(1):75–82.

267 Webb M, Fahimi S, Singh GM, Khatibzadeh S, Micha R, Powles J, et al. Cost effectiveness of a government supported policy strategy to decrease sodium intake: global analysis across 183 nations. BMJ. 2017;356:i6699.

268 Charlton K, Ware LJ, Menyanu E, Biritwum RB, Naidoo N, Pieterse C, et al. Leveraging ongoing research to evaluate the health impacts of South Africa's salt reduction strategy: a prospective nested cohort within the WHO-SAGE multicountry, longitudinal study. BMJ Open. 2016;6(11):e013316.

269 Tugendhaft A, Manyema M, Veerman LJ, Chola L, Labadarios D, Hofman KJ. Cost of inaction on sugar-sweetened beverage consumption: implications for obesity in South Africa. Public Health Nutr. 2016;19(13):2296–304.

270 Armstrong P, Fourie H, Rich E. The impact of a sugar tax on SSBs on the prevalence of obesity. Research Note 41. Stellenbosch: ECONEX; 2016.

271 Graham L, Hochfeld T, Stuart L, Van Gent M. Evaluation Study of the National School Nutrition Programme and the Tiger Brands Foundation In-School Breakfast Feeding Programme in the Lady Frere and Qumbu Districts of the Eastern Cape. Johannesburg: Centre for Social Development in Africa, University of Johannesburg; 2015.

272 Labadarios D, editor. The National Food Consumption Survey-Fortification Baseline (NFCS-FB): South Africa, 2005. S Afr J Clin Nutr. 2008;21((3)(Suppl 2)):245–300.

273 South African Institute for Medical Research. Report of the South African Institute for Medical Research on the Iodine Deficiency Disorder (IDD) Survey of Primary School Learners for the Department of Health, South Africa. Pretoria: South African Institute for Medical Research; 2000.

274 NCD RisC | Risk Factor Collaboration [database on the Internet]. 2017 [cited 27/1/2017]. URL: http://www.ncdrisc.org/

275 Wandai M, Day C. Trends in risk factors for non-communicable diseases in South Africa. Durban: Health Systems Trust; 2015.

276 Maimela E, Alberts M, Modjadji SE, Choma SS, Dikotope SA, Ntuli TS, et al. The Prevalence and Determinants of Chronic Non-Communicable Disease Risk Factors amongst Adults in the Dikgale Health Demographic and Surveillance System (HDSS) Site, Limpopo Province of South Africa. PloS One. 2016;11(2):e0147926.

277 Roglic G, Varghese C, Riley L, Harvey A. Global Report on Diabetes. Geneva: World Health Organization; 2016.

278 Labadarios D, editor. The National Food Consumption Survey (NFCS): Children aged 1–9 years, South Africa, 1999. Pretoria: National Department of Health; 2000.

279 Wentzel-Viljoen E, Steyn K, Ketterer E, Charlton K. "Use salt and foods high in salt sparingly": a food-based dietary guideline for South Africa. S Afr J Clin Nutr. 2013;26(3):S105–S13.

280 Wandai M, Aagaard-Hansen J, Day C, Sartorius B, Hofman KJ. Available data sources for monitoring non-communicable diseases and their risk factors in South Africa. S Afr Med J. 2017;107(4):331–7.

281 Sacco RL, Roth GA, Reddy KS, Arnett DK, Bonita R, Gaziano TA, et al. The Heart of 25 by 25: Achieving the Goal of Reducing Global and Regional Premature Deaths From Cardiovascular Diseases and Stroke: A Modeling Study From the American Heart Association and World Heart Federation. Circulation. 2016;133(23):e674–90.

282 Benziger CP, Roth GA, Moran AE. The Global Burden of Disease Study and the Preventable Burden of NCD. Glob Heart. 2016;11(4):393–7.

283 Forouzanfar M, Liu P, Roth GA, Ng M, Biryukov S, Marczak L, et al. Global Burden of Hypertension and Systolic Blood Pressure of at Least 110 to 115 mm Hg, 1990–2015. JAMA. 2017;317(2):165–82.

284 Huffman MD, Lloyd-Jones DM. Global Burden of Raised Blood Pressure: Coming Into Focus. JAMA. 2017;317(2):142–3.

285 Mills KT, Bundy JD, Kelly TN, Reed JE, Kearney PM, Reynolds K, et al. Global Disparities of Hypertension Prevalence and Control: A Systematic Analysis of Population-Based Studies from 90 Countries. Circulation. 2016;134(6):441–50.

286 NCD Risk Factor Collaboration. Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19•1 million participants. Lancet. 2017;389(10064):37–55.

287 Ataklte F, Erqou S, Kaptoge S, Taye B, Echouffo-Tcheugui JB, Kengne AP. Burden of undiagnosed hypertension in sub-saharan Africa: a systematic review and meta-analysis. Hypertension. 2015;65(2):291–8.

288 Irazola VE, Gutierrez L, Bloomfield G, Carrillo-Larco RM, Dorairaj P, Gaziano T, et al. Hypertension Prevalence, Awareness, Treatment, and Control in Selected LMIC Communities: Results From the NHLBI/UHG Network of Centers of Excellence for Chronic Diseases. Glob Heart. 2016;11(1):47–59.

289 Prakaschandra DR, Esterhuizen TM, Motala AA, Gathiram P, Naidoo DP. High prevalence of cardiovascular risk factors in Durban South African Indians: The Phoenix Lifestyle Project. S Afr Med J. 2016;106(3):284–9.

290 Ntuli ST, Maimela E, Alberts M, Choma S, Dikotope S. Prevalence and associated risk factors of hypertension amongst adults in a rural community of Limpopo Province, South Africa. Afr J Prim Health Care Fam Med. 2015;7(1):E1–5.

