

Contraceptive histories: A comparative analysis of switching behaviour in five East African countries

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DECLARATION

I, Peter Kisaakye, hereby declare that this work is the result of my own research, and references to other people's work have been duly acknowledged.

Signed by candidate

25th September 2018

CONFERENCE PRESENTATIONS

Kisaakye, P and AT Moultrie. 2018. Quality in provision and use of modern contraception: the utility of information exchange in five East African countries. Paper presented at the *International Conference on Family Planning (ICFP)*. Kigali, Rwanda, 12th-15th November. [Forthcoming]

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Kisaakye, P and AT Moultrie. 2015. An analysis of calendar data: examining contraceptive use dynamics in Uganda. Paper presented at the *Union of African Population Studies (UAPS) Conference*. Pretoria, South Africa, 30th November-4th December.

ABSTRACT

Since the inception of family planning programmes in developing countries in the 1960s, cross-sectional data show remarkable progress in the adoption of modern methods of contraception. Despite the positive contribution contraception plays in preventing unwanted pregnancies, sexually active women from sub-Saharan Africa continue to grapple with unintended pregnancies, which in some instances, results in unsafe induced abortion, with its attendant risks to maternal health.

This thesis uses the most recent (as of January 2017) reproductive calendar data from the Demographic and Health Survey (DHS) programme from five East African countries; Ethiopia (2011), Kenya (2014), Rwanda (2014/15), Tanzania (2015/16), and Uganda (2011), to examine how women use contraception over time. The reproductive calendar data that are collected retrospectively provides a better mechanism to understand the trajectory of how women adopt, and immediately switch, contraception than if current-status data were utilised.

Three important findings emerge from the analyses: First, contraceptive use being the most important driver of fertility decline, the slow fertility transition that is evident in the five countries can be largely attributable to limited immediate switching of contraception following discontinuation. Despite this universal observation, the key indicators of immediate switching are largely country-specific, which suggests differences in the way family planning programmes are implemented in these countries.

Second, all five countries follow a similar pattern of adopting modern contraception – where the majority of users adopt short-term methods compared to long-acting reversible contraceptives (LARCs). However, the duration of use of short-term methods is observed to be shorter compared to LARCs, implying that LARCs facilitate contraceptive continuation.

Last, the analysis of current-status data point to improvements in quality of contraceptive provision, and availability – facilitating increased adoption of modern contraception. However, the results indicate that method information exchange is a key predictor of contraceptive use in all countries, with users of LARCs receiving more information than users of short-term methods.

Although family planning programmes have made big strides in recruiting new users, this thesis argues that unintended pregnancy, which often leads to a slow fertility transition, can be prevented once family planning programmes emphasise the benefits of immediately switching, or consistent use of contraception among existing users. Sub-optimal switching of contraception among already existing users is likely to attenuate fertility transition.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CBD	Community Based Distribution
CHWs	Community Health Workers
CPR	Contraceptive Prevalence Rate
CPS	Contraceptive Prevalence Survey
DHS	Demographic and Health Survey
DISH	Delivery of Improved Services for Health
DMPA	Depot Medroxyprogesterone Acetate
EFP	European Fertility Project
FGAE	Family Guidance Association of Ethiopia
FGDs	Focus Group Discussions
FP	Family Planning
FPAU	Family Planning Association of Uganda
HEWs	Health Extension Workers
HIV	Human Immunodeficiency Virus
HRRC	Human Reproduction Research Centres
HSDP	Health Sector Development Plan
ICPD	International Conference on Population and Development
IUD	Intra Uterine Device
KAP	Knowledge, Attitude, and Practices
LARCs	Long Acting Reversible Contraceptives
MCPR	Modern Contraceptive Prevalence Rate
MDGs	Millennium Development Goals
MCI	Method Composition Index
MII	Method Information Index
MLE	Measurement, Learning and Evaluation
MoH	Ministry of Health
NFHS	National Family Health Survey
NFPP	National Family Planning Policy
NGOs	Non-Government Organisations
NPP	National Population Policy
NPPSD	National Population Policy for Sustainable Development

OR	Odds Ratios
PHC	Primary Health Care
PMA2020	Performance, Monitoring and Accountability Surveys
PPA	Population Plan of Action
RHP	Reproductive Health Policy
RHU	Reproductive Health Uganda
RR	Rate Ratios
SDGs	Sustainable Development Goals
SPA	Service Provision Assessment
SSA	Sub-Saharan Africa
TFPA	Tanzanian Family Planning Association
TFR	Total Fertility Rate
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
US	United States
USAID	United States Agency for International Development
WFS	World Fertility Survey
WHO	World Health Organisation
WPP	World Population Prospects

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1 INTRODUCTION

“It is true that most social scientists would not deny the value of life histories for many types of research, especially anything related to the life cycle. Life histories undeniably offer a richness and concreteness of detail and, above all, the opportunity to examine the sequence of behaviour in the larger context of the person’s life” (Balán *et al.* 1969: 105).

A demographic objective – the desire to reduce high population growth, precipitated by mortality decline – was the main motivation for rolling out family planning programmes in the 1960s in sub-Saharan Africa. However, improving the quality of health, service delivery, and environmental protection have also been advanced as important reasons for promoting modern contraception (Bulatao 1989; Seltzer 2002; Cleland *et al.* 2006b).

In East Africa, family planning programmes have been successful at recruiting non-users of contraception to initiate use of contraception. This is reflected in the cross-sectional estimates that are generated from the current-status data in the Demographic and Health Survey (DHS) programme that show increasing proportions of women adopting modern contraception over time. Despite this positive achievement, modern contraceptive use remains at low levels in the region, which could partly explain the slow fertility transition observed in the region.

To tap into the underlying forces or reasons responsible for low contraceptive use (and potentially a slow fertility transition), there is need to understand the trajectories of how women use contraception – a key proximate indicator of fertility decline (Bongaarts 1978). However, current-status data only offers the opportunity to estimate a contraceptive prevalence rate (CPR), which is a snapshot measure. This limits a detailed examination of contraceptive use dynamics – how women adopt, discontinue, and switch contraception. In a situation where women continue to adopt modern contraception, yet fertility transition remains slow, it raises the question of how users of contraception switch methods when they stop using a method for reasons other than wanting to have a child. Therefore, to make sense of how women practice immediate switching, and how this might shed light on the slow fertility transition in East Africa, there is need to make use of either longitudinal or retrospective data.¹

This thesis utilises contraceptive histories collected in the DHS calendar to examine the switching behaviour of women, as well as the key indicators of immediate switching in five East

¹ Longitudinal data involves making repeated visits to the same women over a specified period, while data collected retrospectively involves asking the same women about events that happened in the past over a specified period of time.

African countries namely, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda. The results from the analyses shed light on why contraceptive use has remained low in the region, but also help to explain the linkage between the slow fertility transition, and contraceptive use. Reproductive calendar data offers the richness to understand better how, and when, women adopt, stop, and switch contraception, which offer significant insights into demographic phenomena as well as impact on policy (Laguna *et al.* 2000).²

1.1 Countries under study

This study covers five East African countries namely Ethiopia, Kenya, Rwanda, Tanzania, and Uganda (Figure 1.1). The countries included in the study are chosen because they have sufficiently rich information on contraceptive use collected by the Demographic and Health Survey (DHS) programme to permit thorough analysis of contraceptive use dynamics. Calendar data, used to study contraceptive switching, were collected in all the surveys considered for analyses.

Figure 1.1 Location of the five East African countries under study



² In this thesis, “reproductive calendar data” and “contraceptive calendar data” are phrases that have been used interchangeably to mean the same thing.

1.1.1 The justification for choosing the five countries

Four considerations guided the inclusion of the countries in the study: First, all countries under study form part of the fourteen United Nations designated East African countries excluding Indian Ocean states (Comoros, Madagascar, Mauritius, Mayotte, Reunion, and Seychelles). Second, countries with no Demographic and Health Survey (DHS) data (Djibouti, Somalia, and South Sudan) were not considered, nor were countries (Eritrea and Burundi) whose publicly available recent Demographic and Health Survey data are earlier than 2011, (as of January 2017). Third, all five countries have well-designed family planning programmes in place to track contraceptive use, and strengthen increased uptake of modern contraception, and for which calendar data were collected in the Demographic and Health Survey datasets included for analysis; and last, the five East African countries included for analysis are characterised by high fertility while contraceptive use remains low. The situation of slow fertility transition in the region may be made worse by the high incidence of HIV/AIDS, since some studies carried out elsewhere such as in KwaZulu-Natal reported HIV/AIDS to be a plausible reason for fertility stalling as women switch from more effective methods such as the Injectable, Norplant, IUD to less effective methods of contraception such as the condom (Moultrie *et al.* 2008). Therefore, in a region such as the East African region, where HIV/ AIDS prevalence is high, it is important to investigate whether switching of methods from more effective to less effective methods such as the condom is mediated by HIV/AIDS. Unfortunately, this thesis does not incorporate the component of HIV/AIDS because of data limitations, neither does it consider a switch from a more effective method (mainly the injectable that is mostly used by East African women) to a condom because of fewer cases to make the analysis meaningful. However, an investigation of how women switch from a more effective method to a less effective method of contraception in this thesis may help shed some light on some of the plausible reasons behind why women switch from more effective methods to less effective methods in the five East African countries.

1.2 Problem statement

Although a remarkable increase in the use of modern contraception among new users has been observed, a slow fertility transition and low contraceptive use is still evident in most regions of sub-Saharan Africa (Marston and Cleland 2003). Lack of motivation to effectively use modern contraception among non-users has been identified as the major explanation for the gap between contraceptive awareness and use (Curtis *et al.* 2011). Lack of motivation to effectively use contraception may be aggravated by husband's opposition to use modern methods of family

planning (Maharaj 2000; Frost and Dodoo 2009).³ Moreover, non-use of contraception may result in unwanted pregnancies and mistimed births, with consequently (potentially) higher fertility than desired. This, in turn, may result in negative consequences for maternal and child health (Cleland and Ali 2004). In addition, failure to immediately switch contraception among discontinuers increases the risk of unwanted pregnancies, with the same negative consequences. Further, HIV/AIDS has been observed by Moultrie *et al.* (2008) to influence contraceptive use, through switching from more effective methods to less effective methods such as the condom to prevent contracting it. As a result, women are likely to have unplanned and unwanted pregnancies which eventually lead to fertility stalls. All these challenges are no exception to the East African countries under investigation – where women continue to have large numbers of children, many of which might be because of mistimed or unintended pregnancies. Given low contraceptive use, fertility transition is likely to remain slow. Challenges related to inefficient use of modern contraception require a better understanding of how women use contraception. Unfortunately, a popular measure, the contraceptive prevalence rate, limits detailed analysis of contraceptive use dynamics. Therefore, in addition to adoption of contraception, there is a need to understand consistent use of contraception, which information is vital for policy revision and implementation in the provision of modern contraception, and fertility reduction. Such a study requires the use of other types of data – reproductive calendar data – to understand contraceptive trajectories, particularly immediate switching of contraception.

1.3 The research question, objectives, and hypotheses

This study aims to answer the main research question: Why has contraceptive use remained low in the five East African countries? In answering this research question, we investigate how East African women use and immediately switch contraception. The principal objective of the study is to examine immediate switching of contraception in five East African countries using reproductive calendar data.

Specifically, this research has five objectives: First, to examine method skew as a measure of contraceptive method availability, and quality in the provision of family planning services. Second, to assess whether contraceptive use is dependent on method information exchange between family planning service providers and clients. Third, to examine patterns of contraceptive method adoption and duration of use of contraception. Fourth, to examine consistent use, and transitions

³ Although this is an important area to consider in the provision of family planning services in sub-Saharan Africa, the present study does not focus on it because the question on contraceptive decision-making process was only asked of women in union and yet this thesis considered all women (both married and unmarried), and suggests that this could be an area for further study in the future.

in use of contraception, and how that varies by background characteristics, and last, to identify the key predictors of immediate contraceptive switching among East African women.

In answering the above research question and objectives, this thesis sets out to test three hypotheses: First, following a pattern of fertility transition in most sub-Saharan African countries, characterised by a faster transition in urban than rural areas (Garenne and Joseph 2002), it is anticipated that more urban women would use contraception than their rural counterparts, and therefore urban women may be more likely to switch from a traditional method, or non-use of contraception to a modern method of contraception than their rural counterparts. This hypothesis is drawn from the fact that rural areas are the most disadvantaged areas, with limited access, and poor service delivery of modern contraceptives (Jankowski *et al.* 2013). With accessibility challenges in rural areas, contraceptive continuation is likely to be limited (Ali and Cleland 1995).

Second, because a positive association between the level of women's education and contraceptive uptake is firmly confirmed (Ali and Cleland 2010b), switching of methods, particularly to more effective methods, is more likely to be greater among women with higher education particularly those with secondary or tertiary education compared to women with lower, or no education. This is because better educated women are more likely to be knowledgeable on a wide range of contraceptive methods than uneducated women. As Caldwell *et al.* (1992) observe, highly educated women in Botswana, Kenya, and Zimbabwe were more likely to use modern contraception than their counterparts.

Finally, women older than 40 years are more likely to switch to more effective methods of contraception as compared to women younger than 40 years. One of the social norms for using contraception in sub-Saharan Africa, is to avoid the chances of becoming pregnant among women who think they have reached the age of not bearing children anymore (Timæus and Moultrie 2008).

1.4 Thesis structure

This thesis is presented in eight chapters. Chapter 1 introduces the study, as well as stating the motivation for the research. In this chapter (Chapter 1), the main research question, objectives, and hypotheses of this study are also stated. Chapter 2 reviews the literature on fertility transition and family planning programmes in sub-Saharan Africa – highlighting what we know, what we do not know, and how this thesis aims to fill them. Chapter 3 discusses the methodology used in this thesis as well as evaluating the consistency of the data used in this thesis. Chapter 4 uses current-status data to answer the first two research objectives; examine method skew as a measure of contraceptive method availability, and quality in the provision of family planning services, and assess whether contraceptive use is dependent on information exchange. In Chapter 5, reproductive calendar data are used to examine adoption, and duration of use, of contraception

while Chapter 6 uses reproductive calendar data to examine the variation in consistent use, and transitions in contraceptive use by background characteristics. Chapter 7 uses reproductive calendar data to identify the key indicators of immediate contraceptive switching. Chapter 8 offers a summarised comprehensive story about how women use contraception in the five East African countries, and locates this thesis in the research gap identified in the literature.

2 FERTILITY TRANSITION AND FAMILY PLANNING PROGRAMMES IN SUB-SAHARAN AFRICA: A LITERATURE REVIEW

“...it is less important to focus on the continuation of any particular method than on the total contraceptive behaviour of couples, which takes into account the need for and practice of switching between methods” (Jain 1989: 13).

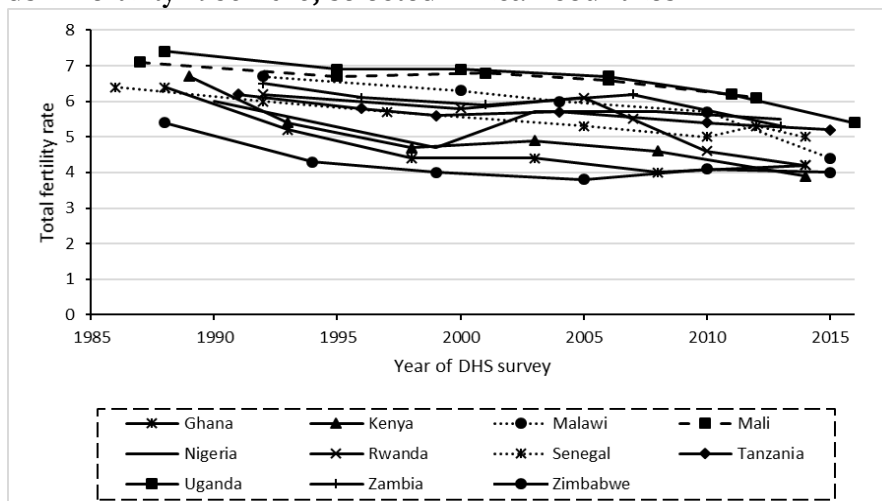
This literature review, providing a synthesis of the literature relevant to the thesis, is divided into seven major sub-sections, starting with a discussion on the context of African fertility transition (in Section 2.1). Section 2.2 follows with an examination of the role of the principal proximate determinant – contraception – in fertility transition. Section 2.3 provides an overview of the changes in the concept of met and unmet need in family planning, and the debates surrounding the provision of family planning services. Section 2.5 provides an explanation and a justification for the use of calendar data, and their applicability to our understanding of how women use contraception over time, followed (in Section 2.4) by a discussion on the public health aspects related to the use, and provision of family planning services. Section 2.6 provides an assessment of the history of family planning programmes, changes in the use of family planning services, and method mix over time, as well as a review of the documented direction between selected socio-economic background characteristics and the use of modern contraception. Section 2.8 offers a discussion on what we know, and do not know, and provides a summary of the gaps in the existing literature, and discusses the relevance of the present study in filling this gap.

2.1 The context of African fertility

Figure 2.1 presents trends in fertility levels for selected sub-Saharan African countries with five or more DHS surveys (Measure DHS 2017).⁴ The trend in Figure 2.1 shows that fertility is still high in almost all countries, with most countries having a total fertility rate of more than 4 children per woman. Although there are signs of fertility decline in all countries, estimates point to a slow pace particularly in Mali, Uganda, and Tanzania. Fertility rates appear to have increased in Zambia between 2001 and 2007, while a sharp decrease in the Nigerian 1999 DHS data has been attributed to data errors (Bongaarts 2006; Schoumaker 2008) if compared to estimates from the 1990 and 2003 Nigerian Demographic and Health Surveys.

⁴ We considered countries with five or more DHS surveys as of May 2017 to provide a better trend in the way total fertility rates have been changing over time.

Figure 2.1 Trends in fertility 1986-2016, selected African countries



Source: Measure DHS (The Demographic and Health Survey Programme)

A review of the literature on African fertility suggests three things: First, a slow fertility transition, which is usually slower in rural than in urban areas; second, evidence of a fertility stall; and last, lengthening birth intervals (a concept emerging recently). These three concepts are discussed in the sections below.

