

The Digital Healthcare Leap



In this paper

- 3** The digital healthcare dilemma in emerging markets

 - 6** Do traditional digital health business models have a role in emerging markets?

 - 10** The leap forward
-

Foreword



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Whether we like it or not, technology has become part of our lives. It has arguably helped us as individuals become more informed and more connected. The use of technology is embedded in the industries of banking, automotive, insurance and retail. Today the health sector faces a daunting new digital challenge: unleashing the power of technology to fundamentally reinvent how care is delivered. On top of their existing technology needs and priorities, today's health providers need to address the digital requirements demanded by health policy or by consumers and other stakeholders.

Digital Health initiatives rely heavily on having the right information in the right place at the right time for use by the right clinician. To really use technology effectively in health, we need systems to interact with one another to provide the data required to make informed decisions about the delivery of care. 'Digital healthcare' is not about the technologies, it's about new ways of solving healthcare problems, creating unique experiences for patients and accelerating healthcare providers' growth. Over the longer term, digital healthcare will help system-wide operations and organisations to deliver more powerful healthcare.

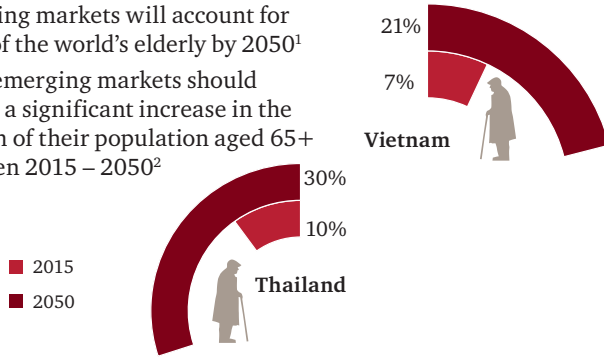
Yet these challenging financial times discourage all but the most prudent, high-return investments. Advanced, enterprise-wide digital health solutions should head many emerging healthcare providers' lists of 'must have' capabilities; however, traditional digital healthcare models often come with high costs. Our experience is that digital health can dramatically improve an organisation's productivity and, in turn, provide benefits in both patient outcomes and the bottom line. This means that if the costs of digital healthcare solutions can be made affordable, digital health could be an answer to the emerging markets' challenge to achieve sustainable growth and leapfrog the developed nations to provide quality, affordable, universal and patient-centric care.

Characteristics of healthcare in emerging markets

Healthcare demand in emerging markets is growing, driven by a number of factors such as a growing population as well as an ageing population. With the growing middle class and rising incomes, people are spending more on healthcare. Non-communicable diseases such as diabetes are no longer 'rich country' diseases and their prevalence is increasing in emerging markets. In these countries most of the healthcare infrastructure is concentrated in urban areas, while more than 50% of the population lives in rural areas.

Ageing population

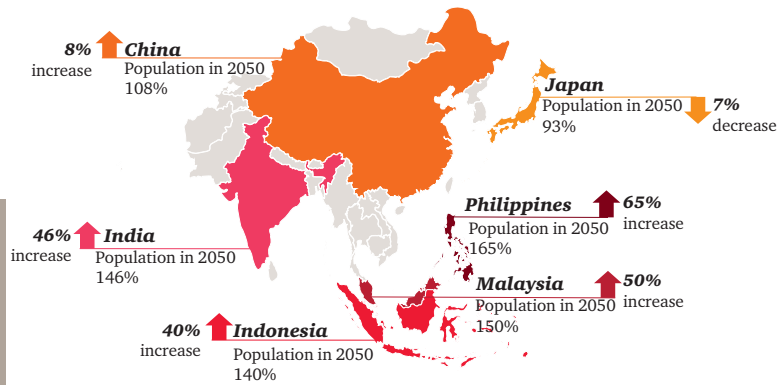
- Emerging markets will account for **80%** of the world's elderly by 2050¹
- Some emerging markets should expect a significant increase in the portion of their population aged 65+ between 2015 – 2050²



Growing population

Many emerging markets in the Asia-Pacific region are yet to reach their 'peak' population³

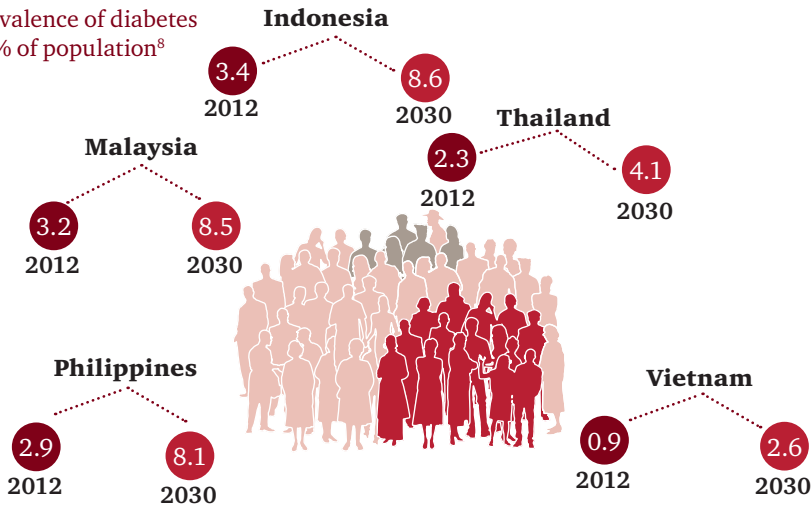
Projected population growth (2015-2050)



Increased prevalence of non-communicable diseases (NCDs)