291 Feigin VL, Roth GA, Naghavi M, Parmar P, Krishnamurthi R, Chugh S, et al. Global burden of stroke and risk factors in 188 countries, during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet Neurol. 2016;15(9):913–24.

292 NCD Risk Factor Collaboration. Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4•4 million participants. Lancet. 2016;387(10027):1513–30.

293 Manne-Goehler J, Atun R, Stokes A, Goehler A, Houinato D, Houehanou C, et al. Diabetes diagnosis and care in sub-Saharan Africa: pooled analysis of individual data from 12 countries. The Lancet Diabetes & Endocrinology. 2016;4(11):903–12.

294 Jaffar S. Diabetes and other non-communicable diseases in Africa: a potential disaster in the waiting. The Lancet Diabetes & Endocrinology. 2016;4(11):875–7.

295 Institute for Health Metrics and Evaluation (IHME). Health transitions in Africa: Evaluating the rise of diabetes and cardiovascular disease. Seattle, WA: IHME; 2016.

296 Sahadew N, Singaram VS, Brown S. Distribution, incidence, prevalence and default of patients with diabetes mellitus accessing public healthcare in the 11 districts of KwaZulu-Natal, South Africa. S Afr Med J. 2016;106(4):389.

297 Pillay S, Lutge E, Aldous C. The burden of diabetes mellitus in KwaZulu-Natal's public sector: A 5-year perspective. S Afr Med J. 2016;106(4):384–8.

298 Folb N, Timmerman V, Levitt NS, Steyn K, Bachmann MO, Lund C, et al. Multimorbidity, control and treatment of non-communicable diseases among primary healthcare attenders in the Western Cape, South Africa. S Afr Med J. 2015;105(8):642–7.

299 Weimann A, Dai D, Oni T. A cross-sectional and spatial analysis of the prevalence of multimorbidity and its association with socioeconomic disadvantage in South Africa: A comparison between 2008 and 2012. Soc Sci Med. 2016;163:144–56.

300 Rheeder P, Muthembe T, Lawson S, Brink J. Diabetes and hypertension screening in Zandspruit, Johannesburg 2012–2014. South African Family Practice. 2016;58(6):219–24.

301 Durao S, Ajumobi O, Kredo T, Naude C, Levitt NS, Steyn K, et al. Evidence insufficient to confirm the value of population screening for diabetes and hypertension in low- and-middle-income settings. S Afr Med J. 2015;105(2):98–102.

302 World Health Organization African Region. Report on the status of major health risk factors for noncommunicable diseases: WHO African Region, 2015. Brazzaville: WHO African Region; 2016.

303 Bierman AS, Tinetti ME. Precision medicine to precision care: managing multimorbidity. Lancet. 2016;388(10061):2721–3.

304 Munrove C. Quality of care in medical schemes. For financial year 2014 and 2015. Pretoria: Council for Medical Schemes; 2016.

305 Nojilana B, Bradshaw D, Pillay-van Wyk V, Msemburi W, Laubscher R, Somdyala NI, et al. Emerging trends in non-communicable disease mortality in South Africa, 1997 – 2010. S Afr Med J. 2016;106(5):477–84.

306 Nojilana B, Bradshaw D, Pillay-van Wyk V, Msemburi W, Somdyala N, Joubert J, et al. Persistent burden from non-communicable diseases in South Africa needs strong action. S Afr Med J. 2016;106(5):436–7.

307 Goeppel C, Frenz P, Grabenhenrich L, Keil T, Tinnemann P. Assessment of universal health coverage for adults aged 50 years or older with chronic illness in six middle-income countries. Bull World Health Organ. 2016;94(4):276–85C.

308 Bruni L, Diaz M, Barrionuevo-Rosas L, Herrero R, Bray F, Bosch FX, et al. Global estimates of human papillomavirus vaccination coverage by region and income level: a pooled analysis. Lancet Glob Health. 2016;4(7):e453–63.

309 Erdmann F, Kielkowski D, Schonfeld SJ, Kellett P, Stanulla M, Dickens C, et al. Childhood cancer incidence patterns by race, sex and age for 2000–2006: a report from the South African National Cancer Registry. Int J Cancer. 2015;136(11):2628–39.

310 Global Burden of Disease Cancer C, Fitzmaurice C, Allen C, Barber RM, Barregard L, Bhutta ZA, et al. Global, Regional, and National Cancer Incidence, Mortality, Years of Life Lost, Years Lived With Disability, and Disability-Adjusted Life-years for 32 Cancer Groups, 1990 to 2015: A Systematic Analysis for the Global Burden of Disease Study. JAMA Oncol. 2016.

311 Ginsburg O, Bray F, Coleman MP, Vanderpuye V, Eniu A, Kotha SR, et al. The global burden of women's cancers: a grand challenge in global health. Lancet. 2017;389(10071):847–60.

312 Denny L, de Sanjose S, Mutebi M, Anderson BO, Kim J, Jeronimo J, et al. Interventions to close the divide for women with breast and cervical cancer between low-income and middle-income countries and high-income countries. Lancet. 2017;389(10071):861–70.

313 Ginsburg O, Badwe R, Boyle P, Derricks G, Dare A, Evans T, et al. Changing global policy to deliver safe, equitable, and affordable care for women's cancers. Lancet. 2017;389(10071):871–80.

314 Sorsdahl K, Sewpaul R, Evans M, Naidoo P, Myers B, Stein DJ. The association between psychological distress, alcohol use and physical non-communicable diseases in a nationally representative sample of South Africans. J Health Psychol. 2016.