2.1.1 Slow fertility transition

The African continent was the last region to experience the onset of fertility transition (Caldwell *et al.* 1992). Although fertility transition in sub-Saharan Africa (SSA) happened much later compared to other parts of the world (Shapiro 2012), there is evidence that fertility transition has begun in most sub-Saharan African countries, with the first onset being identified in the early 1960s in some countries (Garenne and Joseph 2002).⁵

While this decline is well documented, the fertility transition across these countries has not been uniform, with some countries experiencing a faster transition compared to others (Machiyama *et al.* 2010). Moreover, available evidence has pointed to earlier and faster fertility declines in urban areas relative to rural areas (Garenne and Joseph 2002). In some countries, unchanging fertility levels, or slower fertility declines documented in rural areas have been attributed to an overall slow national fertility transition (Garenne 2011).

2.1.2 Fertility stalling

The second aspect associated with African fertility that is gaining more attention is fertility stalling in some parts of sub-Saharan Africa. Countries that have had an interruption after the onset of fertility transition are said to experience fertility stalling (Bongaarts 2008). Bongaarts and Casterline

⁵ Garenne and Joseph (2002) use data from the World Fertility Surveys (WFS) and Demographic and Health Surveys (DHS) to provide evidence of the timing of fertility transition in sub-Saharan Africa.

(2013) have argued that the observed fertility stalls in sub-Saharan Africa were non-existent in other developing regions of the world such as Asia and Latin America during their early stages of the fertility transition. The observation of fertility stalls in sub-Saharan Africa opens the debate about whether a different path of fertility transition is being followed in the region.

However, the stalls witnessed in some African countries may be due to the different ways the concept is operationalised (Moultrie *et al.* 2008). For example, Bongaarts (2006) characterises a fertility stall as occurring when fertility either did not decline, or even increased between successive surveys, for countries in the mid-transition stage (Bongaarts 2006), that is where total fertility is between 2.5 and 5 children per woman.

Moultrie *et al.* (2008) employ a different approach by considering the definition that involves four criteria earlier proposed by Gendell in 1985 and 1989 (Moultrie *et al.* 2008). For a country to have experienced a fertility stall, four conditions should be met: First, a country's fertility rate should be about a fifth lower than it was before the onset of fertility transition. Second, for a fertility stall to be established a country's fertility "decline should have been fairly rapid – of the order of at least 0.15 (and preferably 0.25) of a child per woman per year for at least five years" (Moultrie *et al.*, 2008: 40). Third, the fertility stall reflected in no change in fertility levels should prevail for a period not less than four years and last, the current fertility of the country in question should be higher than the estimated replacement fertility level. According to Moultrie *et al.* (2008), for a fertility stall to be established (in addition to the four requirements advanced by Gendell), it "would require a statistically significant difference in the rate of fertility decline over two time periods – with each period greater than or equal to five years' duration but not necessarily of the same length" (Moultrie *et al.*, 2008: 40). However, despite differences in approaches employed, all definitions point to the underlying interruption in fertility transition in countries that have already begun their fertility transition (Bongaarts 2006; Moultrie *et al.* 2008; Schoumaker 2008).

Fertility stalls that have been documented in some sub-Saharan African countries have taken on different forms. For example, available evidence from the Demographic and Health Surveys (DHSs) points to stalls in fertility decline in Ghana and Kenya at the national level (Garenne 2008). Other studies have observed fertility stalls in particular sub-populations, characterised by educational attainment, or place of residence (Ezeh *et al.* 2009).

Several explanations for the observed African fertility stalls have been proposed. While analysing the possible causes of a fertility stall in Ghana and Kenya, Bongaarts (2006) observes that a decline in demand for modern contraception and decreasing, or slow, economic development could have led to these stalls. Similarly, socio-economic development as measured by the level of women's education, infant and child mortality, and Gross Domestic Product (GDP) has been

identified as a possible cause of fertility stalls in some sub-Saharan African countries (Shapiro and Gebreselassie 2008). In Kenya, an investigation of the possible causes of a fertility stall between 1998 and 2003 concluded that a decline in the use of modern contraception among less educated women, and among younger women could have led to the stalling (Westoff and Cross 2006). In other studies (for example Moultrie *et al.*, 2008) that tried to search for possible reasons for fertility stalls in some rural parts of sub-Saharan Africa, researchers have observed that a shift from using more effective to less effective methods of contraception among areas with high HIV/AIDS prevalence (for example from hormonal to barrier methods) could account for the stalls.

In searching for possible causes of fertility stalls in developing countries, Bongaarts (2006) concludes that there was not enough evidence to support the claim that fertility stalls are a result of declining uptake of modern contraception. In their study of fertility transition in sub-Saharan Africa, Shapiro and Gebreselassie (2008) also do not find any significant evidence between changes in the use of modern contraception and fertility levels. Westoff and Cross (2006) also state that no comprehensive explanation is currently available for the apparent stalls observed in some countries. Further, the suggestion that a decrease in economic development could be the cause of fertility stalls in some countries has also not yet been proved (Schoumaker and Tabutin 2008).

However, some studies (for example, Bongaarts (2006), Moultrie *et al.* (2008), and Schoumaker (2008)) have on the other hand pointed to the possible data errors that might have led to misidentification of stalls. Although Schoumaker (2008) found cases of stalling fertility using DHS data in nine countries (Benin, Cameroon, Ghana, Guinea, Kenya, Mozambique, Nigeria, Rwanda, and Tanzania), he argues that the observed stalls may result from two data quality problems: sample composition, from which the fertility rates are estimated and omission, or displacement of births prior to the survey. He explains that cases of high, or overestimation of, fertility are likely to happen if for example, educated women are underrepresented in the sample to be used for the estimation of fertility rates. By contrast, if a significant number of births are omitted, or displaced (either by interviewers or respondents who may not be willing to disclose the number of deceased children among other reasons) for a specific period before the survey, there is likely to be an underestimation of fertility rates (Schoumaker 2008).

2.1.3 Lengthening birth intervals

The third component characterising African fertility transition is lengthening birth intervals (Timæus and Moultrie 2008; Moultrie *et al.* 2012; Timæus and Moultrie 2013). The authors suggest that in addition to spacing and limiting, women also use contraception to postpone births, leading to lengthening birth intervals. Indeed, longer birth intervals in sub-Saharan Africa than in Asia, or Latin America have been offered as a description of African fertility transition (Bongaarts and

Casterline 2013). This suggests a different fertility transition path in Africa. Notwithstanding, the main implication for this kind of fertility transition as pointed out by Timæus and colleagues is the current decline in fertility is likely to be an artefact of lengthening birth intervals. Consequently, as a result of lengthening birth intervals due to the postponement of births, a slow, or even stalled fertility transition may occur in the future (Timæus and Moultrie 2008; Moultrie *et al.* 2012).

These three considerations suggest that the African fertility pattern is likely to follow a path different from that of Europe (Johnson-Hanks 2007; Moultrie *et al.* 2012). Caldwell *et al.* (1992) also hypothesised that African fertility decline is likely to follow a different pattern from that experienced elsewhere in Asia and Latin America. The authors observe that unlike in Africa, fertility transition was limited among women less than 25 years, with fertility decline concentrated after age 40 (Caldwell *et al.* 1992). On the contrary, Caldwell *et al.* (1992) observe that fertility decline in Botswana, Kenya, and Zimbabwe was occurring at all ages and parities.

Johnson-Hanks (2007) argues that African societies have a different set of ideas, social organization and cultural institutions from European countries which in turn affect their fertility. She reasons from her qualitative work that the models designed to explain European fertility decline do not apply in African contexts. Moreover, the theoretical fertility models applied to Africa typically fail to incorporate the uncertainties observed in the daily lives of African women (Johnson-Hanks 2005). Thus, Johnson-Hanks writes, it would be misleading to compare fertility transition in Africa with those in Europe. Couples' fertility intentions in Africa and their reproductive outcomes are different. For example, men in Europe married when they had access to land, marriage was relatively late for both men and women and marriages were monogamous. In contrast, life in Africa is uncertain and unstable. People are not assured of jobs, salaries, social services, such as transport, accommodation, food, hospital services, and fuel. Moreover, high rates of child morbidity and mortality make it harder for couples to predict accurately their desired family size. Thus, couples are less likely to pursue the idea of using contraception to limit childbearing. In a summarised version, Johnson-Hanks writes:

the point is not that these women are careless, but that their reproductive action responds to conjunctures that emerge – often unpredictably – over time (Johnson-Hanks, 2007: 1038).

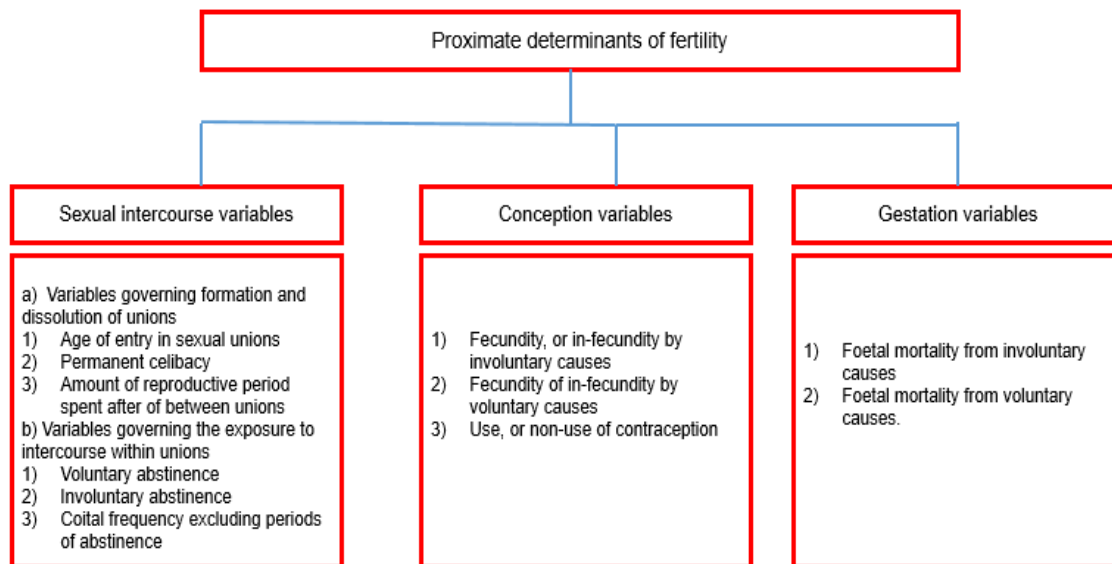
The discourse regarding the patterns of African fertility, and the evidence presented above from the literature, suggest that Africa is following a fertility regime different from that experienced in Europe, and other developing regions of the world. To reiterate, the African fertility pattern is characterised by a slow fertility transition, fertility stalling, and lengthening birth intervals, which three characterisations may largely be as a result of uncertainty. However, birth intervals are

likely to lengthen further as adoption of modern contraception increases. Despite the hardships African women find themselves in, Johnson-Hanks (2007) notes that the use of modern contraception to space births is more important than to stop births. The implication of this practice points to a slow fertility transition, despite an increase in the use of modern contraception.

2.2 Proximate determinants of fertility

Davis and Blake (1956) proposed eleven variables which directly affect fertility. They highlight three broad categories they termed “intermediate variables” through which social forces work to affect the reproduction process namely, sexual intercourse, conception, and gestation (Davis and Blake 1956). Each of these variables play a role in influencing fertility outcomes. The systematic categorisation is as shown in Figure 2.2.

Figure 2.2 Proximate determinants of fertility



Bongaarts reduced Davis and Blake’s schema to “a small number of conceptually distinct and quantitatively important intermediate fertility variables” (Bongaarts, 1978: 106). Bongaarts refined the eleven intermediate factors into four intermediate fertility factors he called the primary “proximate” determinants of fertility. These are the proportion of people married, contraceptive use, induced abortion, and postpartum infecundability (Bongaarts 1978). According to Bongaarts, the four primary proximate determinants of fertility are the most important direct factors that can affect fertility, whereby a change in one would directly affect fertility, keeping other intermediate factors constant.

Although we acknowledge the contribution of the proximate factors in determining fertility decline, contraception plays the most significant role of influencing fertility declines (Robey *et al.* 1993). This is because, as contraceptive adoption increases, the proportion using contraception

becomes the most significant proximate determinant that influences fertility transition (Szreter 1993). This aspect is discussed further in the next section.

2.2.1 Contraception as the most important factor of fertility decline

Seltzer (2002) has defined contraception as the deliberate effort to prevent conception by any method.⁶ Contraception is considered the primary determinant in predicting fertility outcomes in sub-Saharan Africa (Dodoo and Tempenis 2002), because populations with a high contraceptive prevalence rate have registered lower rates of fertility than populations whose contraceptive prevalence rate is still low. Moreover, effective use of contraception reduces the occurrence of unwanted or mistimed pregnancies.⁷

Further, effective use of modern contraception increases the age at childbearing, and inter-birth durations (Caldwell *et al.* 1992; United Nations Population Division 2015). Continued use of modern contraception leads to a reduction in maternal mortality thereby improving women's health, through a reduction in the number of children a woman bears, and an increase in birth intervals (Miller and Babiarz 2016). Child spacing through the use of modern contraception has also been observed to reduce infant and child mortality (Ahmed and Mosley 2002).

2.3 Changes in understanding of family planning programmes

Family planning refers to any “conscious effort of couples or individuals to control the number and spacing of births” (Pressat 1985). The conceptualisation of family planning programmes has changed over time. The first major contribution to the understanding of family planning programmes arose from the KAP (Knowledge, Attitude, and Practices) studies conducted in the 1950s. The information collected in these studies was regarded as vital in the development of family planning programmes especially in developing countries (Westoff 1988). This is because the information gathered could be used to identify categories of women with either a desire to limit or space births but who were not using any method of contraception (Bongaarts and Bruce 1995).⁸ Such information provided a basis through which family planning programmes could be strengthened to help women to achieve their desired family size, especially in Asia (Casterline and Sinding 2000), but also help to inform policy necessary for reducing high rates of population

⁶ However, given the high failure rate associated with the use of traditional methods (Ali and Cleland 2010a; Polis *et al.* 2016a), this thesis downplays the contribution of traditional methods to reducing fertility, and focuses more on the use of modern methods to influencing fertility decline.

⁷ Bongaarts and Casterline (2013) offer a distinction between the two: mistimed pregnancies occur before a woman completes her desired family size, while unwanted pregnancies occur after women have achieved their desired number of children.

⁸ Jain (1999) observes that in the 1970s, the gap between knowledge about modern contraception and use was used to identify unmet need for family planning before the definition underwent several subsequent changes.

growth (Demeny 1975). Consequently, the family planning movement became more popular in developing countries in the 1960s.

Using KAP studies in Taiwan and fertility studies in the United States, the phrase “discrepant behaviour” was coined to describe the discrepancy between fertility preferences and contraceptive use (Robey *et al.* 1996). The data from the KAP studies pointed to a “KAP gap” – the mismatch between the ideal and realised family sizes – because couples were not using effective contraception to achieve their desired number of children. However, Demeny (1975) observes that the discrepancy between actual use of, and the desire for using, modern contraception may be explained by not having adequate family planning services in place. The analyses from the KAP studies indicated that many couples wanted fewer children than they had (Seltzer 2002). Related to this, other terms such as “unmet need” were also coined to highlight the discrepancy between a woman’s fertility preferences and her contraceptive use. A high number of mistimed pregnancies is attributed to limited, or non-use of effective modern contraception, which delays further decline in fertility (Bruce 1990).

Despite the contribution of KAP studies in highlighting the demand for family planning services, Demeny (1975) observes that adoption of modern contraception is likely to be mediated by other social norms, which were not investigated by KAP studies. For example, women’s fertility is likely to be influenced by interests from other family members such as mother-in-law, husband, or even people in the community where she lives. However, in order to increase the demand for using modern contraception, Demeny (1975) suggests two interventions: (i) reducing costs of family planning services; and (ii) providing incentives to users of permanent methods.

2.3.1 Met and unmet need for family planning

In order to achieve wider coverage of family planning services, there was need to make the promotion of family planning programmes key national development programmes. For example, it is evident that at the three main international population conferences, promoting the relevance of family planning programmes and to reduce unmet need among other topical issues became important.

The first international call for the promotion of family planning programmes, and avoiding unwanted, or mistimed pregnancies was made at the first International Population Conference held in August 1974 in Bucharest, Romania, under the auspices of the United Nations (Mauldin *et al.* 1974). Similarly, among other challenges to national development especially in developing countries, the 1984 International Population Conference held in Mexico City also observed that there was high unmet need for family planning, and thus, the call to promote the reproductive health sector became important (Brown 1984). The 1994 International Conference on Population

and Development (ICPD) held in Cairo, also made a strong commitment spearheaded by the international community to improve women's reproductive health and increase access to family planning programmes (DeJong 2000).

Under the Millennium Development Goals (MDGs), which provided a framework for global development initiatives between 2000 and 2015, reducing the unmet need for contraception fell under Goal Five – which sought improved maternal health and increased access to modern contraception. With the new Sustainable Development Goals (SDGs, which cover the period from 2015 to 2030), universal access to sexual, reproductive health and family planning by 2030 is under Goal Three whose main objective is to achieve good health and wellbeing for all (United Nations Statistical Commission 2016). These goals are in line with the primary outcome of the London Summit on Family Planning that took place in 2012, which set a target of ensuring that every woman in the world can access modern contraception by the year 2020 (FP2020) (Castle and Askew 2015). In order to achieve this target, the 2012 London Summit on Family Planning proposed that recruiting additional 120 million non-users of contraception in the 69 world's poorest countries by the year 2020 would be in line with providing every woman with access to modern contraception (Brown *et al.* 2014; Family Planning 2020 (FP2020) 2017).