- 68% of total deaths globally occur due to NCDs; emerging markets account for 75% of these deaths⁷
- Almost 200 million of the world's 370 million people diagnosed with diabetes live in Asia⁸

Prevalence of diabetes as % of population⁸



Growing middle class

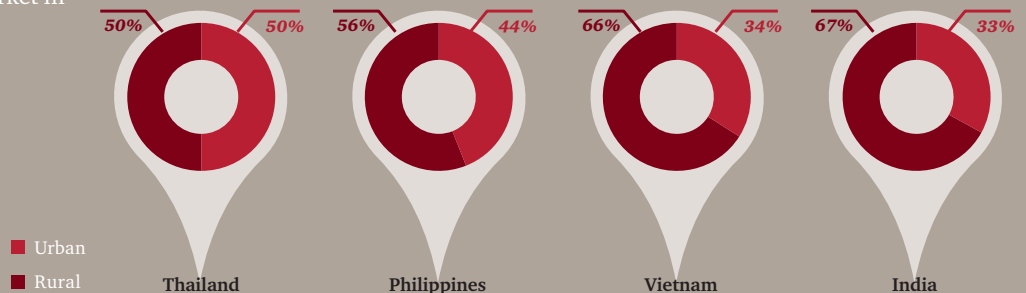


of the global middle class will be in Asia-Pacific by 2030⁴

Urban-rural divide

- Over **50%** of the emerging market in Asia-Pacific live in rural areas⁶

Percentage of population in rural areas (2015)⁵



The digital healthcare dilemma in emerging markets

“There is a clear burning platform and opportunity to address the growing burden of healthcare costs and corresponding impact on economic productivity due to ill health (the impact of non-communicable diseases like cardiovascular, cancer and diabetes is estimated at 4–6% of GDP across the APAC region). Solutions will require robust analysis and foresight, leadership and multi-stakeholder public-private partnerships.”

Sarah Butler

PwC Australia National Healthcare Leader

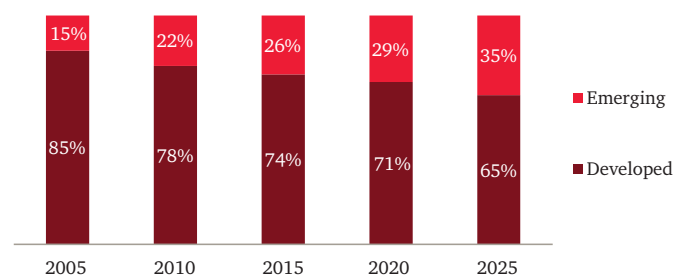
The healthcare gap

Expenditure on healthcare is increasing exponentially in emerging markets (see Figure 1). As incomes are rising and the middle class is growing in emerging markets, people are spending more on healthcare and demanding better healthcare services. With changing lifestyles and people living longer, there is a tectonic epidemiological shift from communicable to chronic disease such as diabetes, cardiovascular diseases and cancer.

While developed economies also have their challenges with affordability of care, their fundamental infrastructure is in place, for the most part, and their population growth remains relatively steady. Improving healthcare access and quality is becoming a priority in emerging markets. However, these countries have significant strain on their health systems. Digitisation of health services, if done in a different model, can help to improve the quality of and access to care while reducing costs.

Figure 1: Healthcare expenditure is increasing exponentially in emerging markets

Healthcare expenditure developed vs. emerging markets (%)



Source: Business Monitor International (BMI)

9% CAGR between 2015 and 2020 in emerging markets

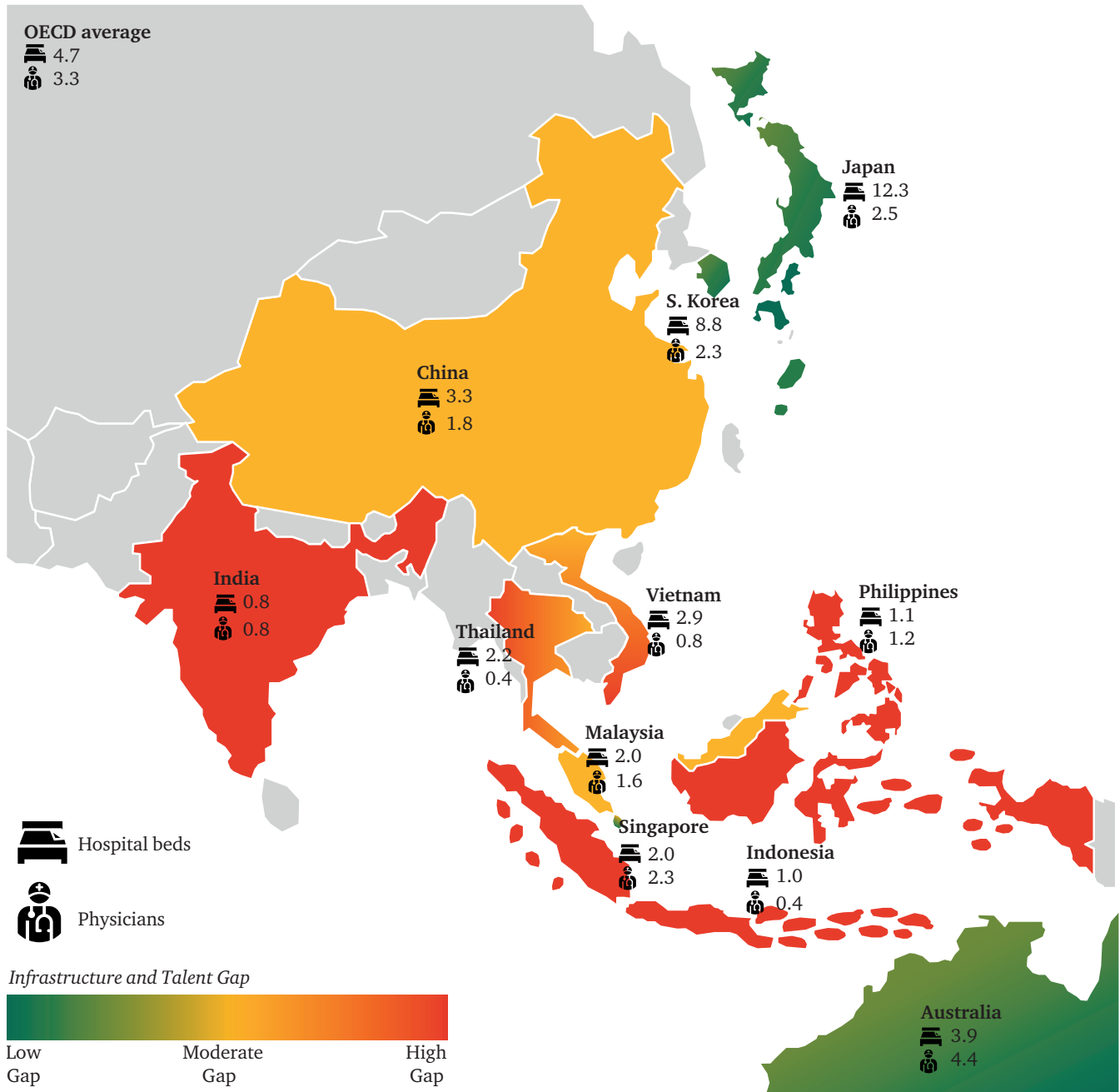
On the demand side, the patients/consumers in emerging markets are becoming more discerning around their own health and customer experience has become a key motivator for providers. Healthcare providers that fail to adapt to this consumer shift will risk consumers turning elsewhere to have their health needs met. For example, in Indonesia, patients are increasingly travelling to neighbouring countries such as Malaysia and Thailand to access better healthcare services.