315 Baron EC, Hanlon C, Mall S, Honikman S, Breuer E, Kathree T, et al. Maternal mental health in primary care in five low- and middle-income countries: a situational analysis. BMC Health Serv Res. 2016;16(1):53.

316 Depression and Other Common Mental Disorders. Global Health Estimates. Geneva: World Health Organization; 2017.

317 Prince M, Comas-Herrera A, Knapp M, Guerchet M, Karagiannidou M. World Alzheimer Report 2016: Improving healthcare for people living with dementia. Coverage, Quality and Costs Now and in the Future. London: Alzheimer's Disease International; 2016.

318 Prince M, Wimo A, Guerchet M, Ali G, Wu Y, Prina M. World Alzheimer Report 2015: The Global Impact of Dementia. An analysis of Prevalence, Incidence, Cost and Trends. London: Alzheimer's Disease International; 2015.

319 National Cancer Registry. Cancer in South Africa: 2012 Full Report. Johannesburg: Naional Health Laboratory Service; 2017.

320 National Cancer Registry. Cancer in South Africa: 2011 Full Report. Johannesburg: National Health Laboratory Service; 2016.

321 Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, et al. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11. Lyon, France: International Agency for Research on Cancer; 2013.

322 International Diabetes Federation. IDF Diabetes Atlas update poster, sixth edition. Brussels, Belgium: International Diabetes Federation; 2014.

323 Cavan D, da Rocha Fernandes J, Makaroff L, Ogurtsova K, Webber S, editors. IDF Diabetes Atlas. Seventh edition, 2015. Brussels, Belgium: International Diabetes Federation; 2015.

324 Norman R, Bradshaw D, Schneider M, Joubert J, Groenewald P, Lewin S, et al. A comparative risk assessment for South Africa in 2000: towards promoting health and preventing disease. S Afr Med J. 2007;97(8 Pt 2):637–41.

325 Council for Medical Schemes. Annual Report 2014/15. 15 years on the pulse. Pretoria: Council for Medical Schemes; 2015.

326 Lloyd-Sherlock P, Beard J, Minicuci N, Ebrahim S, Chatterji S. Hypertension among older adults in low- and middle-income countries: prevalence, awareness and control. Int J Epidemiol. 2014;43(1):116–28.

327 Williams DR, Herman A, Stein DJ, Heeringa SG, Jackson PB, Moomal H, et al. Twelve-month mental disorders in South Africa: prevalence, service use and demographic correlates in the population-based South African Stress and Health Study. Psychol Med. 2008;38(2):211–20.

328 Herman A, Stein D, Seedat S, Heeringa S, Moomal H, Williams D. The South African Stress and Health (SASH) study: 12-month and lifetime prevalence of common mental disorders. S Afr Med J. 2009;99(5 Pt 2):339–44.

329 Andersson LM, Schierenbeck I, Strumpher J, Krantz G, Topper K, Backman G, et al. Help-seeking behaviour, barriers to care and experiences of care among persons with depression in Eastern Cape, South Africa. J Affect Disord. 2013;151(2):439–48.

330 Global Health Observatory [database on the Internet]. World Health Organization. 2016 [cited 14 February 2016]. URL: http://apps.who.int/gho/data/view.main.2485

331 Nojilana B, Groenewald P, Bradshaw D, Reagon G. Quality of cause of death certification at an academic hospital in Cape Town, South Africa. S Afr Med J. 2009;99(9):648–52.

332 Mendis S, Armstrong T, Bettcher D, Branca F, Lauer J, Mace C, et al. Global status report on noncommunicable diseases 2014. Geneva: World Health Organization; 2014.

333 GBD 2015 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1659–724.

334 Kyu HH, Bachman VF, Alexander LT, Mumford JE, Afshin A, Estep K, et al. Physical activity and risk of breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke events: systematic review and dose-response meta-analysis for the Global Burden of Disease Study 2013. BMJ. 2016;354:i3857.

335 Sallis JF, Cerin E, Conway TL, Adams MA, Frank LD, Pratt M, et al. Physical activity in relation to urban environments in 14 cities worldwide: a cross-sectional study. Lancet. 2016;387(10034):2207–17.

336 Prüss-Ustün A, Wolf J, Corvalán C, Bos R, Neira M. Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks. Geneva: World Health Organization; 2016.

337 World Health Organization. Public health impact of chemicals: Knowns and unknowns. Geneva: World Health Organization; 2016.

338 Limb M. Half of wealthy and 98% of poorer cities breach air quality guidelines. BMJ. 2016;353:i2730.

339 Jackson-Morris A, Latif E. Index of Tobacco Control Sustainability. Edinburgh: The International Union Against Tuberculosis and Lung Disease; 2016.

340 Vellios N, van Walbeek C. Determinants of regular smoking onset in South Africa using duration analysis. BMJ Open. 2016;6(7):e011076.

341 Britton J, Arnott D, McNeill A, Hopkinson N, Tobacco Advisory Group of the Royal College of P. Nicotine without smoke-putting electronic cigarettes in context. BMJ. 2016;353:i1745.

342 Dada S, Harker Burnhams N, Erasmus J, Parry C, Bhana A, Timol F, et al. Monitoring Alcohol, Tobacco and Other Drug Abuse Treatment Admissions in South Africa. Phase 39. Cape Town: SACENDU; 2016.

343 Liebenberg J, Du Toit-Prinsloo L, Steenkamp V, Saayman G. Fatalities involving illicit drug use in Pretoria, South Africa, for the period 2003 – 2012. S Afr Med J. 2016;106(10):1051–5.