Since its inception, the term 'unmet need' has become a standard measure in demographic research used to track trends in contraceptive prevalence, to design family planning programmes, and to monitor progress in achieving universal access to modern contraception (Westoff 2012). In its original definition, the term unmet need included sexually active women who were married, or in consensual unions, and who wanted to use contraception to achieve their desired number of children but were not using effective contraception. These women would either wish to space, or stop, further childbearing (Westoff and Pebley 1981; Westoff 1988; Shah *et al.* 2004).

Bradley *et al.* (2012) observe however, that the conceptualisation and definition of the term 'unmet need' has changed over the years, although these changes have not been reflected, or implemented uniformly across all surveys. For example, the original measurement was more concerned about spacing, or limiting, births among married women (Westoff and Pebley 1981; Nortman 1982); but later ideas about incorporating unmarried women, and women who have experienced contraceptive method failure and mistimed pregnancies were proposed to be included in the measurement of unmet need (Dixon-Mueller and Germain 1992).

Unmarried women were included in the measurement of unmet need to offer policy makers a more complete picture of women (including adolescents) in need of contraception. For instance, Ross and Winfrey (2002) estimated that about 16 percent of unmarried women in sub-Saharan Africa in 2000 had an unmet need for contraception. Dixon-Mueller and Germain (1992)

have also argued that earlier measurements produced misleading estimates by excluding many women in need of contraception to achieve their desired family size. For this reason, Ross and Winfrey (2002) have suggested that there is need for a more comprehensive definition of unmet need (Ross and Winfrey 2002). The need to come up with a revised definition of unmet need arose because the current definition led to inconsistencies when comparing countries over time. Inconsistencies were due to different data, or different questions. Moreover, Bradley *et al.* (2012) observe that the calculation of unmet need for family planning was not the same in all DHS which even makes comparability among surveys but within the same country difficult.

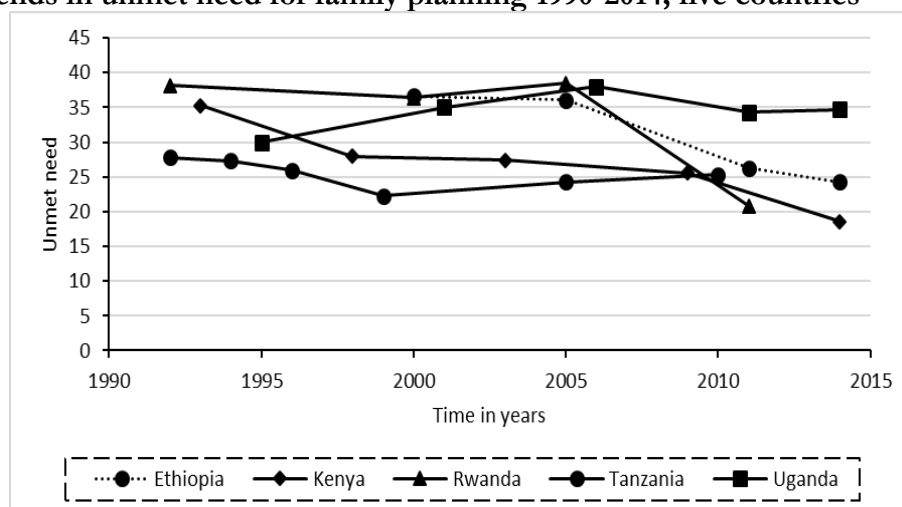
The recently suggested update of the concept of unmet need has been described by Bradley and colleagues (Bradley *et al.* 2012). In harmonising the inconsistencies in reporting and estimation of unmet need, the definition does not make use of calendar data in estimating unmet need. The main reason for excluding calendar data is because not all countries, or surveys collect contraceptive use retrospectively by month and year – thereby making comparisons across countries with time hard. Further, in order to reduce its complexity, it was resolved that the postpartum period be reduced from five years incorporated in the original definition to a period of not more than two years. Whereas infecund women irrespective of their marital status were included in the original definition, the new definition suggests this condition to be limited to only women who reported to be currently married at the time of the survey. When the new definition was applied to 169 DHS surveys from 70 countries, the authors observe that the new definition produces slightly higher estimates of unmet need when compared to the earlier definitions but with similar trends in the unmet need for family planning (Bradley *et al.* 2012) – implying that unmet need for family planning appears to have been underestimated with earlier definitions. Although unmet need for contraception has remained at high levels in developing countries (Brache *et al.* 2013) – because fewer women are using a form of modern contraception (Creanga *et al.* 2011; Darroch *et al.* 2011), current high levels of unmet need for family planning have also been attributed to the increase in population size (Darroch and Singh 2013). An analysis of the Demographic and Health Survey (DHS) data in 35 developing countries (Khan *et al.* 2007) concluded that although contraceptive use has increased over the years, with a reduction in the proportion of women with unmet need for contraception, sub-Saharan Africa remains with high rates of unmet need for family planning (United Nations Population Division 2015). An examination of percentage annual rates presented in Table 2.1 show an increase in modern contraceptive use over time in the countries under study.

Table 2.1 Annual rates of change in fertility and modern contraceptive use, five countries

Country/ Year of DHS survey	Total Fertility Rate (TFR)	Modern Contraceptive Prevalence Rate (MCPR)	Annual decline in TFR (%)	Annual increase in MCPR (%)
Ethiopia 2000	5.9	6.3	1.7	15.1
Ethiopia 2005	5.4	13.9	2.1	11.9
Ethiopia 2011	4.8	27.3	0.8	4.9
Ethiopia 2016	4.6	35.0		
Kenya 1989	6.7	17.9	5.2	10.1
Kenya 1993	5.4	27.3	2.8	2.9
Kenya 1998	4.7	31.5	-0.8	0.0
Kenya 2003	4.9	31.5	1.1	4.0
Kenya 2008/09	4.6	39.4	3.0	5.5
Kenya 2014	3.9	53.2		
Rwanda 1992	6.2	12.9	0.8	-10.1
Rwanda 2000	5.8	5.7	-1.1	12.7
Rwanda 2005	6.1	10.3	3.8	35.6
Rwanda 2007	5.5	27.4	6.3	17.6
Rwanda 2010	4.6	45.1	2.2	1.3
Rwanda 2014/15	4.2	47.5		
Tanzania 1991/92	6.2	6.6	1.4	14.8
Tanzania 1996	5.8	13.3	1.1	7.8
Tanzania 1999	5.6	16.9	-0.3	3.3
Tanzania 2004/05	5.7	20.0	1.0	6.0
Tanzania 2010	5.4	27.4	0.7	2.7
Tanzania 2015/16	5.2	32.0		
Uganda 1988/89	7.4	2.5	1.1	17.5
Uganda 1995	6.9	7.8	0.0	15.0
Uganda 2000/01	6.9	18.2	0.5	-0.3
Uganda 2006	6.7	17.9	1.5	7.2
Uganda 2011	6.2	26.0	2.8	5.9
Uganda 2016	5.4	35.0		

Source: Measure DHS (The Demographic and Health Survey Programme)

However, using estimates from the 2015 UN Population Division database, we observe that unmet need for family planning is still high in the countries under study (Figure 2.3). Although there are signs of a decline particularly in Kenya and Rwanda, Uganda remains with the highest levels, with a significant gap between it and the second highest (Ethiopia).

Figure 2.3 Trends in unmet need for family planning 1990-2014, five countries

Source: United Nations Population Division (2015)

2.3.2 Debates around provision of family planning and method mix

This section examines the importance of method mix in the provision of family planning services, and how method mix can influence method adoption. Further, this section also assesses the importance, and effect, of contraceptive information exchange on contraceptive adoption.

2.3.2.1 *The importance of method mix; and why it matters*

Sullivan *et al.* (2006) define a method mix as a percentage distribution of contraceptive methods by users. Although in practice there is no recommended standard method mix suitable for the provision of family planning services (Sullivan *et al.* 2006), a method mix can be used as a proxy for the measurement of contraceptive method availability, quality, or method choice (Bertrand *et al.* 2014). Despite no contraceptive method being regarded as the best at meeting the reproductive needs of all couples (Ross and Hardee 2013; Ross and Stover 2013), there is a likelihood of a significant proportion of the population using a specific contraceptive method which could be one, or two methods, either because it is the only contraceptive method available, or because of historical, or cultural, reasons. This situation is referred to as method skew – where at least 50 percent of the population are using a specific contraceptive method (Ross *et al.* 2015).

Bulatao (1989: 281) proposes four main factors (four C's) that are likely to influence the choice of contraceptive methods: contraceptive goals; contraceptive access; contraceptive competence; and contraceptive evaluation. Contraceptive goals describe the motivation for choosing a specific contraceptive method such as limiting vs spacing births. Contraceptive access involves the ability to obtain and afford the available, or desired contraceptive method. Contraceptive competence looks at the ability to understand and having the knowledge of how a specific contraceptive method works, and how it can be used and last, contraceptive evaluation is the ability of users to apply judgement in choosing and using a contraceptive method (Bulatao 1989).

Individuals are encouraged to choose contraceptive methods that best suit their reproductive preferences. However, some of the likely causes of method skew as identified by Sullivan *et al.* (2006) are cultural preferences, regulated population policies, limited range of contraceptive methods, provider bias, history of contraceptive method use, population knowledge of the available contraceptive methods, motivation for use of contraception, religious beliefs, and individual, or couple preferences.

Method skew can be used as a proxy measure of quality in the provision of family planning services (Bertrand *et al.* 2000), as it highlights a range of available methods within a population. An improvement in the quality of family planning service provision is likely to result in a bigger clientele base that adopts contraception and ensures continuity of use (Jain 1989; Bruce 1990).

Some of the benefits of using method skew as a proxy measure of quality are its simplicity to comprehend and apply, and its comparability across time and space. However, method skew offers little information as to why one dominant contraceptive method is preferred to others, or if a high proportion of users of a particular contraceptive method implies satisfaction – a limitation in monitoring family planning service delivery (Sullivan *et al.* 2006).

Ross *et al.* (2015) note that an unbalanced method mix can be a limiting factor in terms of contraceptive continuation, or switching.⁹ Therefore to ensure better service delivery and consumer satisfaction, users of contraception ought not to be limited by choice of contraceptive methods but also should be provided with sufficient information about available contraceptive methods (Ross *et al.* 2002). Jain (1989) argues that family planning programmes need to ensure that all categories of women, or couples are catered for. For example, spacers, or limiters should be able to use methods of their choice. Similarly, women, or couples in favour of hormonal, or non-hormonal methods should also have the freedom to determine their preferred method.

Thus, many researchers have argued that providing more contraceptive methods, and promoting underutilised contraceptives not only improves the method mix but also increases the proportion of people using contraception (Ross and Hardee 2013; Ross and Stover 2013; Mbizvo and Phillips 2014; DeGraff and Siddhisena 2015; Ross *et al.* 2015). Using data carried out at the Human Reproduction Research Centres (HRRC) in India, Baveja *et al.* (2000) also observe that making more contraceptive methods available to users increase contraceptive use (Baveja *et al.* 2000). Seiber *et al.* (2007) came to the same conclusion when they assessed contraceptive method availability in Turkey and rural Kenya. In both cases, the authors note an increase in contraceptive use with additional contraceptive methods available to the population (Seiber *et al.* 2007).

2.3.2.2 *Family planning information exchange*

Indicators that measure the quality of care in the provision and use of family planning services offer insights into how women use contraception, the challenges they face in accessing modern contraception, and the reasons for non-continuity in use (Jain 2016). One such indicator suggested by FP2020 is family planning information exchange, a measure of quality in the provision of family planning services (Family Planning 2020 (FP2020) 2017).

Family planning information exchange measures the amount of information given to users of modern contraception on the availability of modern contraception, potential side effects, and how to manage them, with an index ranging from 0 to 100. RamaRao and Jain (2016) argue that

⁹ Ross *et al.* (2015) note that whereas an unbalanced method mix may point to poor provision of family planning services and limited choice, such a phenomenon is likely to happen in populations of both high and low contraceptive prevalence rates.

family planning information exchange is a powerful indicator of measuring quality in the provision of family planning services, as it reflects the transmission of information to users of what contraceptive methods are available and the side effects associated with using such methods. Such information is helpful in designing new approaches that aim to increase method choice, to understand and meet client's needs, to provide correct information needed for managing side effects, and to provide a platform that promotes continuous use of modern contraception.

Whereas family planning programmes have succeeded at increasing coverage in the use of modern contraception in the developing world, particularly in sub-Saharan Africa, challenges related to continuous use of modern contraception, and achieving universal coverage remain pertinent. In order to address such problems, family planning programmes need to consider approaches that incorporate the quality dimension in the provision of family planning services. Programmes that aim to improve and maintain the quality in the provision of family planning services are likely to benefit from continuous use, and even recruit new users of modern contraception. The health systems aspects of family planning programmes are considered in Section 2.4 below.

However, despite the possible positive contribution of family planning information exchange to measuring quality in the provision of family planning services, the indicator faces four major limitations: First, the indicator faces a selection bias, where it makes use of information from only current users of modern contraception. The implication of this is that the views of non-current users of modern contraception are not captured. This limits our understanding of the challenges they faced with using a particular contraceptive modern method before they stopped. Second, the indicator is not free from a recall bias that may result from failure of current users of modern contraception to remember and accurately report all the information required to estimate the index. Third, there is a possibility of a desirability bias to occur, as current users of contraception choose to provide only information they wish the interviewer to hear, and last, information reported by current users of contraception may not exactly be the information given to them by family planning service providers, but rather information from other sources such as the media, or even friends (Jain 2016).

2.4 Public health aspects of contraception and family planning

This section examines the provision and resourcing of family planning programmes in sub-Saharan Africa. Further, this section presents an overview of the models employed in delivering family planning services.

2.4.1 Provision and resourcing of family planning programmes

Provision of contraception is not an entirely monopolised affair in most sub-Saharan African countries, with both private and public institutions playing a role in the provision of contraception. Yet, in most cases, it is public institutions that pioneered the provision of family planning services. There are two reasons that could account for the emergence of private institutions: First, there was need to increase service delivery, coverage, and distribution of family planning services. Second, some governments lacked strong programmes, and political will to promote the provision and use of family planning services. Public provision of contraception mean that services can be obtained from government hospitals, health centres, dispensaries, or government family planning clinics. By contrast, private providers of contraception include all services obtained from private health practitioners, mission hospitals, private hospitals and clinics, pharmacies and non-government organisation offices (Prata *et al.* 2005).

With the introduction of family planning programmes, sub-Saharan African countries realised the need to set up national family planning organisations, or associations, with help from international organisations to manage the provision and distribution of family planning services in their respective countries. Promotion of family planning services was later entrenched in National Population Policies (NPP), which were adopted after the initiation of family planning programmes. For example in East Africa, family planning associations were regulated by Ministries of Health (MoH) that offered guidelines in providing quality family planning services in their respective countries (Ministry of Health 2000; Mukasa 2009; Federal Democratic Republic of Ethiopia 2011).

Elsewhere, in Ghana, family planning clinics were part of the maternal and child health services regulated by the Ministry of Health (Tawiah 1997). With these programmes in place, the government was the sole provider of family planning services, which targeted only married women. Further, most public institutions responsible for the provision of family planning programmes were situated in urban areas (Prata *et al.* 2005), a pattern that continues to the present day.

However, use of public institutions has declined in other developing regions such as South-East Asia although there is no discernible pattern in sub-Saharan Africa (Khan *et al.* 2007).¹⁰ The failure for governments such as in Kenya and Uganda to provide a strong commitment towards the implementation of family planning policies in the early stages when family planning programmes had just been rolled out, affected service coverage and quality in provision of modern contraception (Bongaarts 2011; 2014). Cleland *et al.* (2006b) also observe that despite family

¹⁰ Prata *et al.* (2005) observe that although the private sector is playing a significant role in the provision of family planning services in most developing countries, government institutions have not been keen on supervision, regulation, and accreditation of the services provided by the private sector.

planning policies being in place in most countries in sub-Saharan Africa, there is a lack of a political will to implement these policies effectively, because of either limited funding, or governments not being encouraged to promote use of them. Although both the public and private sectors' aim is to provide family planning services, institution service provision tends to differ by the type of contraceptive method. For example, Lebetkin *et al.* (2014) observe that in Ghana, clinical methods were mostly offered in public institutions whereas private institutions offered more of non-clinical methods.

In Uganda, Prata *et al.* (2005) observe that access to family planning services provided by the private sector was not determined by one's socioeconomic background. Khan *et al.* (2007) also observe that differences in the use of private providers by background characteristics were negligible, although they noted that women with fewer children, and those who reported to be living in urban areas, the educated, wealthy, and women who reported to be exposed to the media were more likely to use private providers. Yet this pattern was reversed among Malawian women by the type of place of residence.

Although both public and private providers are present in nearly all countries, previous studies (Prata *et al.* 2005; Khan *et al.* 2007) observe that in aggregate terms, there is no clear pattern in terms of who provides the most family planning services in sub-Saharan Africa.

2.4.2 Delivery models of family planning

In order to increase contraceptive use, countries adopt health service systems to ensure efficiency in provision. However, the health care service delivery models may differ between countries, or may change over time. For example, at the time when family planning programmes had just been introduced in sub-Saharan Africa, the top-down and bottom-up approaches were the two most commonly used delivery models.

Under the top-down health care system, governments take responsibility for regulating the provision and quality of services provided by health care service providers. This can be done through setting standards, supervision and monitoring. Although there has been changes in delivery models in countries over time, Caldwell (1994) observes that the top-down approach was popular in the Eastern and Southern African countries in the early stages of family planning service provision. On the other hand, under the bottom-up approach, consumers make choices about where to get health care services, based on the information provided to them. This approach encourages health care service providers to maintain, or offer high quality health care services (Mukamel *et al.* 2014).

However, in the quest to achieve wider coverage, family planning programmes encountered challenges, which inhibited successful service provision – motivating a change in

service delivery models. Previous studies (Hoke *et al.* 2012; Lebetkin *et al.* 2014; Malkin and Stanback 2015; Ndayizigiye *et al.* 2017; Tsui *et al.* 2017) have observed that limited skilled personnel, long distances between the place of residence and health facility, high discontinuations, failure of family planning providers to provide necessary and required information regarding the use of family planning services, and inaccessibility are some of the major contributing factors to low contraceptive use in sub-Saharan Africa.