On the supply side, the healthcare system in the emerging markets is characterised by underdeveloped infrastructure and faces an acute shortage of resources (see Figure 2). Governments are looking to improve healthcare access and affordability. They are implementing universal healthcare coverage and increasing national budget allocated to healthcare to upgrade the existing

facilities as well as to add new facilities. However, considering the gap and what is needed to bridge it, the traditional model for growth would not be sustainable.

For example, Indonesia is looking to expand its national insurance programme to all its citizens by 2019. In 2015, it allocated 5% of its national budget to healthcare.⁹ However, it is already facing a funding gap and has an acute shortage of healthcare resources. It would need an additional ~900k hospital beds and ~700k physicians to provide healthcare services comparable to those available in OECD (Organisation for Economic Cooperation and Development) nations. To ensure the long-term sustainability of its national healthcare program, Indonesia needs to look at innovative technology and disruptive business models.

Figure 2: Emerging markets are characterised by underdeveloped infrastructure and face an acute talent gap



Source: Business Monitor International, 2015; OECD Data, 2014



By 2035 the global shortage of healthcare professionals will reach **13 million** from **7 million today**¹⁰



Over **1/3** of countries suffering from this shortage are emerging markets¹¹



Weak tertiary and continuing medical educational system limits quality of knowledge distributed in emerging markets

Digital adoption in emerging markets

“Over the next decade, developing countries will need to spend billions on healthcare infrastructure and services. Advancements in technology must be considered with these investments. Where urgent needs prevail in emerging markets with limited access to healthcare, the learnings from costly EHR implementations in development markets must be considered to determine a more affordable path forward. Similarly to how wireless solutions have allowed developing countries to leapfrog fixed line infrastructure investments for broadband access, emerging markets need to consider innovative EHR solutions that will allow them to leap towards improved healthcare that is more affordable.”

Vaughn Kauffman

PwC Global Healthcare New Entrants Leader

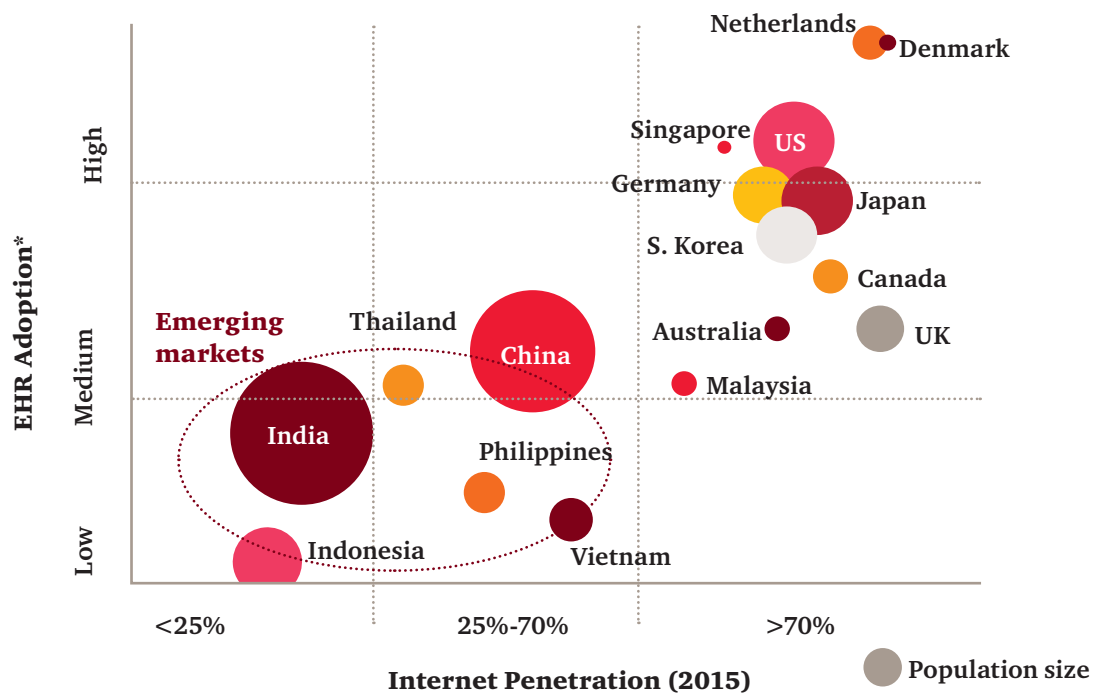
Adoption of traditional Electronic Health Records (EHR) is still low in emerging markets (see Figure 3). These markets mostly use paper-based solutions and outdated IT equipment.