344 Swart D, Reddy S, Panday S, Philip J, Naidoo N, Ngobeni N. The 2002 Global Youth Tobacco Survey (GYTS): The 2nd GYTS in South Africa (SA) – A comparison between GYTS (SA) 1999 and GYTS (SA) 2002. Cape Town: South African Medical Research Council; 2004.

345 Reddy S, James S, Sewpaul R, Koopman F. The 2008 Global Youth Tobacco Survey: The 3rd GYTS in South Africa. Cape Town: South African Medical Research Council; 2010.

346 South African Medical Research Council. South Africa 2011 (Ages 13–15) Global Youth Tobacco Survey (GYTS) Fact Sheet. Cape Town: South African Medical Research Council; 2012.

347 Reddy P, Zuma K, Shisana O, Jonas K, Sewpaul R. Prevalence of tobacco use among adults in South Africa: Results from the first South African National Health and Nutrition Examination Survey. S Afr Med J. 2015;105(8):648–55.

348 Phaswana-Mafuya N, Peltzer K, Chirinda W, Musekiwa A, Kose Z. Sociodemographic predictors of multiple non-communicable disease risk factors among older adults in South Africa. Glob Health Action. 2013;6:20680.

349 Ng M, Freeman MK, Fleming TD, Robinson M, Dwyer-Lindgren L, Thomson B, et al. Smoking prevalence and cigarette consumption in 187 countries, 1980–2012. JAMA. 2014;311(2):183–92.

350 Reddy P, James S, Sewpaul R, Yach D, Resnicow K, Sifunda S, et al. A decade of tobacco control: The South African case of politics, health policy, health promotion and behaviour change. S Afr Med J. 2013;103(11):835–40.

351 Van Walbeek C. Recent trends in Cigarette Smoking Prevalence in South Africa: Some evidence from AMPS data. S Afr Med J. 2002;92(6):468–72.

352 Wu F, Guo Y, Chatterji S, Zheng Y, Naidoo N, Jiang Y, et al. Common risk factors for chronic non-communicable diseases among older adults in China, Ghana, Mexico, India, Russia and South Africa: the study on global AGEing and adult health (SAGE) wave 1. BMC Public Health. 2015;15:88.

353 World Health Organization. WHO Report on the Global Tobacco Epidemic, 2015. Raising taxes on tobacco. Geneva: World Health Organization; 2015.

354 Adeloye D, Thompson JY, Akanbi MA, Azuh D, Samuel V, Omoregbe N, et al. The burden of road traffic crashes, injuries and deaths in Africa: a systematic review and meta-analysis. Bull World Health Organ. 2016;94(7):510–21A.

355 Lutge E, Moodley N, Tefera A, Sartorius B, Hardcastle T, Clarke D. A hospital based surveillance system to assess the burden of trauma in KwaZulu-Natal Province South Africa. Injury. 2016;47(1):135–40.

356 Médecins Sans Frontières. Untreated Violence: The Need for Patient-Centred Care for Survivors of Sexual Violence in the Platinum Mining Belt. Cape Town: Médecins Sans Frontières/ Doctors Without Borders; 2016.

357 Meinck F, Cluver LD, Boyes ME, Loening-Voysey H. Physical, emotional and sexual adolescent abuse victimisation in South Africa: prevalence, incidence, perpetrators and locations. J Epidemiol Community Health. 2016.

358 Abrahams N, Mathews S, Martin LJ, Lombard C, Nannan N, Jewkes R. Gender Differences in Homicide of Neonates, Infants, and Children under 5 y in South Africa: Results from the Cross-Sectional 2009 National Child Homicide Study. PLoS Med. 2016;13(4):e1002003.

359 Devakumar D, Osrin D. Child Homicide: A Global Public Health Concern. PLoS Med. 2016;13(4):e1002004.

360 Malaria cases per year [dataset]. Pretoria: National Department of Health; various years.

361 Matzopoulos R, Prinsloo M, Pillay-van Wyk V, Gwebushe N, Mathews S, Martin LJ, et al. Injury-related mortality in South Africa: a retrospective descriptive study of postmortem investigations. Bull World Health Organ. 2015;93(5):303–13.

362 Road Traffic Management Corporation. Road Traffic Report 31 December 2010. Pretoria: Road Traffic Management Corporation; 2011.

363 Surender R, Van Niekerk R, Alfers L. Is South Africa advancing towards National Health Insurance? The perspectives of general practitioners in one pilot site. S Afr Med J. 2016;106(11):1092–5.

364 Doherty T, Kroon M, Rhoda N, Sanders D. Ending preventable child deaths in South Africa: What role can ward-based outreach teams play? S Afr Med J. 2016;106(7):672–4.

365 Auditor-General South Africa. Performance audit of the management of pharmaceuticals at departments of health. Pretoria: Auditor-General South Africa; 2016.

366 Auditor-General South Africa. Corrective actions and initiatives implemented by management. Pretoria: Auditor-General South Africa; 2016.

367 Antonie F, Simkins C, Augustine M, Barlow A, Doodnath A, Fonkam A, et al. Pharmaceuticals in South Africa – an enquiry. Johannesburg: Helen Suzman Foundation; 2016.

368 Stop Stock Outs Project. 2015 Stop Stock Outs National Survey: Third Annual Report – South Africa. South Africa: Stop Stock Outs Project; 2016.

369 Wirtz VJ, Hogerzeil HV, Gray AL, Bigdeli M, de Joncheere CP, Ewen MA, et al. Essential medicines for universal health coverage. Lancet. 2017;389(10067):403–76.

370 Gotham D, Onarheim KH, Barber MJ. How the MDGs gave up on measuring access to medicines. Lancet Glob Health. 2016;4(5):e296–e7.