Although current estimates from DHS surveys indicate increasing numbers of women adopting contraception, particularly the injectable (Measure DHS 2017), access remains limited in most rural areas of sub-Saharan Africa. Provision of modern contraception is observed to be mostly confined to clinical settings (Prata *et al.* 2013a). As a result, family planning programmes needed to come up with innovative ways – new delivery models – to increase access to family planning services, by taking family planning services closer to the people (Tsui *et al.* 2017), and training clients on how to self-administer some clinical methods (Cover *et al.* 2017).

In a number of countries in sub-Saharan Africa, community-based health service provision was introduced as a family planning health delivery service system. Community-based health service provision includes Community Health Workers (CHWs), licensed drug shops, or registered medicine vendors. Community health workers are people who in most cases do not have formal clinical training but confined to work outside of health facilities to deliver family planning services mostly in areas where they live. On the other hand, licensed drug shops sell family planning products but mainly those that may not require prescription (Malkin and Stanback 2015).

Tsui *et al.* (2017) observe that since the 1990s countries in sub-Saharan Africa have tended to emphasise the use of community-based service provision as a family planning health delivery model. This is because pilot studies that sought to understand the contribution of community-based service provision in the utilisation of modern contraception indicated that the use of family planning services were higher in areas where community health workers operated (Hoke *et al.* 2012). For example, in rural Mali, contraceptive use was observed to increase from 1 percent to 31 percent among 2,551 women that were recruited in a community-based contraceptive distribution programme (Katz *et al.* 1998). A study of 1,739 clients that have never used family planning services in Zambia also revealed that clients were more likely to accept the use of contraception distributed by community health workers as 85 percent of them started using the injectable

(administered to them by CHWs), while 13 percent used the pill, and 2 percent used the condom (Chin-Quee *et al.* 2013).¹¹

Malkin and Stanback (2015) also observe that contraceptive use increased in areas where community health workers provided family planning services in Ethiopia, Kenya, Nigeria, Tanzania, Uganda, and Zambia. According to Hoke *et al.* (2012), community health workers are helpful in the distribution of non-prescribed family planning products such as the pill, condom, but also encourage clients to visit health facilities should they need clinical services (such as sterilisation, IUD or Norplant) they are unable to provide. For example, in Ghana, Lebetkin *et al.* (2014) observe that community-based service provision in form of drug shops increases access among users of modern contraception, particularly for women wanting to obtain non-prescribed contraceptives. The authors observe that about 75 percent of users of the pill and 54 percent of users of the condom receive them from drug shops (Lebetkin *et al.* 2014). In Uganda, 74 percent of family planning clients that receive services from drug shops reported to be satisfied with the service while 98 percent were more willing to obtain their injectable from a drug shop (Akol *et al.* 2014).¹²

Given the high proportion of women using the injectable in sub-Saharan Africa, family planning programmes took advantage of the community-based health service provision system to increase coverage in rural settings – and calls to promote the expansion of the injectable through the use of community health workers have been stressed (Stanback *et al.* 2010; Malarcher *et al.* 2011; Schivone *et al.* 2016). For example, pilot studies conducted in Kenya, Madagascar, Nigeria, and Uganda pointed to an increase in use, and acceptability of the injectable provided by community health workers (Hoke *et al.* 2012). Moreover, use of community health workers is reported to be less time consuming for both clients and service providers (Cover *et al.* 2014). In Uganda and Senegal, Cover *et al.* (2014) reported that community health workers were able to administer the injectable (Sayana Press) within less time and did not experience major challenges.

The literature suggests that different family planning delivery service models co-exist in sub-Saharan Africa, and all are likely to play a part in the provision of family planning services within the same country. However, there have been changes in service delivery over time since the

¹¹ Following a shortage of trained medical personnel in sub-Saharan Africa, the Zambia project aimed at adding the provision of the injectable to the list of usually non-prescribed modern family planning methods (such as the pill, condom) provided by community health workers in order to increase use of modern contraception. As part of the evaluation process, the project considered the safety of administering the injectable by CHWs, the practicability, and whether it can be acceptable by contraceptive users.

¹² As part of the campaign to increase wider coverage in the use of modern contraception, the project conducted by Akol *et al.* (2014) in Uganda, trained 139 private drug shops in four districts of Uganda on how to administer the injectable.

introduction of family planning programmes in sub-Saharan Africa. The reason for the change in service delivery models over time largely recognises the need to increase contraceptive use through expanding access and overcoming the challenges faced in providing family planning services. In particular, the introduction of the community-based health service provision system later-on was largely motivated by limited adoption of, and access to the use of modern contraception mostly in rural areas. The implication is that no single model is employed in the provision of family planning services. Although the East African countries under study (Ethiopia, Kenya, Rwanda, Tanzania, and Uganda) are at liberty to employ any health service model of their choice, the literature indicates that family planning programmes in the countries under study are adopting, encouraging, and promoting the community-based service delivery model in a bid to expand service provision and ultimately increase contraceptive uptake, particularly in disadvantaged settings.

2.5 Contraceptive use dynamics

This section discusses the rationale for studying contraceptive use dynamics, the history of its development, approaches to understanding the calendar, and an explanation of the main components that constitute contraceptive use dynamics. Further, this section gives a justification for focusing on contraceptive switching as an important reproductive health component that can promote consistent use and lead to reductions in unintended pregnancy. This section also reviews previous studies on contraceptive use dynamics, particularly in developing countries and ends with a discussion on the limitations of the use of calendar data.

2.5.1 Importance of studying contraceptive use dynamics

In the early stages when family planning programmes had just been introduced, the most important objective of such programmes was to ensure that women and couples plan for their desired family size, or limit births, by adopting a contraceptive method. The most important strategy employed by donors and funders of family planning programmes, as well as family planning implementers was to encourage non-users to start using a method of contraception. But as advocacy, promotion, and distribution of family planning services intensified, there was need for policy makers to track progress in meeting their objectives. Knowing how many people have adopted a modern contraceptive method was key in the process of evaluating the success and failure of family planning programmes. One such measure used to track progress in the use of modern contraception is the Contraceptive Prevalence Rate (CPR) which measures the proportion of women using a modern contraceptive method at a point in time. The CPR estimate allows for the study of trends in the use of modern contraception with time, thereby providing information on whether there is a decline, or an increase in the use of modern contraception.

However, the CPR is a cross-sectional estimate. Since it only captures information of women using a modern contraceptive method on the interview date, it omits women who have been using contraception for some time but who stopped before the interview. Yet, the time lag of about 4-5 years between surveys in each country makes it hard to study prevalence rates in close-to-real time. Further, other than just knowing the proportion of the population using a contraceptive method at a point in time, the CPR estimate does not provide the required information necessary to study contraceptive method adoption, discontinuation, failure, and switching dynamics prior to the survey interview date. In addition, the inability to identify and understand contraceptive continuation renders the CPR estimate limited in scope in understanding progress made in the provision of family planning programmes. Yet, understanding how women consistently use contraception may guide policy makers and programme managers on how we can avert mistimed, or unwanted pregnancies, other than continuing to recruit non-users of contraception to use for the first time (Jain 1999). With these shortcomings, there was need to devise alternative approaches of how best to study reproductive dynamics. Moreover, with an increase in the adoption of modern contraception, the study of women's reproductive dynamics became important, since they affect fertility outcomes (Steele and Diamond 1999).

The first major development in the study of reproductive dynamics emerged after an experimental reproductive calendar (commonly now known as a contraceptive calendar) was designed and first piloted in Peru in 1986 to collect information on monthly contraceptive use, pregnancies, and postpartum abstinence over a period of six years (Goldman *et al.* 1989a; 1989b). The main rationale of the study was to determine whether estimates of contraceptive use from the experimental study and those collected from the standard questionnaire were comparable. Goldman *et al.* (1989a; 1989b) concluded that the experimental study that collected information using a six-year monthly questionnaire on contraceptive histories generated more robust estimates compared to the use of the standard questionnaire. Moreover, an examination of the quality and consistency of the calendar by Goldman *et al.* (1989a), indicated perfect agreement of current contraceptive use in the Peru experiment (Goldman *et al.* 1989a). The calendar allowed for a thorough collection of complete episodes of contraceptive method use and non-use, pregnancies, terminations, births, and postpartum periods before the survey. Based on this, collecting information on contraceptive histories by year and month became part of the DHS standard questionnaire from the 1990s onwards, although collection of reproductive data at first was only limited to countries with a high contraceptive prevalence rate – before the idea was extended to most developing countries to include even those with a low contraceptive prevalence rate. However, it is important to note that the calendar is not included in all Demographic and Health

Surveys because depending on the country's data needs, the contraceptive calendar module can either be included in the questionnaire, or not (Croft *et al.* 2017).

Whereas the CPR continues to provide a cross-sectional estimate about the proportion of women using a modern method of contraception, calendar data allows estimation of contraceptive prevalence rates by month for an extended period before the survey. This provides a better understanding of the trends in contraceptive prevalence rates. Further, information collected in the calendar allows for the study of contraceptive use dynamics, such as when women adopted contraception, or when they stopped using a method, or when they switched between methods – which are important aspects in the evaluation of the provision of family planning services. The calendar data also allows us to identify terminated pregnancies that do not end in live births although failure to distinguish between whether a termination was spontaneous, or induced remains a limitation in the calendar.

Therefore, the calendar data provides an invaluable source of information that can be used to study contraceptive use dynamics, which is not possible with only the CPR estimate. Thus, the main motivation for focusing on the use of calendar data is underscored by two reasons: First, the need to study trends in the use of contraception by month and year, and second, the need to study the dynamics by which women adopt, abandon, switch, or experience contraceptive failure over time. Additionally, results generated from the study of contraceptive use dynamics can be used as potential pointers to unwanted fertility, induced abortions, quality in provision of family planning services, and client satisfaction of method (Bradley *et al.* 2009). This information is rich enough to guide the provision of reproductive health services, monitor progress and failure of family planning services, as well as policy formulation and implementation.

However, in order to understand how contraceptive use dynamics have varied in developing countries, particularly in sub-Saharan Africa, we review past studies that have utilised calendar data to examine the reproductive behaviour of women. This review follows in the next section.

2.5.2 Previous studies on contraceptive use dynamics

Most studies that have examined contraceptive use dynamics in developing countries have used the Demographic and Health Survey (DHS) calendar data, which is nationally representative of women of reproductive ages 15-49 years. The DHS calendar collects information retrospectively on contraceptive use (both modern and traditional), pregnancies, births, and terminated pregnancies (although there is no distinction made between induced and spontaneous abortions), for a period of at least five years before the survey.

The study of contraceptive use dynamics helps us to understand how users of reversible modern methods of contraception are likely to consistently use contraception, but also studies of

this kind are important indicators of quality in the provision of family planning services. However, earlier studies that used calendar data among countries with a high Contraceptive Prevalence Rate (CPR) observed that most users of reversible contraceptive methods were more likely to stop using a method within the first 24 months of use, and that this practice tends to cut across most women irrespective of their socio-economic status (Ali and Cleland 1995; Ali and Cleland 2010a; Jain and Winfrey 2017).¹³

Using DHS data from six developing countries with high contraceptive prevalence rates (Ecuador, Egypt, Indonesia, Morocco, Thailand, and Tunisia), Ali and Cleland (1995) note that about 30 percent of users in all countries stopped using a method after 12 months while about 50 percent of users had stopped using a method after 24 months. The estimates are consistent with results obtained from an in-depth analysis of 19 developing countries using DHS data by Ali *et al.* (2012). The authors report that the total country-estimate of discontinuation of reversible methods of contraception within 12 months was 38 percent while 55 percent had discontinued within two years (Ali *et al.* 2012).

However, previous studies (Blanc *et al.* 1999; Steele and Curtis 2003; Bradley *et al.* 2009; Curtis *et al.* 2011; Polis *et al.* 2016a) have observed discontinuations, or failure rates to be lower among users of LARCs than short-term methods such as the pills, or condoms. Although the use of LARCs is minimal for reasons such as weak systems that promote their use, the clinical nature of administration, and high service costs (Wickstrom and Jacobstein 2011), Bradley *et al.* (2009) reason that discontinuation of LACRs is lower than short-term methods because the removal of LARCs require the help of medical practitioners, a situation different from short-term methods.¹⁴ Another reason offered for continued use of LARCs is comfort since LARCs do not require occasional administration as short-term methods (Steele and Curtis 2003).

Polis *et al.* (2016a) report that failure rates within a year among users of the IUD (1.4) across 43 studied countries were lower than among users of the condom (5.4), injectable (1.7), and pill (5.5). Using calendar data from 15 Demographic and Health surveys, Blanc *et al.* (1999) observe discontinuations within a year due to side effects to be higher among users of short-term methods particularly the pill, ranging from 11 to 35 percent as compared to users of the IUD which ranged from 6 to 14 percent. Analysis of the 2015 Measurement, Learning and Evaluation (MLE) project

¹³ It is important to note that earlier studies on contraceptive use dynamics made use of the calendar module included in Demographic and Health Surveys only in countries with high Contraceptive Prevalence Rates (CPRs), before it became a standard module to be included in all DHS surveys.

¹⁴ Barden-O’Fallon and Speizer (2011) refer to discontinuations aided by medical personnel (clinical discontinuations) such as the removal of the IUD as “active” discontinuations while discontinuations where the user does not go back to the health facility for re-supply of contraceptive methods such as the injectable, pill, or the condom as “passive” discontinuations.

in urban Senegal also showed lower discontinuation rates among users of the implant (6.3 percent) and IUD (18.4 percent) compared to users of short-term methods such as the pill (38 percent), injectable (32.7 percent), and condom (62.9 percent) (Barden-O’Fallon *et al.* 2018). Results from a study of 23 developing countries that used DHS data observe that the average level of discontinuation among users of the injectable within 12 months was 36 percent, 29 percent among users of oral contraceptives compared to nine percent among users of the IUD (Ali and Cleland 2010a). This same pattern was observed in 19 developing countries by Ali *et al.* (2012), who found discontinuations of the injectable for reasons related to dissatisfaction to account for 35 percent in all 19 countries within a year compared to 13 percent among users of the IUD.

High discontinuations among users of short-term methods raises concern especially in sub-Saharan Africa, where in addition to fertility regulation, some users rely on short-term methods for reasons such as infrequent sex especially among young people (Chandra-Mouli *et al.* 2014; Sedgh and Hussain 2014), myths, misconceptions, or incorrect information (Williamson *et al.* 2009), and the desire to prevent sexually transmitted diseases as opposed to fertility regulation in the case of the condom, while majority are not using contraception. For example, using DHS data from 34 developing countries, Jain *et al.* (2013) report that sub-Saharan Africa had the highest percentage of discontinuers (27 percent) compared to other developing regions studied (16 percent). Moreover, the percentage of non-users of contraception among women with unmet need was also observed to be higher in sub-Saharan Africa (68 percent) compared to other developing regions (57 percent) (Jain *et al.* 2013).

Although a number of reasons can be offered for contraceptive discontinuations, Ali and Cleland (1999) observe that most discontinuations are as a result of side effects. The authors argue however, that differences in the level of counselling offered to users of reversible modern methods of contraception might explain the difference in discontinuations by side effects. This is because some users of reversible modern methods of contraception may receive more information on how to manage side effects from service providers than others (Ali and Cleland 1999). In a study that used 16 DHS calendar files, Bradley *et al.* (2009) also found out that method failure, or side effects constituted the highest proportion of discontinuations among women in need of contraception. For example, in Kenya, the increase in discontinuation rates from nine percent in 1998 to 14 percent in 2003 was attributed to an increase in the proportion of women who reported side effects as a reason for stopping use.

Side effects, or method dissatisfaction were also noted to be significant reasons for stopping use of oral contraception (pill) in 19 developing countries (Ali and Cleland 2010b). The authors observe that about 28 percent of discontinuations within a year were due to dissatisfaction,

or side effects as compared to 6.2 percent attributed to method failure, or 9.6 percent among women who want to have a child. Of the three sub-Saharan African countries (Kenya, Tanzania, and Zimbabwe) included in the study, Kenya had the largest proportion (32.8 percent) of discontinuations attributed to side effects, or dissatisfactions compared to Tanzania (25.1 percent) and Zimbabwe (7.9 percent) (Ali and Cleland 2010b).

Previous studies (Mumah *et al.* 2015; Barden-O’Fallon *et al.* 2018) that have focused on specific geographic, or settlement settings also observe side effects to be an important reason for discontinuations. Using data from Nairobi slums, Mumah *et al.* (2015) observe side effects to have been the highest contributor (50 percent) of all discontinuations among postpartum women. However, in addition to side effects, challenges related to accessing modern contraceptives by young women have also been reported to be reasons for stopping use (Blanc *et al.* 2009). Using DHS data from 21 developing countries, Blanc *et al.* (2009) attribute higher discontinuation of contraception among adolescents (25 percent higher than among older women) to challenges such as cost, embarrassment, fear, and lack of knowledge.

In order to promote consistent use, Ali and Cleland (2010a) have suggested switching between methods to be more promoted among populations that rely heavily on short-term methods as compared to those using LARCs. This is because only a small proportion of women are likely to use the same method throughout their reproductive lives (Grady *et al.* 2002). However, campaigns that seek to promote the use of LARCs have also been suggested as potential solutions to high discontinuations and unmet need (Wickstrom and Jacobstein 2011; Mumah *et al.* 2015).