The traditional EHR solutions have mostly been implemented in developed markets and represent a monumental change transformation which can be measured in decades, rather than months or years. There is a significant up-front cost required to purchase and install EHR as well as training costs and ongoing maintenance costs. The USA Congressional Budget Office (CBO) reported that, on average, EHR implementation costs for hospitals amount to approximately US\$14,500 per bed with annual operating costs of US\$2,700 per bed per year.¹² For example, USA based healthcare provider, Lifespan, announced plans to implement Epic’s EHR in March 2013, and the health system went live in April 2015. The implementation is estimated to have cost US\$100 million.¹³ Healthcare providers in emerging markets are unlikely to be in a position to afford such prohibitively expensive operating costs from major EHR vendors.

However, the adoption of digital healthcare solutions including EHRs in emerging markets could change dramatically in the next few years. With the internet and smartphone penetration growing and the technology infrastructure moving to cloud-based services, this presents the opportunity to develop innovative and cost-effective solutions to deliver healthcare services. These new digital healthcare models involve rapid prototyping, design and implementation which presents a great opportunity for emerging markets to leapfrog the developed markets.

Also it will be easier to implement innovative solutions in emerging markets because of fewer sunk costs, given existing infrastructure and equipment, lower fixed costs from building overcapacity, weaker vested interests and less divided public opinion than is typical in established markets.

Figure 3: Digital adoption is still low in emerging markets



Source: Statista, HIMMS Analytics Electronic Medical Record Adoption Model, PwC Analysis

*Note: EHR Adoption includes usage of medical records, health records, and other digital solutions by hospitals and physicians to deliver healthcare service.

Do traditional digital health business models have a role in emerging markets?

“Emerging markets will reset the delivery model for EMRs and EHRs in the next few years. The lack of legacy infrastructure can liberate health systems (both public and private) from the financially daunting capital costs which have led to government-sponsored initiatives such as Meaningful Use in the United States. Cloud-based technology, mobile enablement and fees for service models will lead to faster deployment and increased benefits for patients. Perhaps then the emerging markets will instead become the leaders, with the followers quickly shedding their ‘on premises’ technology.”

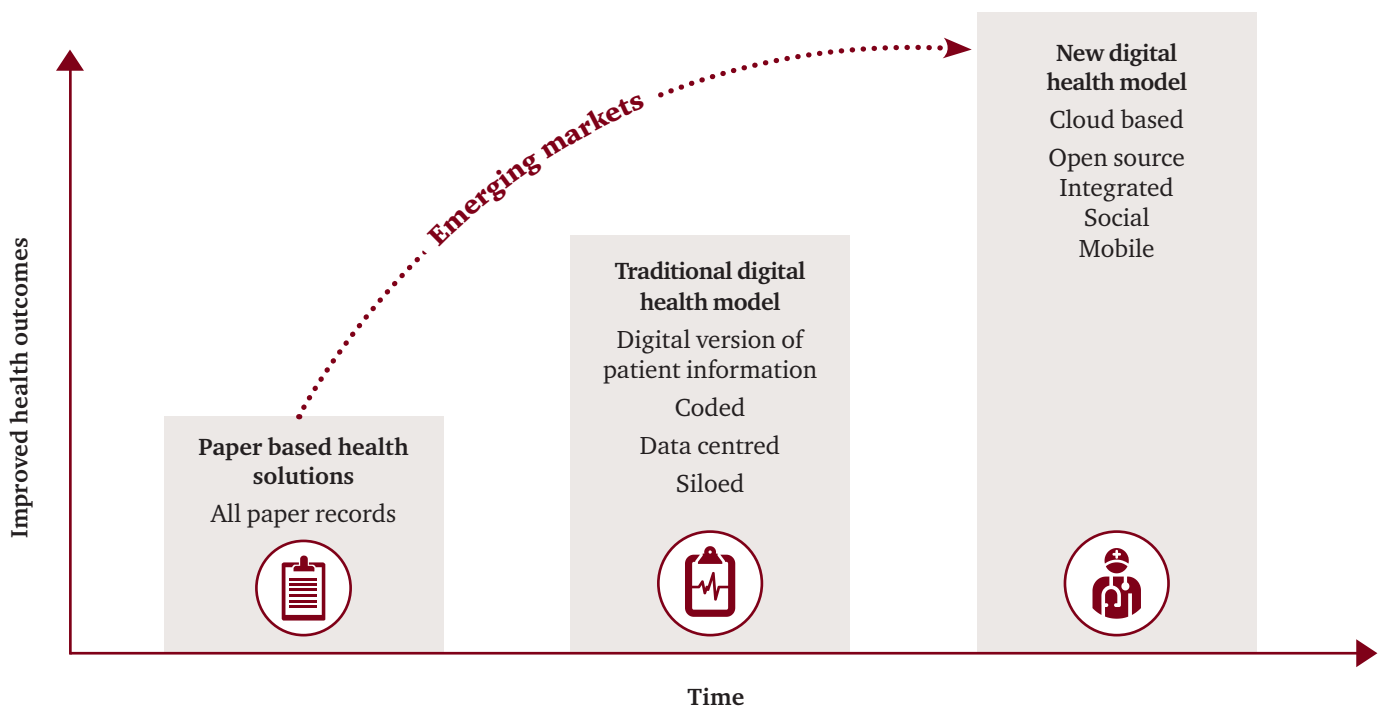
John Forsythe
PwC Australia, Southeast Asia,
New Zealand Digital Healthcare Leader