371 Mediscor PBM. Mediscor Medicine Review 2015. Centurion: Mediscor PBM; 2016.

372 Day C, Gray A. Health and Related Indicators. In: Padarath A, King J, Mackie E, Casciola J, editors. South African Health Review 2016. Durban: Health Systems Trust; 2016.

373 Soderlund N, Schierhout G, van den Heever A. Private Health Sector Care. In: Ntuli A, editor. South African Health Review 1998. Durban: Health Systems Trust; 1998.

374 Kawonga M, Knight S. State-aided Hospitals. In: Crisp N, Ntuli A, editors. South African Health Review 1999. Durban: Health Systems Trust; 1999.

375 Wilbury & Claymore. Hospitals Direct Database. Version 2–2 ed. Sandton: Media 24; 2010.

376 Stander V, Editor. 2004 Hospital & Nursing Yearbook for Southern Africa. 44th ed. Pretoria: Pharmaceutical Printers and Publishers; 2004.

377 Integration of the public and private sectors under a National Health Insurance (NHI) system in SA. Health Reform Note 4. Stellenbosch: Econex; 2010.

378 Treatment Action Campaign, Doctors without Borders/ Médecins Sans Frontières, Rural Health Advocacy Project, Rural Doctors Association of Southern Africa, SECTION27, Southern Africa HIV Clinician's Society. Stock Outs in South Africa. Second Annual Report. 2014 Stock Outs Survey. South Africa: Treatment Action Campaign; 2015.

379 City of Tshwane, Foundation for Professional Development, National Department of Health, University of Cape Town, Africa Health Placements. Report of the Community Service for Health Professionals Summit held on the 22nd April 2015. South Africa: City of Tshwane, Foundation for Professional Development, National Department of Health, University of Cape Town, Africa Health Placements; 2015.

380 Khunou SH, Davhana-Maselesele M. Level of job satisfaction amongst nurses in the North-West Province, South Africa: Post occupational specific dispensation. Curationis. 2016;39(1):e1–e10.

381 McPake B, Russo G, Hipgrave D, Hort K, Campbell J. Implications of dual practice for universal health coverage. Bull World Health Organ. 2016;94(2):142–6.

382 Hongoro C, Funani, II, Chitha W, Godlimpi L. An Assessment of Private General Practitioners Contracting for Public Health Services Delivery in O.R. Tambo District, South Africa. J Public Health Afr. 2015;6(2):525.

383 Personnel and Salary Information System (PERSAL) [database on the Internet]. National Treasury – Vulindlela. time series [cited 31 March 2016].
URL: http://www.vulindlela.gov.za/

384 Health Professions Council of South Africa (HPCSA). HPCSA Statistics. South Africa: HPCSA; time series [cited 1 June 2016].
URL: http://www.hpcsa.co.za/

385 South African Nursing Council (SANC). Statistics of South African Nursing Council. South Africa: SANC; time series [cited 9 Feb 2017].
URL: http://www.sanc.co.za/stats.htm

386 Updated GP and Specialist Numbers for SA. Health Reform Note 7 October 2010. Stellenbosch: Econex; 2010.

387 South African Pharmacy Council (SAPC). Statistics for registered persons and organisations. Pretoria: SAPC; time series [cited 1 Feb 2017]. URL: http://sapc.za.org/B_Statistics.asp

388 South African National Department of Health. Department of Health Annual Report. April 2000 – March 2001. Pretoria: National Department of Health; 2001.

389 Schierhout G, Delate R, Ridgard N. First HIV and AIDS National Communication Survey 2006: Summary of the findings from the Provincial Analysis.: Johns Hopkins Health and Education in South Africa; 2008.

390 South African National Treasury. Provincial Budgets and Expenditure Review 2010/11 – 2016/17. Pretoria: National Treasury; 2015.

391 Institute for Health Metrics and Evaluation. Financing Global Health 2015: Development assistance steady on the path to new Global Goals. Seattle, WA: IHME; 2016.

392 Dieleman JL, Schneider MT, Haakenstad A, Singh L, Sadat N, Birger M, et al. Development assistance for health: past trends, associations, and the future of international financial flows for health. Lancet. 2016;387(10037):2536–44.

393 Blecher M, Pillay A, Patcharanarumol W, Panichkriangkrai W, Tangcharoensathien V, Teerawattananon Y, et al. Health financing lessons from Thailand for South Africa on the path towards universal health coverage. S Afr Med J. 2016;106(6):4–5.

394 Council for Medical Schemes. Annual report of the Registrar of Medical Schemes 2002–3. Pretoria: Council for Medical Schemes; 2003.

395 Council for Medical Schemes Annual Report 2005–6. Pretoria: Council for Medical Schemes; 2006.

396 Council for Medical Schemes. Annual Report 2010–2011. Pretoria: Council for Medical Schemes; 2011.

397 Ataguba JE, Day C, McIntyre D. Full Case Study: Monitoring and evaluating progress towards Universal Health Coverage in South Africa. PLoS Med. 2014;11(9):e1001686.

398 South African National Treasury. Provincial Budgets and Expenditure Review 2005/06 – 2011/12. Pretoria: National Treasury; 2009.

399 Council for Medical Schemes. Report of the Registrar of Medical Schemes 1999. Pretoria: Council for Medical Schemes; 2000.

400 Thomas S, Muirhead D. National Health Accounts Project: The Public Sector Report. Pretoria: National Department of Health; 2000.

401 Council for Medical Schemes. Report of the Registrar of Medical Schemes 2000. Pretoria: Council for Medical Schemes; 2002.

402 South African National Treasury. Provincial Budgets and Expenditure Review 2003/04 – 2009/10. Pretoria: National Treasury; 2007.