Immediate switching of contraception can be used as an indicator of quality in the provision of family planning services (Bradley *et al.* 2009). This is because immediate switching of contraception may indicate that discontinuers receive counselling to consistently use modern contraception by switching between methods. Further, immediate switching may also imply adequate availability of different types of contraceptive methods to choose from (Steele and Curtis 2003). However, despite a high level of discontinuations among users of reversible contraceptives, Ali and Cleland (2010b) observe that switching between methods is less practiced among discontinuers – yet failure to promptly, or immediately switch exposes sexually active women to unintended pregnancies (Ali and Cleland 2010a; Jain and Winfrey 2017). Moreover, inconsistent use of contraception is also reported to be a cause for mistimed pregnancies (Glei 1999; Barden-O’Fallon *et al.* 2008; Curtis *et al.* 2011). For example, a study of six developing countries (Bangladesh, Dominican Republic, Kazakhstan, Kenya, the Philippines, and Zimbabwe) that used DHS data observed unintended births resulting from discontinuations to be higher than intended births in all countries (Curtis *et al.* 2011). The authors report that 50 percent of all unintended

births were as a result of delayed, or failure to switch contraception following stopping. This pattern is similar to results generated from the 1995 National Survey of Family Growth, that was conducted in the United States, that observed teenagers (15-19 years) who were not using contraception to be 12 times more likely to have an unintended pregnancy than their counterparts that were consistently using contraception (Glei 1999).

Moreover, limited switching is observed to be more prevalent in sub-Saharan African countries compared to other developing regions of the world (Ali *et al.* 2012). For example, Ali *et al.* (2012) observe that whereas 80 percent switched contraception within three months following stopping because of method related reasons in Moldova, Morocco, Turkey, and Viet Nam, less than 50 percent switched in all sub-Saharan African countries (Ethiopia, Kenya, Malawi, Tanzania, and Zimbabwe) considered in the study. Further, Ali and Cleland (2010b) observe that only 35 percent of the 28 percent that discontinued oral contraceptives due to dissatisfaction or side effects switched to another reversible modern method of contraception. Another study that used 14 Demographic and Health Survey (DHS) data in developing countries observed that only 50 percent of women who had discontinued the IUD for method related reasons switched within three months to another reversible method (Ali *et al.* 2014). These findings raise concern (such as receiving adequate information exchange) surrounding the switching behaviour of women among discontinuers.

In searching for explanations for the limited switching observed, previous studies (Ali and Cleland 2010b; 2010a; Jain *et al.* 2013; Ali *et al.* 2014) have cited limited choice of methods, unavailability of contraceptive methods, and poor quality in service provision, including counselling users of modern contraception to continuously use contraception to be reasons for less switching particularly among the less educated, the poor, and women living in rural areas. Ali and Cleland (2010b) report, however, that the level of women's education was a strong predictor of immediate switching following discontinuation of oral contraceptives. A similar conclusion was reached at by Barden-O'Fallon *et al.* (2018), who observed the level of education to be a significant predictor of switching in urban Senegal: women with formal education were 50 percent more likely to switch between methods following discontinuation than their counterparts with no formal education. This pattern was also observed among discontinuers of the IUD, where pooled country rate ratios indicated that more educated women (RR=1.47), those in the highest wealth quintiles (RR=1.38), and limiters (RR=1.35) were more likely to switch compared to their counterparts (Ali *et al.* 2014).

Ali and Cleland (2010b) reason that because better educated women are more knowledgeable about family planning programmes, more familiar with a number of contraceptive

methods, and service providers, they are more motivated to switch than less educated women. Although immediate switching among discontinuers of reversible methods is observed to be limited, Ali and Cleland (2010a) report from a study of 23 developing countries that utilised DHS data that most discontinuers switched to another reversible modern method of contraception after three months of stopping (45.6 percent) compared to those that switched to traditional methods (14.9 percent).

Moreover, the type of switching can also be used as a predictor of unwanted pregnancies. Ali *et al.* (2014) argue that women who switch to less reliable methods such as traditional methods are at risk of unwanted pregnancies. Bradley *et al.* (2009) observe that, on average, the age of a woman and parity emerged as consistent predictors of switching to either a less, or more effective method of contraception in eight countries. The authors observe that the likelihood of switching to either a less or more effective method of contraception was higher among women aged 15-24 years than those older than 24 years (Bradley *et al.* 2009). Similarly, switching to either a less, or more effective method of contraception was higher among women with one child compared to non-parous women. The reason for switching to a more effective method is obvious – as women may want a more effective method. However, Bradley *et al.* (2009) note that women who switch to less effective methods despite wanting more effective methods may reflect challenges in service quality, as these women may have not received appropriate counselling on the effectiveness of contraception by type of method. Steele and Curtis (2003) caution that the nature of switching largely influences reproductive health outcomes. That is, switching to less effective methods may result in more unintended pregnancies compared to switching to more effective methods of contraception. Immediate switching provides a better protection against chances of conceiving unwanted pregnancies, while delayed, or failure to switch rather increases the risk of unwanted pregnancies. Conversely, when discontinuers switch to other methods, it is likely to be due to either a better family planning system that offers a wide range of products, or it may be due to inadequate supplies of the first method, or poor advice on how to mitigate health concerns (Steele and Curtis 2003).

Three important conclusions emerge from previous studies. First, discontinuations happen among all users of modern contraception. However, although the reasons underlying discontinuations are varied across different populations, discontinuations among users of short-term methods are observed to be higher than among users of long-acting reversible contraceptives. The immediate implication for such a pattern is inconsistent use of contraception and possible unintended pregnancy, with risks to maternal or infant morbidity, or mortality (Barden-O’Fallon and Speizer 2011) – when the most used contraceptive methods (short-term methods) are the

most discontinued. As discussed earlier, reasons such as incorrect, or lack of information, the desire to prevent sexually transmitted diseases as opposed to fertility regulation, non-clinical nature of short-term methods that do not require the attention of medical experts are likely causes for high discontinuations among users of short-term methods of contraception.

Second, although a number of reasons are offered for why women discontinue use of a contraceptive method, a lot of evidence from the review points to side effects as a significant reason for stopping use. We note that this remains a challenge in the provision of family planning services; as service providers and family planning programmes need to ensure that users of contraception consistently use modern contraception to avoid unintended pregnancy.

Third, since discontinuations are likely to occur for reasons not related to wanting to have a child, immediate switching of contraception becomes an important aspect among discontinuers of contraception through which unwanted pregnancy can be avoided. A number of studies (Bradley *et al.* 2009; Ali and Cleland 2010b; 2010a; Barden-O'Fallon and Speizer 2011; Ali *et al.* 2012; Jain *et al.* 2013; Mumah *et al.* 2015; Polis *et al.* 2016a; Jain and Winfrey 2017) have emphasised the need to switch immediately to an effective contraceptive method among discontinuers to avoid unwanted pregnancy, and reduce unmet need. Steele and Curtis (2003) observe that since switching of contraception is a behavioural practice that involves decision making – unlike method failure – discontinuers of contraception can be encouraged and helped in making a decision to immediately switch or consistently use modern contraception in order to avoid unintended pregnancy. Otherwise, Jain and Winfrey (2017) argue that discontinuations are likely to increase as use of modern contraception increases, and if switching is not stressed, there is likely to be an increase in the number of unintended pregnancies.

Previous studies (Barden-O'Fallon *et al.* 2008; Blanc *et al.* 2009; Bradley *et al.* 2009; Ali *et al.* 2014; Polis *et al.* 2016a; Jain and Winfrey 2017; Barden-O'Fallon *et al.* 2018) have suggested improvements in quality among users of modern contraception, including counselling, providing the right information on the effectiveness of methods, and how to manage side effects, and improving method provision as solutions to inconsistent use. Jain and Winfrey (2017) suggest that in order to improve consistent use of contraception, information about contraceptive use should be given to users at the start of method use, and also when they go back to family planning service providers for additional contraceptive methods (on repeat visits). This is because failure to immediately switch after stopping may be influenced by past experience with contraceptive methods used before (Steele and Diamond 1999). Provision of information is essential to promoting consistent use since failure to provide the necessary information may rather limit immediate switching, despite different contraceptive methods being available (Modey *et al.* 2014).

For example, using qualitative data collected from Kampala and Mbarara districts of Uganda, Hyttel *et al.* (2012) observe that discontinuation of the injectable was largely due to the inability of service providers to provide appropriate information on how to manage side effects. The authors observe that service providers instead placed much emphasis on preventing unintended pregnancy compared to providing information to users of contraception on how to manage side effects that may arise from the use of modern contraception (Hyttel *et al.* 2012).

The literature review on contraceptive use dynamics adds clarity to our understanding of reproductive behaviour in developing countries, and sets the scene for the investigations carried out in this thesis. The findings from the literature point to higher discontinuation of short-term methods (relative to LARCs) which are largely precipitated by side effects. However, the literature calls for an improvement in quality of service provision and promotion of immediate switching following discontinuation as important solutions to avoiding unintended pregnancy. Given this background information, this thesis aims to examine consistent use, and transitions in use of contraception, predictors of immediate switching of contraception, and assessing the quality in the provision of family planning services among East African women in five countries. The results emerging from this set of investigations will provide a better understanding of the reproductive behaviour of East African women in the five countries studied. This information is also helpful to the understanding of fertility transition in the region. Given the theoretical importance of immediate switching of contraception to promoting consistent use and avoiding unintended pregnancy, it is important that reproductive health programmes prioritise immediate switching of contraception among all users of modern contraception. A justification for why it is necessary to study switching of contraception follows in the next section.

2.5.2.1 A case for studying switching of contraception

Switching of contraception refers to change of, or between different contraceptive methods.

Although calendar data offers the ability to analyse a number of contraceptive use dynamics, the principal focus of this research is to examine switching behaviour. Three considerations guide this decision. First, because family planning programmes have aimed historically to increase adoption of contraception, most research has tended to focus on why women stop use, or experience failure of a contraceptive method. In so doing, switching between contraceptive methods is a neglected aspect of reproductive health (Ali and Cleland 2010b). However, as more women adopt modern methods of contraception, continuity of use becomes more important (Freedman and Berelson 1976) – encouraging existing users of modern contraception to practice immediate switching between methods. Based on this argument, this research seeks to understand how continuity in using contraception can be a function of switching between contraceptive methods.

Second, available evidence suggests that users of modern contraception are less likely to use the same contraceptive method throughout their reproductive life (Grady *et al.* 2002; Frost 2011). Changing, or switching between contraceptive methods is likely to be influenced for reasons such as the desire to use a more effective method, cost, side effects, or accessibility challenges among others. Therefore, studying the switching behaviour of users of contraception provides an opportunity to understand the type of contraceptive methods users of contraception are more likely to switch from, and to. Related to the previous two reasons, the third reason appreciates the fact that most users of modern contraception are likely to discontinue use of a contraceptive method at some point in time, for a reason other than wanting to have a child.

Therefore, an investigation of the likelihood of women switching between methods following discontinuation of contraception is important. If women can immediately switch contraception, then the likelihood of women experiencing unwanted pregnancies and mistimed births is reduced, because of lower exposure to unprotected sexual intercourse. Thus, by comparing the immediate switching behaviour of women by their background characteristics, areas that require redress and strengthening of reproductive health implementation can be identified. The aim of this thesis is to investigate the effect of women's socio-economic and demographic factors, that work through the medial strategies and immediate factors to affect immediate switching of contraception. Although the study of switching of contraception offers significant insights in the way women use contraception, particularly on how they consistently use contraception and quality in service provision, the process is not free of limitations that relate to the nature of the data used in the study. These shortcomings are discussed in Section 8.2.

2.6 Provision and assessment of the history of family planning programmes in five East African countries

This section examines changes in contraceptive use over time, the history of family planning programmes in the countries under study since initiation, and the events that led to the establishment of a National Population Policy (NPP) in each country. An account of the different structural family planning institutions in relation to contraceptive uptake is also provided. Table 2.2 provides a summary of major dates when family planning programmes and national population policies were adopted.

Table 2.2 Population estimates, year(s) of first family planning programmes and national population policies initiated

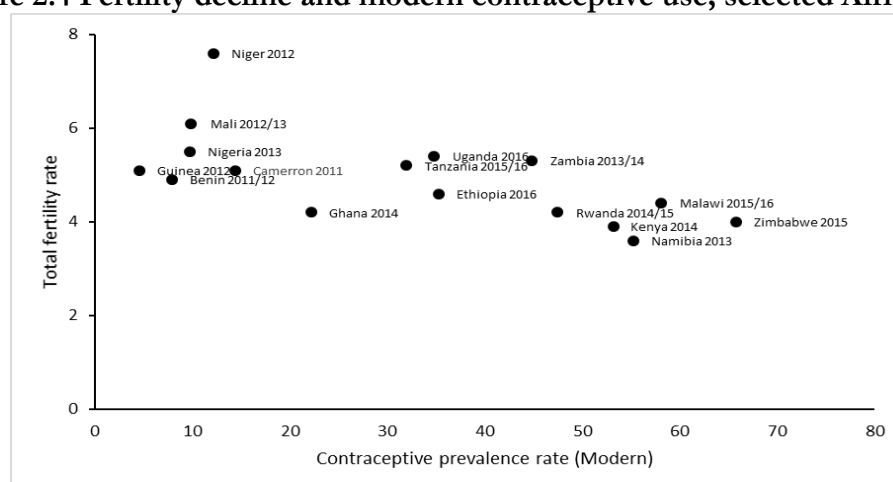
Country	Population (2017 WPP estimates in '000s)	Year of first Family planning programme	Year of first National Population Policy
Ethiopia	104,957	1966	1993
Kenya	49,700	1957	1967
Rwanda	12,208	1982	1990
Tanzania	57,310	1960	1992
Uganda	42,863	1957	1995

Source: Richey (1999); Ndegwa *et al.* (2008); Pathfinder International (2008); Leahy and Akitobi (2009); Mukasa (2009); Kenya National Bureau of Statistics and ICF Macro (2010); National Institute of Statistics of Rwanda and ICF International (2012); United States Agency for International Development (2012); United Nations Population Division (2017)

2.6.1 Changes in contraceptive use over time

Figure 2.4 shows an inverse relationship between total fertility rate and contraceptive use in selected sub-Saharan African countries. In offering interpretations to the European fertility decline, Guinnane *et al.* (1994) observe that contraception played a major role in fertility decline (Guinnane *et al.* 1994). Similarly, Mauldin *et al.* (1978) note that contraception played a more significant role than socio-economic factors (such as education, economic status, urbanisation) in fertility declines observed in developing countries (particularly in Asia and Latin America) in the period 1965-1975 (Mauldin *et al.* 1978).¹⁵

Figure 2.4 Fertility decline and modern contraceptive use, selected African countries



Source: Measure DHS (The Demographic and Health Survey Programme)

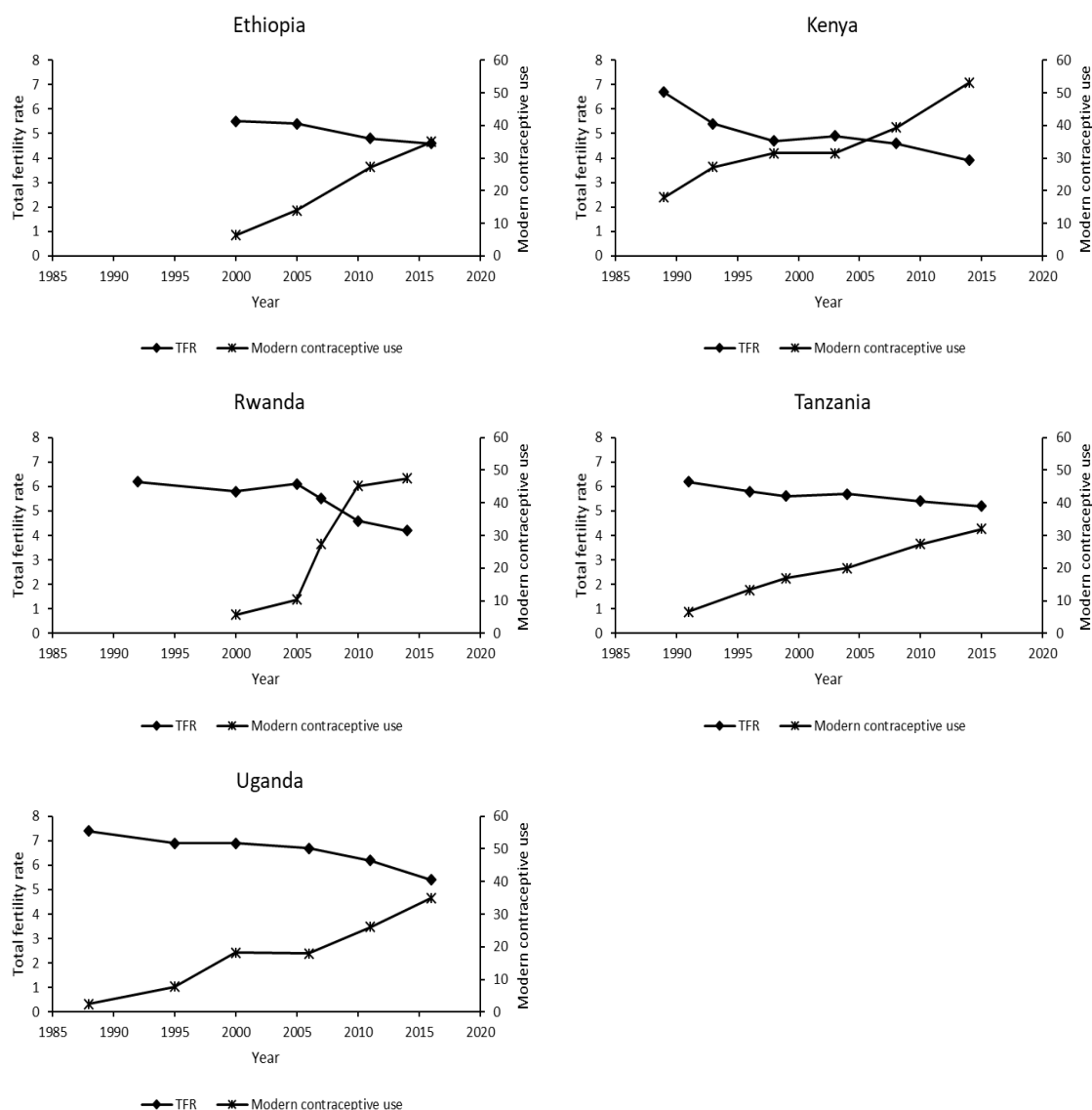
Note: Estimates are for the latest DHS survey. We considered sub-Saharan African countries with at least four DHS surveys (as of January 2018), the latest having been conducted after 2010. However, Figure 2.5 considers all surveys to examine the trends in fertility decline and modern contraceptive use in the countries under study.