Traditional digital health models

Most developed countries have moved away from paper-based healthcare solutions and have adopted or are in the process of adopting ‘traditional’ digital healthcare models (see Figure 4). These traditional models require the purchase or lease of hardware and software as well as dedicated space to house servers/data centres. These systems are coded, siloed, fully customised and require highly skilled programmers and IT professionals to develop and manage solutions. The developed markets are now moving to a new digital health model with increasing adoption of cloud and mobile-based technology in the healthcare system. But integration and interoperability challenges of existing traditional models will make this progress slower.

For example, in Singapore, the National Electronic Health Record (NEHR) system was rolled out in 2011. It allows patient healthcare records to be shared across the entire healthcare system. Currently, all community hospitals, 56 community healthcare providers and close to 40% of GP clinics have access to NEHR.¹⁴ The Singaporean government aims to get the remaining private players on board as well. It invested US\$128 million to develop Phase 1 of the NEHR, and is paying about US\$15 million each year in maintenance costs.¹⁵ Singapore is now transitioning to a new digital health model. It is looking to move health information to the cloud. Named as hCloud, the project will cost US\$37 million for the first ten years.¹⁶ However, it will help to bring down the cost of running the Healthcare IT system. Future developments will also include the use of data analytics to support both decision making at the point of care and national planning for the Ministry of Health (MOH).

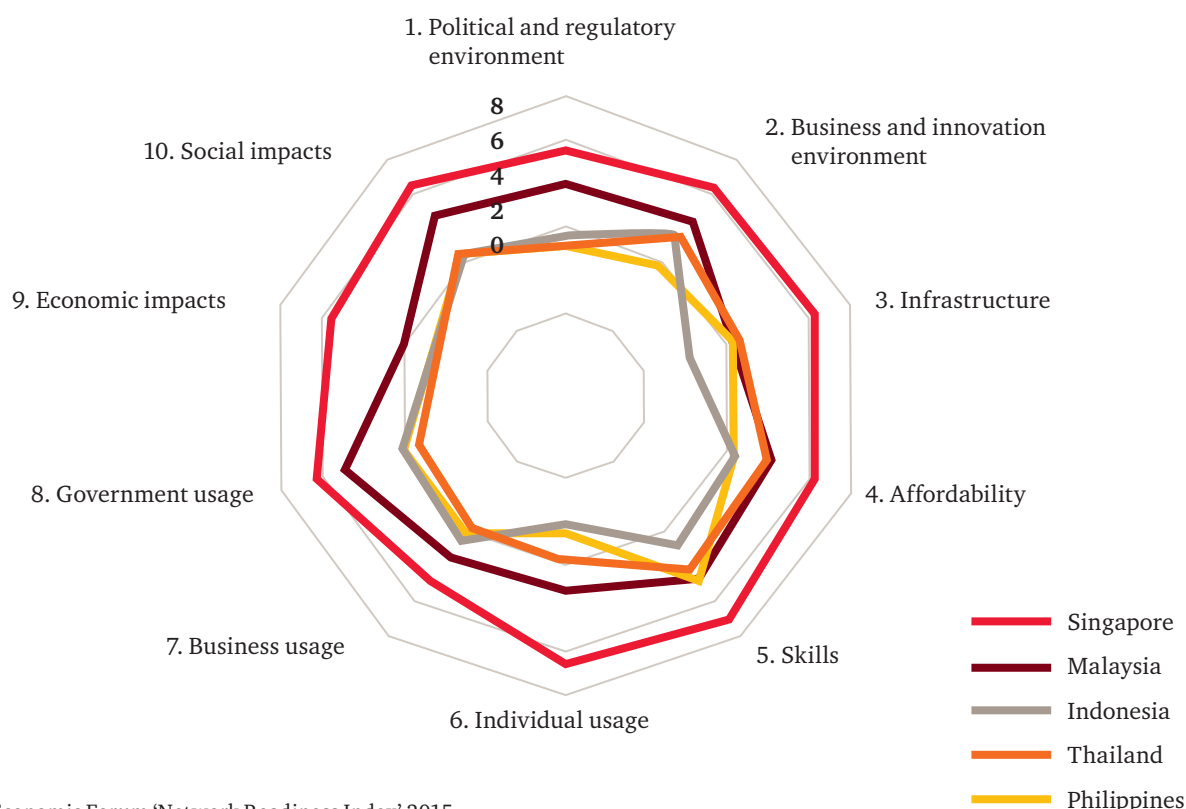
Figure 4: Emerging economies will leapfrog developed markets and adopt the new digital health model



Emerging economies are unlikely to adopt the traditional digital health models. There is a significant gap in most of the parameters required for successful adoption of the traditional digital healthcare model, including affordability. Figure 5 compares emerging economies in Southeast Asia to Singapore on the ten parameters required to leverage information and

communications technologies (ICTs) for social and economic impact. An emerging market such as Indonesia lags behind Singapore in terms of the political and business environment, infrastructure, affordability, skills and stakeholder readiness required to adopt the traditional digital health model.