403 Day C, Gray A, Budgell E. Health and Related Indicators. In: Padarath A, English R, editors. South African Health Review 2011. Durban: Health Systems Trust; 2011.

404 Blecher M, Thomas S. Health care financing. In: Ijumba P, Ntuli A, editors. South African Health Review 2003/04. Durban: Health Systems Trust; 2004.

405 Hirschowitz R, Sekwati W, Budlender D. South Africa in transition: Selected findings from the October household survey of 1999 and changes that have occurred between 1995 and 1999. Pretoria: Statistics SA; 2001.

Abbreviations

A	
ADR	adverse drug reaction
AEFI	adverse events following immunisation
AGSA	Auditor-General of South Africa
AHPCSA	Allied Health Professions Council of South Africa
AHS	Annual Health Statistics
AIDS	Acquired Immune Deficiency Syndrome
AMPS	All Media and Products Survey
ANC	African National Congress
ANC	antenatal care
APP	Annual Performance Plan
ART	antiretroviral therapy
ARV	antiretroviral
ASDRs	age-standardised death rates
ASIRs	age-standardised incidence rates
ASSA	Actuarial Society of South Africa
ATM	African traditional medicines
AZT	azidothymidine (and/or zidovudine)
B	
BAS	Basic Accounting System
BF	Breast feeding
BMI	body-mass index
BMJ	British Medical Journal
BoD	burden of disease
BOR	bed occupancy rate
BP	blood pressure
BTech	Bachelor of Technology
C	
C^2AIR^2	caring, competence, accountability, innovation, responsiveness and respect
CAPI	computer-assisted personal interviewing
CARe	Centre for Actuarial Research
CBE	community-based education
CCMDD	Central Chronic Medicines Dispensing and Distribution
CDA	Central Drug Authority
CDC	Centers for Disease Control and Prevention
CDL	Chronic Disease List
CDUs	Chronic Dispensing Units
CDW	Corporate Data Warehouse
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CHAI	Clinton Health Access Initiative
CHC	community health centre
CHP	Centre for Health Policy
CHW	community health worker
CI	confidence interval
CIN 2+	cervical intraepithelial neoplasia grade 2 or greater
CIN	cervical intraepithelial neoplasia [neoplastic – as referred to in text]
CMS	Council for Medical Schemes
CNPs	clinical nurse practitioners
CoGTA	Cooperative Governance and Traditional Affairs
COHSASA	Council for Health Service Accreditation of Southern Affrica
CoMMiC	Committee on Mortality and Morbidity in Children
CPA	Cape Provincial Administration
CPD	Continuing Professional Development
CPI	Consumer Price Index

CPRD	Clinical Practice Research Database
CS	community survey
CS	Caesarean section
CS	community service
CSP	Comprehensive Service Plan
CVDs	cardiovascular diseases
D	
DALYs	disability-adjusted life-years
DAS	Disability Assessment Scale
DCS	Department of Correctional Services
DCSTs	District Clinical Specialist Teams
DEX	Disease Expenditure Project
DFLEs	disability-free life expectancies
DH	district hospital
DHB	District Health Barometer
DHIS	District Health Information System
DHIS	District Health Information Software
DHMO	District Health Management Office
DHMT	District Health Management Team
DHS	District Health System
DHS	District Health Service
DIA	diastolic blood pressure
DII	Disability Inequality Index
DNA PCR	deoxyribonucleic acid polymerase chain reaction
DoH	Department of Health
DOTS	Directly Observed Treatment, Short-course
DOTS-Plus	DOTS for drug-resistant tuberculosis
DRG	diagnosis-related group
DR-TB	drug-resistant tuberculosis
DSD	Department of Social Development
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4th edition
DSS	Demographic and Surveillance System
DST	drug susceptibility testing
DTI	Department of Trade and Industry
E	
EC	Eastern Cape
ECD	Early Childhood Development
EDL	Essential Drug List
EDP	Essential Drugs Programme
EFV	efavirenz
EHPs	Environmental Health Practitioners
EID	early infant diagnosis
EML	Essential Medicines List
EMS	Emergency Medical Services
EMTCT	elimination of mother-to-child transmission of HIV
ENDS	electronic nicotine delivery systems
EPA	Entrustable Performance Activity
EPI	Expanded Programme on Immunization
EPWP	Extended Public Works Programme
F	
FC	female condom
FDA	Federal Drug Agency
FMHS	Faculty of Medicine and Health Sciences
FNA	fine-needle aspiration
FP2020	Family Planning 2020
FPGH	Foreign Policy and Global Health