Although these findings underscore the importance of contraception in reducing fertility, the sub-Saharan African region has had a slow fertility transition compared to other parts of the world. Despite this, the trend analysis shown in Figure 2.5 shows an increasing trend in the proportion of

¹⁵ According to Mauldin *et al.* (1978), modernisation can be measured by socioeconomic factors such as the level of education, health, economic status, and urbanisation.

users of modern contraception over time. However, the pace of fertility decline is not the same in these countries. The fertility transition in Tanzania and Uganda has been slower but with a sluggish increase in modern contraceptive use compared to other countries.

Figure 2.5 Fertility decline and trends in modern contraceptive use among married women, 1988-2016, five countries



Source: Measure DHS (The Demographic and Health Survey Programme)

Note: Figure 2.5 utilises all publicly available DHS surveys for trend analysis in the countries under study from married women.

Fertility has declined significantly in Kenya and Rwanda, where use of modern contraception has significantly increased over time. On the contrary, fertility decline in Ethiopia has been faster than in Uganda despite low use of modern contraception in Ethiopia. Although 35 percent of currently married women were reported to be using a modern method of contraception in 2016 in Ethiopia (Central Statistical Agency (CSA) [Ethiopia] and ICF 2016) and Uganda (Uganda Bureau

of Statistics (UBOS) and ICF 2018), fertility remains higher in Uganda. The trend in use of modern contraception in Ethiopia and Uganda is observed to be about the same despite of differing fertility levels.

2.6.2 The history of family planning programmes

Much of the information that gives the history of family planning programmes in the countries under study is found in government publications or reports. The following sections provide an overview of how family planning programmes and national population policies evolved in the respective countries.

2.6.2.1 Ethiopia

According to the latest estimates from the World Population Prospects (WPP), Ethiopia is the second most populous nation after Nigeria in sub-Saharan Africa (United Nations Population Division 2017). The first family planning programme was introduced in the country in 1966 by the Family Guidance Association of Ethiopia (FGAE) (United States Agency for International Development 2012), and the first National Population Policy (NPP) was enacted in 1993. The formation of the FGAE was largely motivated by the desire to start up a formal organisation whose main goal is to introduce and increase the use of modern contraception among sexually active women. To this end, the FGAE was not only instrumental in expanding contraceptive use but was also the sole provider of family planning services in the country until the 1980s, when the government of Ethiopia through the Ministry of Health (MoH) incorporated family planning programmes into its maternal and child health programmes (United States Agency for International Development 2012). The implication of this is that, to date, FGAE is no longer the main player in providing family planning services in Ethiopia, but family planning programmes are now part of the national agenda, with provision supported by the central government through the Ministry of Health.

The main objectives of the 1993 National Population Policy were to devise means of reducing the high population growth rate which was at 3.2 percent and reduce total fertility from 7.7 children to 4 children through promoting and increasing contraceptive uptake from 4 percent to 44 percent by 2015, and reducing infant, child, and maternal mortality. Further, the NPP also aimed at promoting smaller families, improving agricultural output, conserving the environment, reducing rural-urban migration, fostering economic development, empowering women, and allowing them to freely participate in economic activities, improving social, and economic status of women, children, youth, and old people, improving access to health, housing, and education services (Government of Ethiopia 1993).

The Policy proposed strategies to help achieve these objectives. These included establishing a programme to train community-based distribution workers to provide contraceptive methods, improve the nutrition of infants, and increase inter-pregnancy intervals by promoting breast feeding, raise the minimum age at first marriage from 15 years to 18 years, encourage girl-child education and counselling programmes that keep them in school. Other strategies include provision of employment and encourage growth of small businesses through providing credit, making family planning information widely available through radio programmes and posters, encouraging women to get involved in economic activities, designing family planning programmes that involve men, and promoting research in the field of reproductive health (Government of Ethiopia 1993).

Further, guidelines to help stakeholders in promoting and providing high quality family planning services, increase the amount of contraceptive methods, and broaden the method mix were designed (Government of Ethiopia 1993). The aim was to ensure that high quality family planning products are available to reduce the risk of unwanted pregnancy but also to increase adoption of contraceptive methods. In addition, a 20-year Health Sector Development Plan (HSDP) was developed with an aim of promoting Primary Health Care (PHC), to improve sanitation, child and maternal health, and prioritise the provision of family planning services.

As a result of such policies (the National Population Policy and the Health Sector Development Plan), Ethiopia has emerged as one of the success stories in sub-Saharan Africa in terms of contraceptive uptake – largely because of government commitment especially after the year 2000 (Bongaarts and Casterline 2013; Olson and Piller 2013). In order to increase contraceptive uptake particularly in rural areas, the government has prioritised and invested in the provision of family planning services through establishing new health centres and health posts. Olson and Piller (2013) also note that government expenditure on the health sector increased from 10 percent in 2005 to 14 percent in 2010 of the total national budget. The health posts provided in rural areas have been helpful in bringing family planning services closer to people. Further, the government of Ethiopia has expanded contraceptive use in rural areas through initiating and strengthening the community-based service provision of family planning services in rural areas. Moreover, use of clinical methods such as the Norplant has increased from 0.2 percent in 2005 to 3.4 percent in 2011 as a result of the training given to HEWs to administer such services (Olson and Piller 2013).

Because of increased uptake of modern contraception, Bongaarts (2017) observes that fertility levels have followed suit, although at a slow pace. Increased funding from both government and from donor agencies such as the United States Agency for International

Development (USAID) has consequently led to increased supply of family planning products. Further, extension of family planning programmes to hard-to-reach areas through the Health Extension Workers (HEWs) project has paid off in terms of getting more newly recruited adopters of modern contraception.¹⁶ For example, the use of trained community health workers has been observed to lead to an increase in the use of LARCs in rural areas (Zerfu *et al.* 2018). An intervention programme that assessed the use of LARCs in 282 villages distributed by health extension workers observed an increase of 72.3 percent in the use of LARCs, nine months after the intervention programme (Zerfu *et al.* 2018).

Despite these achievements, the Ethiopian family planning movement still has challenges to overcome in the provision of family planning services, but also in trying to achieve a wider coverage. For example, some rural areas are still short of a wide range of family planning products, making women in such places less likely to either adopt, or switch to a preferred contraceptive method (Jankowski *et al.* 2013). Moreover, most contraceptive methods distributed by health extension workers are non-clinical such as the pills, condoms – limiting choice in hard-to-reach places. Further, the emergence of other reproductive health issues has also challenged the smooth implementation of family planning programmes. For example, concerns about incorporating HIV/AIDS in the provision of family planning services have become central in reproductive health programmes (Federal Democratic Republic of Ethiopia 2011). Thus, efforts to integrate HIV/AIDS prevention in family planning programmes have been promoted (Mekonnen and Worku 2011).

2.6.2.2 Kenya

Kenya's family planning programme was introduced in 1957 making it one of the first countries in sub-Saharan Africa to introduce a family planning programme. A few family planning clinics, in Nairobi and Mombasa, funded by Pathfinder International, were set up prior to that date (Ndegwa *et al.* 2008). The Kenya government adopted the first National Population Policy (NPP) in 1967 – making it the first sub-Saharan African country to have a National Population Policy. Reasons such as the geographical size and location, the country being relatively richer than most sub-Saharan Africa, motivated the international community, and development funding from the World Bank to target Kenya as the first country in sub-Saharan Africa to implement the 1967 National Population Policy (Chimbwete *et al.* 2005).

From its establishment, the NPP suffered setbacks, and could not achieve much from the objectives that were laid out therein. Chimbwete *et al.* (2005) observe that either people did not

¹⁶ In some literature, Health Extension Workers (HEWs) are referred to as Community Health Workers (CHWs).

have the information required to encourage them use modern contraception, or they did not understand the information given to them about the use of family planning services. Moreover, most Kenyan men at the time were considered more influential in society when they had more children, and with many wives. Therefore, the idea of having a small family was considered as western and antagonistic to African culture. Further, Chimbwete *et al.* (2005) observe that the Kenyan people considered the use of modern family planning services as an immoral practice, and those that adopted modern family planning services were more inclined to use them for spacing births (Chimbwete *et al.* 2005).

Given the challenges encountered in the implementation of the 1967 National Population Policy, a second National Population Policy was enacted in 1984 and thereafter in 2000, a National Population Policy for Sustainable Development (NPPSD) was set in place (Kenya National Bureau of Statistics and ICF Macro 2010). Although among other objectives of the NPPSD were to promote gender equality, environmental protection, reduction of poverty, the primary objective was to promote family planning programmes and consequently reduce high fertility, but also to improve maternal and child health. In order to reach the Contraceptive Prevalence Rate (CPR) target of 56 percent by 2015, Ndegwa *et al.* (2008) note that the government of Kenya has partnered with universities, Non-Government Organisations (NGOs), and private organisations to strengthen the community-based service delivery system initiated by Pathfinder International in the 1980s in the provision of family planning services. The government has also made efforts to increase contraceptive use by targeting vulnerable groups such as adolescents, men, sex workers, and slum dwellers through counselling, education, provision of contraceptives (Ndegwa *et al.* 2008). Ngethe (2014) also observes that funding allocated to the health sector has increased from 4 percent in financial year 2010/11 to 6 percent in financial year 2013/14 of the national budget.

However, as in Ethiopia, family planning programmes in Kenya also faced challenges associated with implementation, and there was little progress prior to the late 1980s. These challenges ranged from the emergence of the HIV/AIDS epidemic, inaccessibility of family planning services, limited trained human personnel, to limited funding (Ngethe 2014). While there is now a wide range of family planning methods available in Kenya, Ndegwa *et al.* (2008) observe that a significant number of women continue not to use modern contraceptives even though they might need, or want them. Despite these challenges, the government's commitment toward promoting the use of modern methods of contraception was a big step in the realisation of successful family planning programmes in Kenya (Ngethe 2014). Further, the use of health extension workers has been linked to an increase in the use of public health care services in Kenya, because of the link they establish between families and health care providers (McCollum *et al.*

2016). Moreover, health extension workers play monitoring and support roles in use of health care services – which facilitates continuous use of reproductive health services.

2.6.2.3 *Rwanda*

Rwanda is another success story in the use of modern contraception in sub-Saharan Africa (Solo 2008). The first family planning programme in Rwanda was initiated in 1982 with the main objective of promoting the use of modern contraception among married women (National Institute of Statistics of Rwanda *et al.* 2012). Rwanda's National Population Policy (NPP) was then enacted in 1990 and its main purpose was to provide guidance in coordinating population activities, promoting people's quality of life, to reduce total fertility from 8.6 children to about 4 children, and also reach a CPR target of 48 percent by 2000 (Belohlav and Nolan 2013). However, progress made by family planning programmes was cut short by the genocide that took place in 1994, leading to a decrease in the Contraceptive Prevalence Rate (CPR) (Solo 2008).

After the genocide, the National Population Policy for Sustainable Development (NPPSD) – a revision of the 1990 National Population Policy – was adopted in 2003 (Government of Rwanda 2006). The main objective of the NPPSD was to implement the resolutions reached at the International Conference on Population and Development (ICPD) in 1994. These resolutions centred on improving the quality of people's life through improving food security, economic growth, providing access to better education, and health. Other objectives included improving human resources and good governance. Consequently, the Reproductive Health Policy (RHP) was adopted in 2003 to improve maternal and child health, and the declaration of family planning programmes as developmental priorities (United States Agency for International Development 2012). The establishment of the Reproductive Health Policy was premised on six objectives: (i) to improve maternal health; (ii) improve the provision of family planning services; (iii) prevent and treat sexually transmitted diseases; (iv) promote and improve adolescent reproductive health; (v) prevent and manage sexual harassment; and (vi) empower women.

Additional policies that aimed to incorporate fertility and population growth issues as part of the country's development plan were adopted in 2005 to help with alleviating poverty and population growth (Solo 2008), and "Vision 2020" whose aim is to align the country's population growth with its economic growth (Government of Rwanda 2012). In achieving this, "Vision 2020" aimed to reduce population growth from 2.6 percent in 2000 to 2.2 percent by 2020 (Belohlav and Nolan 2013). However, given the level of destabilisation Rwanda faced as a result of the genocide, "Vision 2020" came up with six guidelines to help achieve economic development: (i) reconstruct the nation; (ii) unite the population; (iii) improve human resource; (iv) develop public infrastructure; (v) promote small-scale businesses; and (vi) promote and modernise agriculture.

In order to reduce the country's population growth and also increase the use of family planning services, the Government of Rwanda set up a National Family Planning Policy (NFPP) in 2006 whose objectives were largely based on the six pillars of "Vision 2020". These objectives include: reduce maternal, infant, and child mortality; improve nutrition of children and families as a whole; encourage families to have children they can manage through the use of contraception; provide family planning information; and increase variety of modern contraceptive methods (Government of Rwanda 2006). In a bid to harmonise all these strategies, the government of Rwanda enacted a second National Population Policy in 2009 (Belohlav and Nolan 2013).

As a result of the policies, Rwanda's CPR has increased over time, from 12.9 percent in 1992 to 45.1 percent in 2010, although estimates are still below the target of 70 percent that was set to be achieved by the year 2015 (Government of Rwanda 2012). The recorded success is largely attributable to government's commitment in ensuring that Rwanda meets the targets as laid down in the National Population Policy. In addition to making family planning programmes a national priority, the government of Rwanda committed sufficient funding to increasing family planning products, provided training to health providers at regional and district levels, as well as providing motivation campaigns to use modern contraception. For example, through government's commitment, Belohlav and Nolan (2013) observe that employment and education opportunities have increased especially for young girls. Moreover, enacted family planning programmes provided for and encouraged the training of community based workers and district supervisors, that disseminated family planning information and encouraged continuous use. Use of community health workers has proven to expand contraceptive access, choice, and new methods in communities (VanEnk *et al.* 2018). Through the use of community-based service provision, family planning services have been able to reach the least educated and those living in rural areas. Further, the government of Rwanda has engaged civil society organisations, religious leaders, and public health practitioners to debunk the myths surrounding the use of modern contraception (Belohlav and Nolan 2013).

However, Rwanda faced challenges in the quest to making family planning services accessible to everyone. Failure to achieve universal access to family planning services to those in need either because of cultural, religious factors, or distance have been major challenges in Rwanda. For example, Solo (2008) observes that some people living in remote areas continued to have challenges in accessing modern contraception, either because of too long distances between health centres and where they live, or because of high accessibility costs.

2.6.2.4 *Tanzania*

Promotion of family planning programmes in Tanzania was first spearheaded by the Tanzanian Family Planning Association (TFPA) in 1960, with support of the Pathfinder Fund (Pathfinder International 2008). However, implementation of family planning programmes was strengthened in 1985 with the introduction of Community Based Distribution (CBD) systems to help with distributing non-clinical family planning products in hard-to-reach areas. Other reproductive health components such as maternal and child health were later added to the family planning programmes in 1989 before the first Tanzanian National Population Policy was enacted in 1992 (Richey 1999).

The 1992 National Population Policy of Tanzania set a number of objectives. These include integrating population issues into the country's development agenda; improving people's level of education, health, and the right to freely decide the number of children one wants to have and when to have them; provide employment; design programmes to take care of special groups of people such as the old, youth, children, disabled, and refugees; and promote gender equality, women's empowerment, and reproductive health in education institutions. Others are to prevent the spread of sexually transmitted diseases including HIV/AIDS; reduce poverty; increase food production; promote programmes that protect the environment; and promote research in the field of reproductive health (United Republic of Tanzania 2006).

However, because of emerging issues facing society such as HIV/AIDS, early childbearing among adolescents, high maternal, infant, and child mortality, there was need to revise the 1992 National Population Policy to incorporate all of them (United Republic of Tanzania 2006). Thus, the National Population Policy was revised in 2006 to cater for all these emerging issues (National Bureau of Statistics (Tanzania) and ICF Macro 2011). However, Tanzania has not been able to replicate the success realised in countries such as Ethiopia, Kenya, or Rwanda. Diseases such as malaria and tuberculosis equally led to high morbidity and mortality, and the government of Tanzania felt the need to deal with these emerging issues but in the process downplayed family planning programme efforts (Judice and Snyder 2013). Other challenges that have proved to be stumbling blocks in achieving universal access to family planning services in Tanzania are limited funding allocated to family planning programmes and associations, and myths and mistrust such as claims that the use of family planning services leads to infertility and infidelity (Mungure and Owaga 2014). Moreover, implementation of family planning programmes became difficult because of limited trained personnel, lack of data by sex needed to monitor progress and design appropriate tools, inadequate advocacy programmes, and programmes that focused more on child spacing than other reproductive health concerns (United Republic of Tanzania 2006).

Based on these challenges, increasing government funding and commitment, providing adequate training to family planning providers especially in rural settings and among religious,

community leaders, as well as incorporating men more directly in programmes and interventions have been suggested as possible solutions to increasing uptake of modern contraception in Tanzania (Mungure and Owaga 2014). In particular, the establishment of community-based distribution services with help of the Pathfinder international, access to family planning services has increased in rural areas. Family planning programmes have also integrated people living in urban areas particularly the youth, shop attendants, pharmacists, as well as institutions such as schools, private organisations in the provision of family planning services. Family planning programmes have also integrated HIV/AIDS in the provision of reproductive health services (Pathfinder International 2008). Further, the government has argued that it is important that the supply of a variety of high quality modern contraceptive products is consistent and in line with the demand of the local population to suit their needs (United Republic of Tanzania 2010), but also more importantly to promote reproductive health discussions between young women, married couples, and family planning service providers (Carlin 2011).