Figure 5: Fundamental gaps in every aspect of Information Communication Technology



Source: World Economic Forum 'Network Readiness Index' 2015

New digital health models

In emerging markets the new digital health model will play a pivotal role in overcoming many of the challenges impeding healthcare delivery. It will help improve healthcare access, affordability, quality and safety. Emerging markets will leapfrog developed markets to move to the new digital health model (see Figure 4).

Emerging markets are increasingly digitising health information. Affordable EHR solutions are coming to market, such as cloud-based EHR or open-source EHR, which can help emerging markets digitise at a fraction of the cost and in a fraction of the time.

The Philippines has implemented an **open source electronic medical record system** for government health facilities called CHITS (the Community Health Information Tracking system). CHITS is managed by the UP Manila – National Telehealth Centre. The program has been able to improve health care delivery in government health centres. Nurses and midwives who usually record health data on paper were trained to use the system to generate timely reports for DOH national vertical health programs. Through the program implementation, delays

in accessing health data were minimised, giving more time for health workers to give care to patients at the health centre.¹⁷

Many private sector providers in emerging markets have also opted for **cloud-based solutions**. There is strong support for healthcare cloud systems from both public and private hospitals in Malaysia and the Philippines. Mary Johnston Hospital in Manila, in the Philippines, implemented a cloud-based EHR solution called HarmoniMD. This solution is built from the ground up using the latest cloud technologies and helps leapfrog over legacy server-based applications.¹⁸ Similarly, the Philippines-based company Lifedata offers a web-based electronic medical records system. It has also signed an agreement with the Philippine Medical Association (PMA) for the 'standardisation and computerisation of clinical practices in the Philippines'.¹⁹

Digitising the health information lays the foundation of the digital health model in emerging markets. For best outcomes, other healthcare innovations such as telemedicine, mHealth applications and e-prescriptions will be built around the digitised health information.

Making the transition to the new digital health model

The new digital health model is focused on four key elements – disruption, engagement, integration and trust (see Figure 6).

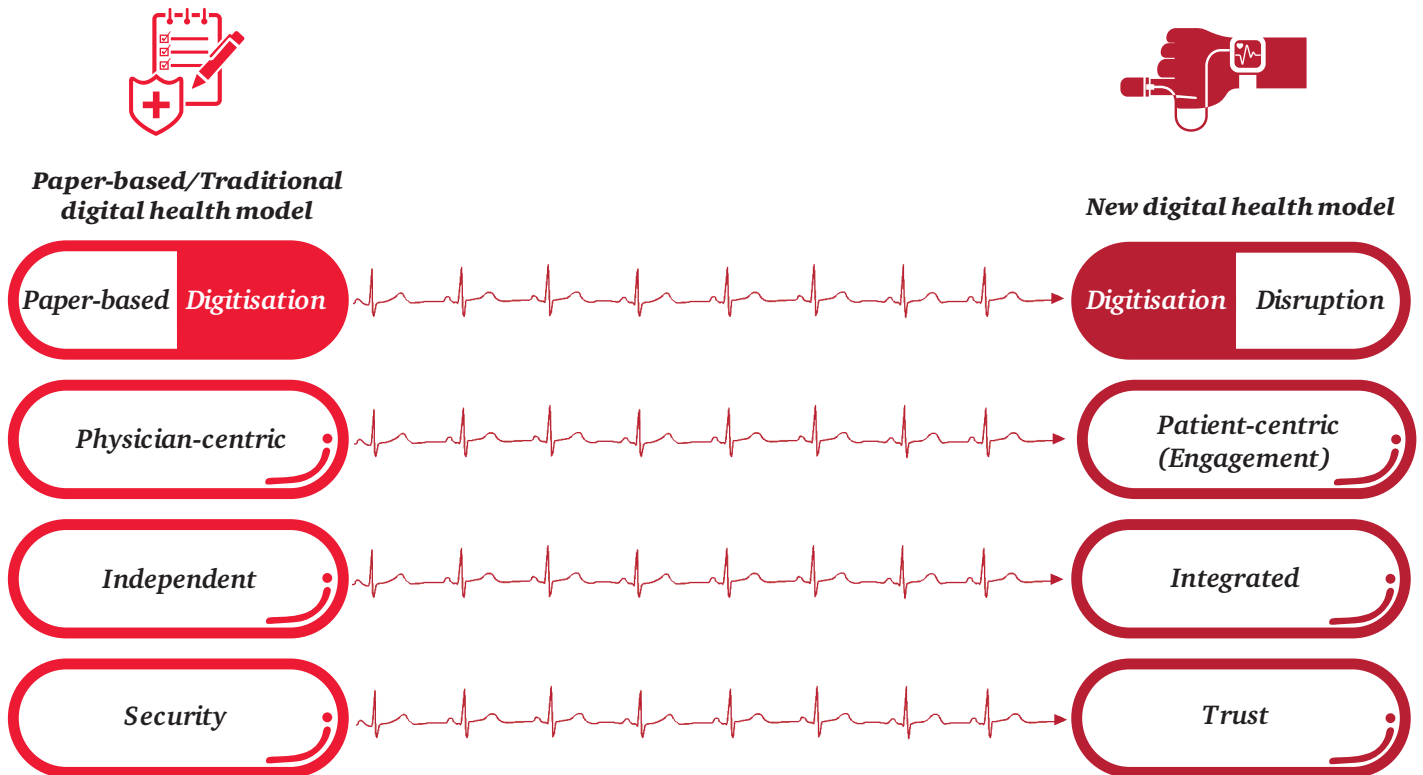
Disruption – Transforming businesses through innovative models that don't exist in the market today.