FS	Free State
FY	financial year
G	
GATHER	Guidelines for Accurate and Transparent Health Estimate Reporting
GBD	Global Burden of Disease
GDP	gross domestic product
GEAR	Growth, Employment and Redistribution programme
GHS	General Household Survey
GLOBOCAN 2012	Global Burden of Cancer Study 2012
GP	Gauteng Province
GPP	Good Pharmacy Practice
GSH	Groote Schuur Hospital
GSHS	global school-based student health survey
GYTS	Global Youth Tobacco Survey
H	
HALE	healthy life expectancy
HARP	human papillomavirus
HASA	Hospital Association of South Africa
HCT	HIV counselling and testing
HCWs	healthcare workers
HDI	Human Development Index
HDR	Human Development Report
HDSS	Health Demographic and Surveillance System
HE^2RO	Health Economics and Epidemiology Research Office
HEAIDS	Higher Education and Training HIV/AIDS Programme
HER2	human epidermal growth factor receptor 2
HF	health facility
HICs	high-income countries
HISP	Health Information Systems Program
HITAP	Health Intervention and Technology Assessment Program
HIV	Human Immunodeficiency Virus
HIV+	HIV-positive
HLG-PCCB	High-level Group for Partnership, Co-ordination and Capacity-building
HoD	Head of Department
HPCSA	Health Professions Council of South Africa
HPRS	Health Patient Registration System
HPV	human papillomavirus
HPV DNA	human papillomavirus deoxyribose nucleic acid
HR	Human Resources
HREC	Human Research Ethics Committee
HRH	human resources for health
hrHPV	high-risk human papillomavirus
HS	health system
HSIL	high-grade squamous intra-epithelial lesion
HSP	Health Services Package
HSRC	Human Sciences Research Council
HST	Health Systems Trust
HTA	Health Technology Assessment
I	
IARC	International Agency for Research on Cancer
IC	Ideal Clinic
ICD	International Classification of Disease
ICDM	Integrated Chronic Disease Management
ICO	Institut Catalan d'Oncologica
ICRM	Ideal Clinic Realisation and Maintenance
ICSM	Integrated Clinical Services Management
ICT	Information and Communication Technology

IEC	Information, Education and Communication
IES	Income and Expenditure Survey
IES LBPL	IES lower-bound poverty line
IES UBPL	IES upper-bound poverty line
IFPRI	International Food Policy Research Institute
IGFR	Intergovernmental Fiscal Review
IGME	Inter-agency Group for Child Mortality Estimation
IHD	ischaemic heart disease
IHME	Institute for Health Metrics and Evaluation
IKS	indigenous knowledge systems
IMCI	Integrated Management of Childhood Illness
iMMR	institutional maternal mortality ratio
IMR	infant mortality rate
INH	Isoniazid
INRUD	International Network for Rational Use of Drugs
IPECP	inter-professional education and collaborative practice
IT	Information Technology
ITG	Industry Task Group
IUCD	intrauterine contraceptive device
IVDs	in vitro diagnostics
K	
KI	key informant
KZN	KwaZulu-Natal
KZN PTC	KwaZulu-Natal Pharmacy and Therapeutics Committee
L	
LCBOs	low-cost benefit options
LFS	Labour Force Survey
LG	local government
LIC	longitudinal integrated clerkship
LL	lower limit
LMICs	low- and middle-income countries
LMIS	Logistics Management Information System
LP	Limpopo Province
LPA	Line Probe Assay
LSIL	low-grade squamous intra-epithelial lesion
LTBI	latent TB infection
M	
MAC	Ministerial Advisory Committee
MBChB	Bachelor of Medicine and Bachelor of Surgery
MC	male condom
MCA	Marketing Code Authority
MCC	Medicines Control Council
MCH	maternal and child health
MDGs	Millennium Development Goals
MDR-TB	multidrug-resistant tuberculosis
MEC	Member of the Executive Council
MHFs	Migrant Health Forums
MIC	Medicines Information Centre
Mini-CEX	Mini-Clinical Evaluation Exercise
MIS	management information system
MMC	medical male circumcision
MMR	maternal mortality ratio
MOSASWA	Mozambique, South Africa and Swaziland
MP	medical practitioner
MP	Mpumalanga Province
MRC	Medical Research Council
MRI	magnetic resonance imaging

MRU	Maternal and Child Health Research Unit
MSF	Médecins Sans Frontières
MSH	Management Sciences for Health
MSM	men who have sex with men
MTBDRS	rapid GenoType TB test detecting DR-TB and XDR-TB
MTBPS	Medium-term Budget Policy Statement
MTCT	mother-to-child transmission (of HIV)
MTEF	Medium-term Expenditure Framework
MYE	mid-year estimates
N	
N/A	none/not applicable
NADEMC	National Adverse Drug Event Monitoring Centre
NAFCI	National Adolescent-friendly Clinic Initiative
NaPeMMCo	National Perinatal Mortality and Morbidity Committee
NAPHISA	National Public Health Institute of South Africa
NC	Northern Cape
NCCEMD	National Committee on Confidential Enquiries into Maternal Deaths
NCD	non-communicable disease
NCD-RisC	Non-Communicable Diseases Risk Factor Collaboration
NCR	National Cancer Registry
NCS	National Core Standards
NDMP	National Drug Master Plan
NDoH	National Department of Health
NDP	National Development Plan
NDP	National Drug Policy
NDPC	National Drug Policy Committee
NeXT	An Open-label RCT to Evaluate a New Treatment Regimen for Patients with Multidrug-resistant Tuberculosis
NFCS	National Food Consumption Survey
NGOs	non-governmental organisations
NHA	National Health Act
NHC	National Health Council
NHI	National Health Insurance
NHISSA	National Health Information System of South Africa
NHLS	National Health Laboratory Service
NHLS CDW	National Health Laboratory Service Corporate Data Warehouse
NHLS PCR	National Health Laboratory Service polymerase chain reaction
NHS	National Health Service
NICD	National Institute for Communicable Diseases
NICE	National Institute for Health and Care Excellence
NIDS	National Indicator Data Set
NiDs	National Income Dynamics Study
NIKSO	National Indigenous Knowledge Systems Office
NIMART	nurse-initiated management of antiretroviral therapy
NIOH	National Institute for Occupational Health
NiX-TB	New Investigational Drugs for XDR-TB (trial)
NMR	neonatal mortality rate
NPO	non-profit organisation
NPS	National Prescribing Service
NSNP	National School Nutrition Programme
NSP	National Strategic Plan
NSSIs	non-standard stock items
NTDs	neglected tropical diseases
NVP	nevirapine
NW	North-West Province
NYRBS	National Youth Risk Behaviour Survey