2.6.2.5 Uganda

Uganda has one of the highest total fertility rates in sub-Saharan Africa, with the 2016 Demographic and Health Survey (DHS) current estimate being at 5.4 children per woman (Uganda Bureau of Statistics (UBOS) and ICF 2018). Moreover, fertility transition in Uganda has followed a slower pace than other countries under study, despite having had one of the first family planning programmes in the East Africa region. In 1957, the Family Planning Association of Uganda (FPAU) was established with the main objective of encouraging married women to use modern contraception to reduce high fertility (Leahy and Akitobi 2009).¹⁷

However, since a significant proportion of never-married women also experience unwanted pregnancy, family planning programmes have targeted the youth and single women by promoting the use of modern contraception among all classes of women (Prata *et al.* 2013b; Crossland *et al.* 2015). The government of Uganda through the Ministry of Health (MoH) in the 1960s committed to supporting the provision of family planning services through FPAU, by introducing and promoting family planning programmes in government hospitals and targeting women who had come for antenatal and immunisation services (Mukasa 2009). Through the Ministry of Health, the Uganda government introduced and promoted maternal and child health, and child spacing (Mukasa 2009). These policies were later followed by the enactment of the 1995 National

¹⁷ The reason for focusing on married women is because single women were either discouraged from accessing family planning services, or family planning programmes did not cater for their needs. Although, family planning programmes now serve all women irrespective of their marital status, earlier policies that favoured only married women are likely to have indirectly led to a significant number of unwanted pregnancies among sexually active single women.

Population Policy and a further revision in 2008, which had as its main objective improving people's quality of life and tackling emerging population issues such as HIV/AIDS.

Although the 1995 National Population Policy was well-intended, it fell short of not having the Plan of Action necessary to implement the objectives laid out in the policy document (Government of Uganda 2010). For this reason, the 2008 National Population Policy stipulated five major themes as part of the Plan of Action: (i) sexual and reproductive health and rights; (ii) gender equality, and women empowerment; (iii) advocacy and behavioural change; (iv) institutional framework and coordination; and (v) population development and family wellbeing.

The National Population Policy of Uganda that was revised in 2008 took into account the challenges and emerging issues at the time such as HIV/AIDS related cases, the need to involve men in the provision and use of family planning services (Government of Uganda 2010). Consequently, family planning programmes spearheaded by Reproductive Health Uganda (RHU), formerly called the Family Planning Association of Uganda (FPAU) has succeeded at empowering women to use modern contraception and expanded family planning services to the youth. In addition, Leahy and Akitobi (2009) observe that RHU has been in position to establish a network of 260 community-based health distribution agents to train people on how to use contraception, and distribute family planning services in all districts. Further, outreach teams and mobile clinics have been set up by Marie Stopes (an NGO) in about 85 percent of the country's districts to increase access to family planning services. Other things done are the inclusion of hormonal contraception by the government of Uganda on the drug list and including family planning services in the country's budget framework (Leahy and Akitobi 2009).

Unlike in Kenya and Rwanda where full political commitment was provided to family planning programmes, Uganda has not fully benefited from such an arrangement. There has been disagreement on whether the government should support wider coverage of use of modern contraception, or it should rather promote population growth as a driver of economic development (Khan *et al.* 2008). On many occasions, the presidency has reiterated their support for a larger population arguing that a larger population enhances economic development and thus only modest funding has been allocated to family planning programmes (Leahy and Akitobi 2009). In turn, the majority of women, or couples in need of contraception have had to rely on the private sector rather than government facilities for family planning services (Okullo *et al.* 2003).

The literature suggests that similar problems have been experienced in the five East African countries in the promotion of modern contraception. Three major problems can be identified: First, the emergence of HIV/AIDS at a time when family planning programmes had just started making progress was a major challenge. Bongaarts (2011) observes that areas with high HIV

prevalence have struggled to replicate the same success of faster adoption of modern contraception as that observed in other areas with lower prevalence of the epidemic. Second, logistical challenges such as shortage of skilled manpower, contraceptive supplies, accessibility problems, undeveloped family planning delivery systems, limited funding, and poor service have been bottlenecks in increasing coverage in the use of family planning services (Megquier 2014), and finally, the role of cultural beliefs, or patriarchy where family planning programmes have been perceived by some people as promoting infidelity (Bawah *et al.* 1999), strained relationships (Hyttel *et al.* 2012), or fear of causing infertility and disease (Williamson *et al.* 2009; Mungure and Owaga 2014; Twesigye *et al.* 2016).

In all five East African countries, prior to the adoption of a National Population Policy, family planning programmes were largely funded by international, or non-government organisations, before they were supported by respective governments. However, the adoption of national population policies provided guidelines on how to increase the use of modern contraception by incorporating family planning programmes in national agendas. These services were directed almost exclusively at married women and thus single women were inhibited from accessing modern contraception. In the initial stages of promoting modern contraception, short-term reversible modern contraceptives were the most promoted methods as opposed to long-term reversible, or permanent methods, which may be as a result of some LARCs being either undeveloped or unavailable at the time – implying that the history associated with contraceptive use (Sullivan *et al.* 2006) is a convincing reason responsible for a high adoption of short-term contraceptive methods in these countries (Miller *et al.* 1991).

Although political, or government commitment is observed to be one of the major reasons for increased use of modern contraception in Ethiopia, Kenya, and Rwanda (Bongaarts and Casterline 2013), projects such as the use of health extension workers in Ethiopia (Zerfu *et al.* 2018), and Rwanda (VanEnk *et al.* 2018), and community extension projects such as the “Tupange” project in Kenya (Muthamia *et al.* 2016), have been driving forces toward recruiting more non-users of contraception, increasing access, and choice. Health extension workers have the ability to disseminate reproductive messages, help with counselling, but also distribute non-clinical contraceptives in the hard-to-reach areas (Behrman *et al.* 2002).

2.6.3 Contraceptive method mix

The introduction of family planning services in the 1960s in most sub-Saharan African countries was not immediately followed by the introduction of a wide range of contraceptive methods. For example, in East Africa (Ethiopia, Kenya, Rwanda, Tanzania, and Uganda), when family planning programmes had just been introduced, promoters of family planning services encouraged the use

of short-term methods such as the injectable, pill, or condom, as opposed to other methods such as LARCs because they were not readily available – narrowing the method mix. Bertrand *et al.* (2014) define a method mix as the percentage distribution of contraceptive users by method.

However, because of the need to improve quality and access (Government of Ethiopia 1993), additional family planning products were developed – leading to a broadened method mix. A broadened method mix promotes choice, reduces the chances of abandoning contraceptive use, and increases access to family planning services (Hoke *et al.* 2012). The choice of contraceptives is regarded as one of the core elements in the provision of quality family planning services (Jain and Hardee 2018). The use of a particular contraceptive method is influenced by the clients' preference for a particular contraceptive method, availability of the preferred contraceptive method, and provision of information about all available contraceptive methods (RamaRao and Jain 2016). With the introduction of new family planning products, family planning programmes had to monitor progress in terms of adoption of modern contraception. One such popular method used is the method skew.

Ross *et al.* (2015) define method skew as a situation where more than 50 percent of users use a particular method. Method skew can be used to assess the quality of service delivery because family planning programmes are able to know if a country has a broadened method mix, or not. For example, the presence of method skew may indicate a narrow method mix, while an absence of method skew may indicate a broadened method mix.

A broadened method mix enables users of modern contraception to switch between methods (Grady *et al.* 2002). Sonfield (2017) offers three reasons why women end up using more than one contraceptive method throughout their reproductive lifespan: First, women switch between methods before finding a contraceptive method they can use consistently with minimal side effects. Second, due to changes in relationships, changes in life courses, and changes in couple's reproductive goals, women find themselves changing, or using more than one, contraceptive method in their reproductive lifetime. Last, use of some contraceptive methods is sometimes dependent on the desire to avoid contracting HIV/STIs, in addition to pregnancy prevention. For example, use of, or a switch to condoms is sometimes motivated by a desire to prevent contracting sexually transmitted infections (Williamson *et al.* 2006; Eeckhaut 2017), but at the same time the same women may be using a more effective method such as the IUD, or Norplant to prevent themselves from conceiving, a situation commonly known as dual protection.¹⁸

¹⁸ Cleland *et al.* (2006b) classify sterilisation, IUD, Norplant, and injectable as more effective methods of contraception. The pill is categorised as an effective method whereas the condom, withdrawal, and abstinence are grouped under less

However, although the 50 percent heuristic applied to users of a contraceptive method may indicate limited choice of methods in a given country (which points to poor quality of provision), it is also possible that other reasons may explain why the majority of users prefer a specific method of contraception (Bertrand *et al.* 2014). Sonfield (2017) observes that other reasons considered in choosing a contraceptive method are being able to afford and access a contraceptive method, concerns about possible side effects, frequency of sexual relations, risk of sexually transmitted infections, being able to use a contraceptive method without either partner's knowledge, or permission, and path-dependence.

Jain (1989) argues that family planning strategies that involve promotion of a broadened method mix not only help to meet the client's needs related to satisfying their method choice and family limitation, but also facilitate contraceptive switching and consistency in use of contraception. He further argues that once clients are satisfied with provision of different methods of contraception, then individuals are likely to use contraception continuously. A further benefit of providing a wide range of contraceptive methods is the reduction in the likely coercion in the use of some contraceptive methods for example forceful sterilisation, or LARCs (Sonfield 2017). However, the limit to Jain's hypothesis is that whereas a significant proportion of women can now adopt contraception – because of increased provision of different types and methods of contraception – consistency in use may be lower especially among users of short-term methods, but the situation is slightly different for users of LARCs.

A method mix in a given country can be used as a measure of quality in service delivery of family planning services. A narrow method mix is a sign that users of contraception have limited choice of contraceptives to choose from while a broadened method mix indicates variety in choice of methods. It should be noted that in the early stages of providing family planning services in sub-Saharan Africa, users of contraception were limited in terms of method choice. Moreover, most users used short-term methods of contraception.

2.6.4 Quality in health service provision

The quality of health service provision is an important dimension in ensuring that the services offered in the field of reproductive health appeal to clients in a way that promotes service-uptake and continuity. This is because improved quality of care in the provision of contraceptive services leads to an increase in the use of modern contraception. Moreover, upholding or promoting

effective methods. The categorisation of contraceptive methods in this thesis takes these classifications into consideration. However, although dual protection cannot be ruled out, the data used in this thesis does not provide information on the use of more than one contraceptive method at the same time (in a particular month), since only one contraceptive method was captured for each month.

human rights has been suggested to be an important element in the provision of reproductive health services especially in low developed countries (World Health Organisation 2017b). The World Health Organisation recommends that all efforts that aim to increase contraceptive use through expanding accessibility should ensure that the client's human rights are protected and respected (World Health Organisation 2015). That is, family planning programmes should ensure that family planning services are not discriminative, they should be available, accessible, acceptable, provide all the necessary information about the services offered, and respect one's privacy. Further, clients should be able to make informed decisions regarding the methods they choose, should be allowed to participate in the promotion of family planning programmes, and respective countries are expected to link their policy guidelines to internationally acceptable human rights (World Health Organisation 2015).

Improving the quality in the provision of modern contraception (as one of the reproductive health dimensions) has been suggested to lead to increased uptake of modern contraception and continuity (Bruce 1990). However, despite the suggestion to include quality in the provision of reproductive health services, Bruce (1990) observes that a number of approaches (definitions) have been employed at measuring quality in provision – for example, availability of services and costs that have to be met by clients (Hermalin and Entwisle 1985), access (Alkema *et al.* 2013), choice of methods (Jain 1989), staff training (Duvall *et al.* 2014), counselling on how to manage side effects (Hoke *et al.* 2012). Another study (Babalola *et al.* 2001) has considered service provider-client relations, competence in provision, affordable services, waiting time for a service, variety of methods, and services that meet the client's needs as elements of quality. Bruce (1990) observes that the lack of a standard definition to measure quality means that programme managers are unable to incorporate the quality dimension in their reproductive health programmes.

In order to harmonise the definition of quality, key elements (both on the side of clients and service providers) have been proposed as inclusive. Bruce (1990) offered a framework for quality in the provision of family planning services, he argues that clients consider as important in the provision of modern contraception. These are: “choice of contraceptive methods; information given to contraceptive users; technical competence; interpersonal relations; follow-ups and continuity; and appropriate constellation of services” (Bruce, 1990: 63-64). These six elements are also in agreement with the five elements proposed by the World Health Organisation (WHO), mainly for service providers (such as family planning clinics, primary health care and maternal and child health service points) in the provision of quality contraceptive services: the provision of family planning services must ensure that the client's privacy is protected and that all information is kept confidential; choice of contraceptive methods; accessibility and acceptability of services;

involvement of clients in service improvement; and promotion of continuation of care (World Health Organisation, 2017: 6).

Other studies that have examined the contribution of family planning supplies and service environment to contraceptive use (Wang *et al.* 2012) have assessed quality in the provision of contraceptive services by linking Demographic and Health Survey (DHS) data to Service Provision Assessment (SPA) data in Kenya, Rwanda, Tanzania, and Uganda. SPA surveys that are usually conducted within the same DHS year provide information on health facilities (public or private) and supplies within a geographic area. Therefore, once SPA data are linked with DHS data, analyses that are based on the association between health facilities and contraceptive use provide an indication of quality in the provision of contraceptive services. Using data from Kenya (2003 DHS and 2004 SPA and 2008-09 DHS and 2010 SPA), Rwanda (2007-08 DHS and 2007 SPA), Tanzania (2004-05 DHS and 2006 SPA), and Uganda (2006 DHS and 2007 SPA), Wang *et al.* (2012) observe that in all countries, areas with a higher health facility density than the national average were more likely to use modern contraception, suggesting that family planning service environment is an important predictor of contraceptive use. Further, the authors also observe that method availability at health facilities, staff training, counselling, visual or audio aids, and privacy were all significantly associated with contraceptive use in all countries. For example, Wang *et al.* (2012) report that the odds of using modern contraception increased by 50 percent in all countries for every added contraceptive method in the available method mix. However, routine staff training was observed to be lacking in all the countries under study. That is, 10 percent or less in Tanzania and Uganda, and about 33 percent in Kenya and Rwanda.

However, despite the positive contribution of such analyses in understanding the association between service environment and contraceptive use, there are three main limitations encountered in linking data from SPA surveys and DHS'. First, health facilities have to be linked to DHS clusters where they are situated. However, women may not necessarily use health facilities that are found where they live – a possibility that these women use facilities that are close to where they live but which may be in a different DHS cluster. Second, since the selection of DHS clusters is based on the country's population density, which is different with health facilities, there is a possibility that the distribution of health facilities within a DHS cluster is not representative of all health facilities in the country and last, the nature of data that is collected from SPA surveys – conducted either within the same DHS year or about a year apart – provides a possibility of having information from SPA surveys that may not be in agreement with information that was collected in the DHS data.

Although a number of elements have been suggested to measure quality, challenges related to measurement have been cited to hinder evaluation of family planning programmes (Bruce 1990). For example, it is possible that some of the elements are unmeasurable (difficult to measure) or that the publicly available data lacks the variables that can be used to measure quality. Despite a multiplicity of elements that can be used to measure quality in service provision, this thesis follows previous work by Jain (2016) and Ross *et al.* (2015) – by considering the family planning information exchange and method skew as proxy measures of quality in the provision of family planning services in the five East African countries under study. As discussed in Section 2.3.2, family planning information exchange measures information exchanged between service providers and clients on the availability of contraceptive methods, possible side effects, and how to manage them (Jain 2016; Family Planning 2020 (FP2020) 2017) while method skew refers to a situation where 50 percent of users are using a specific contraceptive method (Ross *et al.* 2015). However, in order to have a sense of the quality in the provision and use of modern contraception in the countries under study, this thesis examines, in Chapter 4, method skew and method information exchange as proxy measures of quality in provision of modern contraception.

2.6.5 Selected socio-economic factors that affect contraceptive use

This section examines the effect of the main socio-economic factors on contraceptive use, particularly in sub-Saharan Africa – to offer guidance and a justification for the theoretical framework to adopt in this study.

2.6.5.1 Education and contraceptive use.

Ali and Cleland (1999) observe that women's education is an important socio-economic factor that influences reproductive behaviour. Previous studies (Caldwell 1980; Lloyd *et al.* 2000; Kravdal 2002; Bongaarts 2010; Wang *et al.* 2013) have observed that better educated women are more likely to use modern contraception than less educated women. Education can offer women the ability to access information and the technology necessary to overcome barriers that would hinder them from achieving family formation strategies (Potts and Marsh 2010). A study that examined contextual factors that affect contraceptive use in rural Rwanda and Nepal observed a positive association between the level of education and contraceptive use in Rwanda (Wang *et al.* 2013). The authors observe that women with secondary or higher education were about 1.5 times more likely than women with no education to use modern contraception (Wang *et al.* 2013).

Using DHS data from 30 sub-Saharan African countries, Bongaarts (2010) observes that better educated women were more likely to demand and effectively use modern contraception compared to less educated women. These results resonate with those of a study that used DHS data from 14 sub-Saharan African countries to study the effect of education on contraceptive use

(Ainsworth *et al.* 1996). The authors observe that an increase in women's level of education was significantly associated with an increase in contraceptive use in all 14 countries. A study of six SSA countries (Burkina Faso, Ghana, Ivory Coast, Kenya, Malawi, and Tanzania) that utilised DHS data, also concludes that apart from Ghana, women with secondary or higher education were more likely to use contraception than their counterparts with no education in all countries (Stephenson *et al.* 2007).

Bongaarts (2010) argues that this relationship is expected because better educated women are more likely to be knowledgeable, have more access, are more likely to be employed, and are more likely to be autonomous than their counterparts with less education. Further, results from meta-analysis of 31 developing countries reveal that women who had completed primary education were two times more likely to use modern contraception than their counterparts with less education (Ahmed *et al.* 2010). These findings underscore the importance of considering education when trying to understand trends, or patterns in contraceptive use.