Engagement – Enabling digital interactions between clients and customers in a more engaging and patient-centred way.

Integration – Providing seamless access to health information across systems and devices.

Trust – Ensuring secure information in a digital age to inspire trust in the providers by the customers.

Figure 6: New digital health model is focused on four key elements – disruption, engagement, integration and trust



From digitisation to disruption

New entrants are disrupting the traditional health model by offering digital healthcare services in new and unique ways. They are exploiting the cost-quality curve to deliver healthcare services in an alternative setting. The new care delivery models introduced by these new stakeholders will partially fill the healthcare gap.

The new entrants are increasingly collaborating with healthcare providers and combining the use of EHRs and **mHealth applications**. There will be an increasing influx of **wearable solutions** in emerging markets that will support consumer and healthcare desire for monitoring and tracking to be integrated into daily life.

With fewer sunk costs and regulatory hurdles, emerging markets will be able to transition quickly to these disruptive solutions.



A small start-up founded in 2009 in Myanmar offers web-based and mobile application solutions related to healthcare. Its main solution is offered in conjunction with the leading telecom provider. The mobile application (app) helps users schedule telemedicine consultation or appointments with doctors. Users can also order medicine and seek health-related information through the app. The app had a user base of around 7,000 in 2015 and the telecom partner has agreed to pre-load the app in 600,000 mobile phones in 2016, and 1 million phones the year after.

The start-up is further seeking partnerships with hospitals to give the app to their patients. It has also developed a health information system aimed at helping healthcare providers to track patient data. It is also currently creating a human resource information system to help healthcare providers keep track of doctor entry and retirement.²⁰

From physician-centric to patient-centric (Engagement)



Consumers are demanding better quality and customer service through social, mobile analytics and cloud technologies. With democratisation of data and increased usage of social media and mobile, patients will play a more active role in clinical decision making. The new digital model will focus on customer experience and understanding patients in their everyday lives. The solution will use customer relationship management technology to deliver patient-centric care.

The digital solution will also act as a hub by sharing information across a broad community to provide support, coaching, recommendations and other forms of assistance. It will enable patient involvement and the provision of ubiquitous and instant feedback in order to realise new behaviours and/or sustain desired performance.²¹

From independent to integrated



Consumers increasingly expect seamless management of their information across their healthcare providers. Currently, traditional healthcare models rely on disparate systems, multiple sources of truth and silos of solutions that don't support the provider. The new digital healthcare model will transition towards an inherent capability to ensure seamless information exchange across system(s) of record.

Leading products must integrate data collected from disparate devices and apps into external health ecosystems. It should be integrated into existing activities and workflows of providers and patients to provide the support needed for new behaviours.

As health data becomes more integrated and **analytics and Big Data** becomes more prevalent, healthcare providers will increasingly gain insight into real-time customer needs and pain points. Analytics will help in early diagnosis, better treatment and improved clinical decision making.

From security to trust



Cybersecurity is a growing concern in healthcare, especially given recent disruptive ransomware incidents, and the increasing cost of breaches. Data breaches happen for both malicious and benign reasons, enabled by greater digital adoption. Health records are an attractive target for criminals due to the breadth and depth of their data, and healthcare organisations' relatively low degree of focus on security issues.

Ensuring secure information in a digital age to inspire trust in consumers by their providers is critical. Security in the traditional sense rested on a patient's level of comfort about the protection of the privacy of health related information and threats of cybersecurity breaches. In the new digital health model where measures have been established to ensure the security of this type of information, the patient's focus has shifted to how to establish a trust based relationship with their healthcare provider who may or may not be physically present.

Healthcare providers and governments are rethinking strategies for avoiding these attacks. Employee education is a key tactic for avoiding attacks. The players are also looking at innovative solutions such as cloud-based initiatives, Big Data analytics and advanced authentication to improve security and build trust.²²



The leap forward for the emerging markets

“The benefits of digital healthcare can be felt beyond patients. By assisting the prevention of illness and supporting the provision of care through alternative locations such as clinics, fewer new doctors and nurses will need to be trained and fewer additional beds and hospitals created, which can help to reduce the overall financial healthcare burden on governments in emerging markets, enabling them to fund other key areas of the economy. A whole nation benefits from digital healthcare.”









David Wijeratne

PwC Growth Markets Centre Leader

Benefits of moving to the new digital health model

There are substantial potential benefits of digital healthcare solutions in addressing business challenges caused by the current systems and processes associated with paper medical records. The benefits are not unlike those that could be achieved in a developed market; however, with a much lower cost base, and much broader diversity of solutions that cross the continuum of care, they could be significantly enhanced (see Figure 7).