O	
OECD	Organisation for Economic Co-operation and Development
OHS	October Household Survey
OHSC	Office of Health Standards Compliance
OPD	outpatient department
OSD	Occupation-specific Dispensation
OST	opioid substitution therapy
P	
PAE	physician-assisted euthanasia
PAF	population-attributable fraction
PAS	physician-assisted suicide
PBCRs	population-based cancer registries
PCGCs	provincial clinical governance committees
PCR	polymerase chain reaction
PDE	patient-day equivalent
PDOH	Provincial Department of Health
PDSA	Plan-Do-Study-Act
PEPFAR	(United States) President's Emergency Plan for AIDS Relief
PER/BDS	pregnancy exposure registry/birth defect surveillance
PERSAL	Government personnel administration system
PGWC	Provincial Government Western Cape
PHC	primary health care
PM	particulate matter
PMA	Pharmaceutical Manufacturers' Association
PMB	Prescribed Minimum Benefit
PMDS	Performance Management and Development System
PMTCT	prevention of mother-to-child transmission (of HIV)
PPIP	Perinatal Problem Identification Programme
PR	peer reviews
PrEP	pre-exposure prophylaxis
Pre-XDR-TB	pre-extensively drug-resistant tuberculosis
PRICELESS SA	Priority Cost Effective Lessons for System Strengthening South Africa
PRIME	Programme for Improving Mental Health Care
PTB	positive tuberculosis diagnosis
PTC	Pharmaceutical and Therapeutics Committee
PV	pharmacovigilance
PWID	people who inject drugs
Q	
QI	Quality Improvement
R	
RCS	Rural Clinical School
REF	Risk Equalisation Fund
RIF	rifampicin
RMP	Risk Management Plan
RMR-TB	rifampicin mono-resistant TB
RMS	Rapid Mortality Surveillance
RPM Plus	Rational Pharmaceutical Management Plus
RR-TB	rifampicin-resistant tuberculosis
RTMC	Road Traffic Management Corporation
RXH	Red Cross Hospital
S	
SA	South Africa
SABSSM	South African National HIV Prevalence, Incidence and Behaviour Survey or South African HIV/AIDS behavioural risks, sero-status and media impact survey
SACENDU	South African Community Epidemiology Network on Drug Use
SADAP	South African Drug Action Programme
SADC	Southern African Development Community

SADHS	South Africa Demographic and Health Survey
SAGE	Study on global AGEing and adult health
SAHMS	South African Health Monitoring Study
SAHPRA	South African Health Products Regulatory Authority
SAHR	South African Health Review
SAMF	South African Medicines Formulary
SAMHS	South African Military Health Services
SAMJ	South African Medical Journal
SAMMDRA	South African Medicines and Medical Devices Regulatory Authority
SAMRC	South African Medical Research Council
SANAC	South African National AIDS Council
SANBS	South African National Blood Services
SANC	South African Nursing Council
SANHANES-1	South African National Health and Nutrition Examination Survey
SAPC	South African Pharmacy Council
SAPMTCTEs	South African Prevention of mother-to-child transmission evaluations
SAPS	South African Police Service
SASH	South African Stress and Health
SASSA	Social Security Agency of South Africa
SAVACG	South African Vitamin A Consultative Group
SCA	Supreme Court of Appeal
SCM	supply-chain management
SDGs	Sustainable Development Goals
SDH	social determinants of health
SDI	Socio-demographic Index
SEP	single exit price
SEPA	single exit price adjustment
SEQ	socio-economic quintile
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
SL	second-line
SOWC	State of the World's Children Report
SPS	Strengthening Pharmaceutical Systems
sq.m	square metres
SSBs	sugar-sweetened beverages
SSIs	standard stock items
SSP	Stop Stock Outs Project
StatsSA	Statistics South Africa
STEPS	STEPwise approach to non-communicable disease risk factor surveillance
STGs	standard treatment guidelines
STIs	sexually transmitted infections
STREAM	Standardised Treatment Regimen of Anti-tuberculosis Drugs for Patients with MDR-TB
SU	Stellenbosch University
SVS	Stock Visibility System
SYS	systolic blood pressure
T	
TB	tuberculosis
TBF	Tiger Brands Foundation
TBH	Tygerberg Hospital
TIMS	TB in the Mines
TMIH	Tropical Medicine and International Health
TNCs	transnational corporations
ToP	termination of pregnancy
TSR	Targeted Spontaneous Reporting
U	
U5MR	under-5 mortality rate
UCT	University of Cape Town
UHC	universal health coverage

UHI	Urban Health Index
UK	United Kingdom
UL	upper limit
UN	United Nations
UNAIDS	(Joint) United Nations Programme on HIV and AIDS
UNFPA	United Nations Fund for Population Activities
UNICEF	United Nations Children's Fund
US	United States of America
USA	United States of America
USAID	United States Agency for International Development
V	
VAT	Value-added Tax
VIA	Visual inspection with Acetic Acid
VR	virologic response
W	
WASH	Water, Sanitation and Hygiene for All
WBOTs	Ward-based Outreach Teams
WC	Western Cape
WHA	World Health Assembly
WHB	wash-hand basin
WHO	World Health Organization
WHO AFRO	World Health Organization Regional Office for Africa
WHO CSDH	WHO Commission on the Social Determinants of Health
WHO-SAGE	WHO Study on global AGEing and adult health
WHR	waist-to-hip ratio
WISN	Workload Indicators of Staffing Needs
WMR	World Malaria Report
WPBTS	Western Province Blood Transfusion Services
X	
XDR-TB	extensively drug-resistant tuberculosis
Y	
YLDs	years lived with disability
YLLs	years of life lost