Figure 7: Summary of benefits of digitising healthcare for patients, providers and payers

	Patients	Providers	Payers
 EMR	Easier to read and understand	Easy storage and retrieval; improved efficiency and productivity	
 EHR	Better diagnosis and treatment	Coordination and informed decision-making	Faster reimbursements
 Personal Health Records	Personal wellness management	Consistency of information	Links to healthcare plans and lower claims
 Remote Diagnostics	Reduces duplicated tests and referrals	Easy access	Lower cost
 Remote Monitoring	Patient-centric integrated care	Reduce emergency and re-admissions	Lower cost
 Telecare	Access to specialist care	Improves productivity and reduces burden of healthcare resources	Lower cost
 mHealth applications	Greater patient engagement and saves time	Proactive and targeted care	
 Big Data/Analytics	Accurate diagnosis, better treatment	Improves diagnostics and accuracy of treatment	Lower cost

* EMR – Electronic Medical Records; EHR – Electronic Health Records

Key considerations in moving to the new digital health model

It is well documented that 80% of large organisational change initiatives fail to achieve their intended objectives, particularly in technology-related programs. Regardless of the quality of technology developed prior to rollout, implementations often encounter change resistance and can fail – primarily due to an inability to manage the people, process and organisational issues effectively.

Digital health initiatives offer the opportunity to have a fundamental impact on the business model of the implementing organisation. With the introduction of new ways of solving business problems, creating unique experiences for the customer and engaging people through digital mechanisms, many tasks may also become automated or be eliminated, and result in new workflows to complement digital solutions. As a result, any company looking at digital healthcare needs to provide substantial support to the business in order to manage people through this change process. Attempting to implement a digital change in a healthcare environment requires the active involvement of clinical leaders and sponsors who are committed to the change process and can help lead the organisation through the change. These individuals or groups are sponsors and champions who play a key role in driving the change.

Healthcare providers and administrators need to set strategies that harness technology for mutual interests and mutual gain as they build care delivery models with patients – not patient encounters – at their centre. The companies that will emerge as winners in this new marketplace will be those that can articulate how technology can add value, align incentives, strategically share and analyse data, and redeploy, extend and expand their workforce to embrace digital enablers. The following elements are key:

- **Understanding which digital health technologies** healthcare providers and consumers value should shape digital strategies
- **Generating meaningful, actionable insights** through analytics will focus investments and yield better, faster results
- **Understanding what motivates both caregivers and consumers** to adopt and continue to use digital technology will be critical for sustainability
- **Rethinking the workforce** and informing workflows will fuel the Digital Health return on investment.

Conclusion

After decades of slow progress, it's time for healthcare to take the leap into the new digitally enabled healthcare era. The magnitude of the challenge facing the health sector is considerable. Its implications are far reaching for all aspects of society and the economy. It is clear that the challenge of affordable and sustainable healthcare is common across both emerging and developed economies. Finding a sustainable solution to enable better healthcare delivery is no longer the responsibility of the public sector. There is a collective responsibility across both the public sector and private sector to redefine traditional healthcare business models to find new pathways to sustainability.

Innovative companies are empowering healthcare customers with new solutions and forcing the entire industry to rethink the way it does business. With the patient/customer becoming more discerning around their own health, customer experience has become a key motivator for providers. Consumers are no longer passive patients, but have become more engaged and more discerning, wielding new tools and better information to compare

providers. The near future will be marked by how well the industry responds to this consumer shift. Hospitals and healthcare providers that fail to adapt will risk declining revenues as consumers turn elsewhere to have their health needs met. The message is clear for healthcare delivery: digital is here and if as a provider you are not prepared, you may be left behind.

Healthcare companies should look to how they will integrate and connect their existing systems with new digital technologies and merge the data locked inside them to generate meaningful, actionable insights for caregivers. In the new digital health era, digitally enabled care is no longer going to be a nice-to-have, but rather a fundamental business imperative. Industry leaders across providers, insurers, medical technology and the pharmaceuticals all see major shifts in how care is being delivered. Digital technology has the potential to bridge time, distance, the affordability of healthcare and the expectation gap between consumers and clinicians.



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Acknowledgements

References

1. World Economic Forum, 'Why ageing is an issue for emerging markets', 12 Feb 2014
2. Business Monitor International (BMI) Database
3. United Nations, 2015 World Population Prospects (High fertility variant, 2015 – 2100)
4. PwC, Changing demographics demand healthcare reforms, 2015
5. The United Nations Development Program's Human Development Report 2013, 'The Rise of the South: Human Progress in a Diverse World'
6. United Nations Department of Economic and Social Affairs, 'Population Facts – Our urbanising world', Aug 2014
7. World Health Organisation, 'Global status of NCDs', 2014
8. MDDI online literature review, 2014
9. Indonesia Ministry of Finance, 2016
10. WHO, 'Global health workforce shortage to reach 12.9 million in coming decades', 11 Nov 2013
11. Oxford Journal, 'Health professionals' migration in emerging market economies: patterns, causes and possible solutions', 2013
12. Congress of the United States – Congressional Budget Office, 'Evidence on the Costs and Benefits of Health Information Technology', May 2008
13. Becker's health IT and CIO Review, '8 Epic EHR implementations with the biggest price tags in 2015', July 2015
14. Singapore Ministry of Health Website, 'Future phase of NEHR'
15. Singapore Worker's Party, 'Easing the cost of healthcare for Singaporeans', 2013. Cost data converted from SGD to USD based on exchange rate of 1SGD = 0.75USD
16. Integrated Health Information Systems (IHIS), 'IT boost to keep health care humming', October 2014. Cost data converted from SGD to USD based on exchange rate of 1SGD = 0.75USD
17. CHITS Philippines Website (<https://chits.ph/>)
18. Healthcare IT News, 'Manila hospital implements cloud-based EHR', 18 Apr 2012
19. LifeData System Inc. Company Website (http://lifedata.ph/?page_id=16)
20. KoeKoe Tech Company Website (<http://www.koekoetech.com/>)
21. PwC 'Emerging mHealth: Paths for growth', 2012
22. PwC 'Cybersecurity in Health Services', 2016

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