2.6.5.2 *Type of place of residence and contraceptive use*

The place of residence can be used as a proxy measure of access to using modern contraception (Ali and Cleland 1999). However, the effect of the type of place of residence on contraceptive use is largely mediated by the availability of, and access to reproductive health services (Ali and Cleland 1995), although other confounding factors such as wealth and education are also likely to play a role. For example, low contraceptive use in rural areas of sub-Saharan Africa is ascribed to poor infrastructure, insufficient method availability, less skilled family planning providers, long distances that makes rural areas hard-to-reach, and the costs of obtaining modern contraception (Dodoo and Tempenis 2002; Jankowski *et al.* 2013). Further, the scarce number of skilled personnel to help with administering the clinical services in rural areas aggravates the problem (Ross *et al.* 2015). The authors observe that some modern methods which require technical expertise to administer such as the Intrauterine Device (IUD) and sterilisation may not be used by rural women because of limited trained personnel (Ross *et al.* 2015). However, Ali and Cleland (1999) observe that the situation can be worsened if re-supplying of non-clinical methods such as the oral contraceptives, condoms is not on schedule. These observations offer insights to why fertility transition is slower in most rural areas of sub-Saharan Africa than in urban areas (Garenne and Joseph 2002), but also why rural women are more likely to discontinue contraception than urban women (Ali and Cleland 1999).

Using cluster analysis in Ethiopia, Jankowski *et al.* (2013) observe that the demand and use of modern contraception was higher in urban areas than in rural areas. Stephenson *et al.* (2007) observe that urban women in three East African countries (Kenya, OR=1.02; Malawi, OR=1.14;

and Tanzania, OR=1.56) were more likely to use modern contraception than their rural counterparts. These results from the literature suggest that given the challenges encountered in the provision of family planning services in rural areas, women may be less likely to use modern contraception compared to their counterparts living in urban areas – suggesting that switching of contraception is more likely to be practiced among urban women than rural women.

2.6.5.3 *Household wealth and contraceptive use*

Household wealth has been observed to have a direct impact on people's reproductive health (Howe *et al.* 2008). This is because household wealth which proxies the socio-economic status of a household can be used as a determinant of affordability and health seeking behaviour of women, particularly in obtaining family planning services (Ahmed and Mosley 2002; Ahmed *et al.* 2010).¹⁹ Similarly, employment also increases one's economic status to be able to meet the costs of obtaining reproductive services.

An analysis of the relationship between economic status and the utilisation of reproductive health services, including the use of modern contraception in 31 developing countries, using DHS data observed that women in the poorest wealth quintile were about 74 percent less likely to use modern contraception than their counterparts in the richest wealth quintile (Ahmed *et al.* 2010). Similarly, results from pooled analyses of 14 DHS surveys from developing countries indicated that women in the highest wealth quintile were more likely to switch between reversible methods of modern contraception (pooled rate ratio=1.38) compared to their counterparts with the lowest wealth quintile (Ali *et al.* 2014). The implication of these findings point to a higher likelihood of women from poor households to discontinue the use of modern contraception, practice less switching between contraceptive methods, and also risk unintended pregnancy. These findings highlight the importance of household wealth, or the economic status of the household in determining contraceptive use.

2.6.5.4 *Media exposure and contraceptive use*

The use of the media can be a powerful strategy through which behavioural messages are shared among communities (Hutchinson and Wheeler 2006). The implication of this is that women who receive family planning messages through the media are more likely to be receptive of family planning services (Barber and Axinn 2004). Having access to family planning messages through the

¹⁹ It is important to note that since the wealth index is a household index, its applications to individuals implicitly assumes that the resources of the household are at the disposal of individuals which may not be the case, particularly in complex household forms.

media has been observed to have a positive effect on the discussion of family planning programmes, approval, and use of contraceptive methods in the developing world (Olenick 2000).

Exposure to family planning messages through the media has been observed to have a positive association with the use of family planning services in Bangladesh, India, and Pakistan. For example, using the 1993/94 and 1996/97 DHS data in Bangladesh, the 1992/93 National Family Health Survey (NFHS) data in India, and the 1990/91 DHS data and 1994/95 Contraceptive Prevalence Survey (CPS) data in Pakistan, Olenick (2000) observes that ever-married women that were exposed to family planning messages on either television or radio were more likely to use family planning services than their counterparts not exposed to family planning messages. Olenick (2000) reports that married women exposed to family planning messages on radio, or television in Pakistan were 53 percent and 68 percent respectively more likely to use contraception than their counterparts not exposed. This pattern is similar to married Indian women exposed to family planning messages on television (OR=1.0), or radio (OR=1.1) who were also more likely to use contraception, while results from both the 1993/94 and 1996/97 DHS data in Bangladesh show that married women exposed to family planning messages on either television, or radio were 20 percent more likely to use contraception compared to their counterparts who are not exposed.

A study that utilised data from the Delivery of Improved Services for Health (DISH) in Uganda, after controlling for other background factors, observed that women who were exposed to multiple sources of media were 1.9 times more likely to be currently using a modern method of contraception while non-current users were 1.5 times more likely to use a modern method of contraception in the next 12 months than women not exposed to the media (Gupta *et al.* 2003). In Tanzania, having access to multiple sources of media was also observed to have a positive influence on contraceptive use after controlling for the type of place of residence, education, age, marital status, number of surviving children, and radio, or television ownership (Jato *et al.* 1999). Using data from the 1991/92 Tanzania DHS and 1994 Tanzania KAPS (Knowledge, Attitudes, and Practice Study), Jato *et al.* (1999) note that women who reported to have been exposed to multiple media sources (more than six) were 11 times more likely to use modern contraception than their counterparts exposed to none. Further, Jato *et al.* (1999) observe that the likelihood of using modern contraception was higher among women who were able to remember family planning messages shared on radio (1.9 times) than women who were not able to remember any family planning messages on radio – but this difference is expected to reduce as contraceptive use increases.

Although the literature points to a higher possibility of women exposed to the media to be more likely to use modern contraception, it is important to note that having access to the media

may not always and necessarily translate into use – implying that other distal factors, or unobserved factors may influence the way women use modern contraception. For example, after controlling for other background characteristics in a sample of 2,712 sexually active women and men, exposure to the media was found to have no effect on the use of the female condom in Tanzania (Agha and Rossem 2002).

2.6.5.5 *Access to family planning services and contraceptive use*

Access, which can be measured by the distance or time between the place of residence and health facility, has been observed to offer mixed effects on the use of modern contraception. Whereas some studies (Hermalin and Entwisle 1985; Lutalo *et al.* 2000; Ketende *et al.* 2003) have reported a positive association between having access to family planning services and use of modern contraception, other studies (Mroz *et al.* 1999; Seiber and Bertrand 2002; Heard *et al.* 2004) have noted that having access to family planning services may not be a definitive factor in influencing use of family planning services.

A study that used both facility data and the 2000 Malawi DHS observed that access was not significant in predicting modern contraceptive use after other background factors were controlled for (Heard *et al.* 2004). This conclusion is similar to that reached at in a study that used both facility data and the 1991/92 Tanzania DHS data (Mroz *et al.* 1999) – where the distance to a health facility was not significant at influencing contraceptive use.

However, Ali and Cleland (1999) argue that studies that consider access to the utilisation of reproductive health services provide insights on women's likelihood to use modern contraception. Using data from a sample of 1,766 women aged 15-49 years, and facility data of 292 health facilities in Uganda, Ketende *et al.* (2003) observe that women with access to private health facilities were about two times as likely as those without access to use modern contraception after controlling for women's social and demographic factors. Further, Focus Group Discussions (FGDs) conducted in the Rakai district of Uganda reveal that having access to family planning services was regarded an important factor to using modern contraceptive methods (Lutalo *et al.* 2000). In Malawi, results from the 2010 DHS data show that use of the injectable among women with access to family planning services was observed to be 5.7 percentage points more than among women with no access to family planning services after controlling for other background factors (Skiles *et al.* 2015).

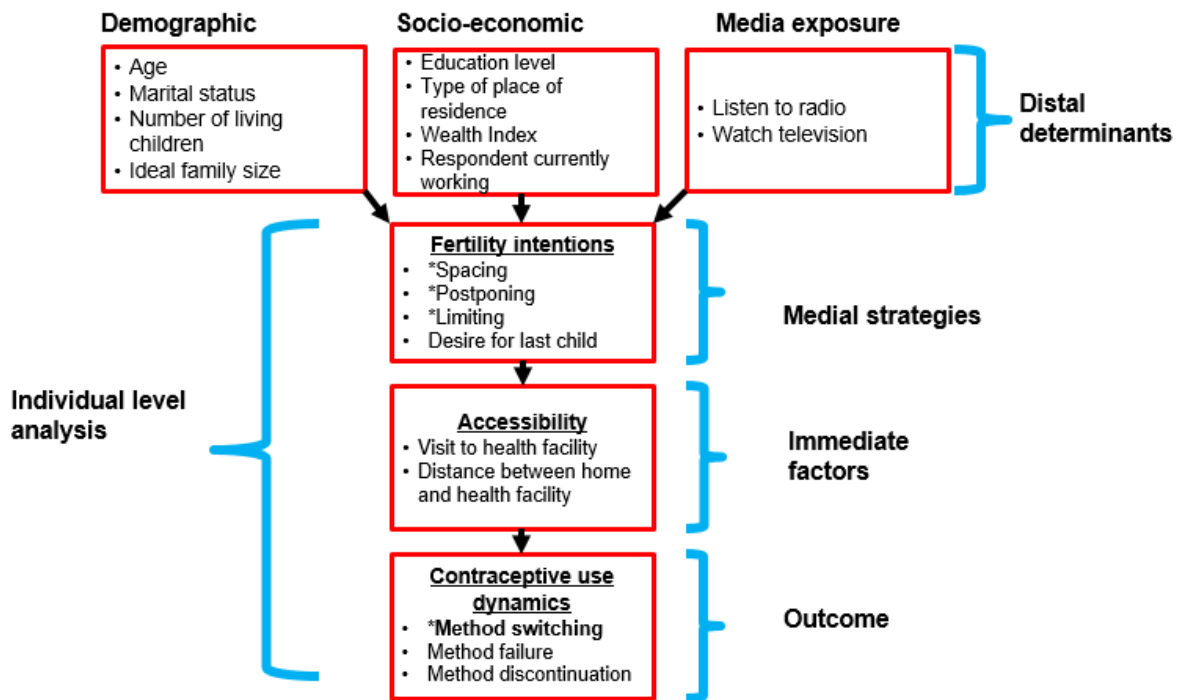
2.7 **Conceptual framework**

Ali and Cleland (1999) have noted that the factors that significantly affect current contraceptive use are also likely to influence contraceptive continuation. This implies that the framework used to study the factors that affect current contraceptive use can be adapted to understand consistent use

of contraception over time. Based on this, the discussion above helps to inform the theoretical framework guiding this study. Thus, this study adopts a theoretical framework described in Moultrie and Timæus (2015) to examine the effect of the relationship between discussed socio-economic factors and contraceptive use, and switching between methods. This is because their framework offers theoretical and hypothesized interlinkages between the distal, medial, immediate and outcome variables, and shows how individual-level and population-level factors can be located within the standard framework of the proximate determinants of fertility. This study builds on the categorisation of the four main concepts from Moultrie and Timæus' framework. These are grouped under the distal determinants, medial strategies, immediate factors, and outcome variables (Moultrie and Timæus 2015).

However, previous studies, for example Bradley *et al.* (2009), have adopted a framework developed by Bulatao (1989) to select which variables to include in the model. Although previous studies (Steele and Curtis 2003; Bradley *et al.* 2009; Ali and Cleland 2010a) provide helpful information on the choice of the variables to be included in the model, as they reported significant (important) predictors of contraceptive switching, the selection of the distal determinants to be considered for analysis in this research is also premised on Bulatao's (1989) framework, that considers four broad factors that are likely to influence the choice of contraceptive methods; contraceptive access, contraceptive competence, contraceptive evaluation, and contraceptive goals. Thus, each of the variables included in the models can be categorised under these four factors. For example, the motivation to use contraception, ideal family size, wantedness of last child, and number of living children were categorised under contraceptive goals. The type of place of residence, household wealth, media exposure, access to family planning services, and work status were categorised under contraceptive access. The level of education was categorised under contraceptive competence, while age put under contraceptive evaluation. Thus, the resulting conceptual framework employed in this study is shown in Figure 2.6.

Figure 2.6 Conceptual framework showing the interlinkages between the distal, medial, immediate, and outcome factors.



Source: Adapted from the theoretical framework described in Moultrie and Timæus (2015)

According to Figure 2.6, the distal determinants which work through the medial strategies, are the background factors that influence contraceptive use (Timæus and Moultrie 2008). The distal determinants are further subdivided into three categories. The first comprises demographic factors (age, marital status, number of living children, and ideal family size); the second, socioeconomic factors (level of education, type of place of residence, household wealth index, and whether a respondent is working, or not); and the third is media exposure. The medial strategies comprise the three main motivations for using modern contraception. These are use of contraception to space, limit, or postpone births (Timæus and Moultrie 2008). These theoretical considerations have a bearing on the immediate determinants that finally influence the outcome variable for this study. Each of these three motivations provide a theoretical underpinning of the process whereby a woman may decide on how and when to use contraception. Women/ couples who want to have a child immediately will stop using contraception, so they are able to conceive.

On the other hand, women who want to have a child later will use contraception for purposes of either spacing, or postponing, while women who do not want to have additional children will use contraception for purposes of limiting births. However, the practice of either spacing, or limiting births is likely to affect switching as women switch from less to more effective methods of contraception, or vice versa. For example, women who want to space births are likely

to switch to less effective methods compared to those who want to limit births, who may be more likely to switch to more effective methods.

According to Figure 2.6, accessibility factors – as one of the three conditions suggested by Coale (1973) necessary for fertility reduction – are considered to directly influence contraceptive use and particularly contraceptive method switching. Given high fertility evident in traditional societies, Coale (1973) suggested three preconditions necessary for fertility decline: First, fertility should be within the calculus of conscious choice. Second, fertility reduction should be advantageous, and last, effective techniques necessary for fertility reduction should be known and accessible (Coale 1973; Van de Walle 1992). However, for reasons discussed in Section 2.5.2.1, this study focuses on only contraceptive method switching. Thus, the conceptual framework (Figure 2.6) adapted in this study demonstrates the effect of the distal determinants considered in this study on women's immediate switching behaviour.

2.8 Conclusion

This section provides an assessment of what we know, in terms of the lessons we learn from the available literature, as well as being cognisance of the gaps in the literature, which form part of what we do not know. The section ends with highlighting the gaps that this thesis intends to fill.

2.8.1 What we know

A review of the literature suggests five conclusions: First, in East Africa, cross-sectional estimates and trend analyses point to increasing proportions of women adopting modern methods of contraception over time in all the countries under study, although contraceptive use remains at low levels. However, the majority of studies on sub-Saharan Africa have tended to focus solely on ever-married women because of the primary assumption that sexual activity takes place among married women, but also because earlier family planning programmes targeted only ever-married women.

Second, whereas adoption of modern contraception is increasing over time in the five East African countries (United Nations Population Division 2015), almost all women are more likely to stop using a method at some point in time during their reproductive life span, for reasons other than wanting to have a child (Jain and Winfrey 2017). In this case, women who stop using contraception but they do not want to have a child soon could have health concerns for doing so, as most women who stop using a method have often cited health concerns as the main reason for stopping use. Despite these considerations, users of contraception who either give up completely on using modern contraception, or who do not immediately switch to another method of contraception after stopping have a high risk of unintended pregnancy (Jain and Winfrey 2017).

Third, there is widely available evidence that fertility transition is under way in almost all countries in sub-Saharan Africa. Although the pattern is not uniform, with some areas having a faster transition than others, it should be noted that the increase in the use of modern contraception has been a driving force toward reducing high fertility to relatively lower levels in sub-Saharan Africa. Further, significant and effective use of modern contraception has also offset high levels of mistimed pregnancies and induced abortion in the region. Although we note that many theories have been offered to explain fertility transitions, the use of modern contraception remains the most important predictor of fertility decline.

Fourth, the duration of use of contraception has been suggested to be a likelihood predictor of unwanted, or mistimed pregnancies (Glei 1999; Curtis *et al.* 2011). The implication of this is that women who use contraception for a short time duration are likely to have a high risk of mistimed pregnancies. Further, additional evidence on the use of family planning services suggests that whereas unwanted, or mistimed pregnancies may be as a result of non-use of contraception, or method failure arising from method breakdown, or incorrect use, failure to use contraception continuously, or consistently also plays an important role in having unwanted pregnancies (Frost *et al.* 2007). As Freedman and Berelson (1976) have previously argued, promoting continuity in the use of contraception is the most important thing compared to continuity in the use of a specific method of contraception, as discontinuing use of a method is inevitable.

Finally, the evidence emerging from the literature indicates higher discontinuations among users of short-term methods, which are more adopted than LARCs. Although stopping use of a contraceptive method for reasons other than wanting to become pregnant is likely to occur, immediate switching of contraception is less practised among discontinuers. Moreover, family planning programmes have not attached the same level of importance to immediate switching of contraception among current users, as with adopting modern contraception.

2.8.2 What we do not know

The fight against reducing mistimed pregnancies is compromised when women choose not, or are unable, to use contraception consistently. Therefore, the practice of stopping use of contraception gives rise to another yet important research dimension and reproductive health concern – the switching of contraception.

Despite the wealth of knowledge from the literature, there is a gap in understanding the switching dynamics based on the type of switching in East Africa, and if any switching behaviour could be influenced by the family planning system in place. To answer this, there is need to first examine the quality of family planning services. In addition, because women are less likely to use a contraceptive method continuously, there is need to find out if adoption of contraception to

include both new and old users is dependent on method information exchange. Further, there is also a need to understand if the extent of switching behaviour is similar in all countries under study. This is helpful in that it may provide family planning providers with insights on the riskier groups of having unintended pregnancies which calls for strengthening in the provision of contraception, but also devise more meaningful and easier ways of intensifying contraceptive use. Moreover, results that speak to a uniform cause would be beneficial and can be used as guidelines in other settings elsewhere that require redress and programme action.

While it is clear that non-use of contraception, method failure, and method abandonment are possible causes of unintended pregnancies, inconsistent use emanating from failure to immediately switch contraception remains the biggest challenge in the fight against reducing, or eliminating mistimed, or unwanted pregnancies. Further, whereas most studies have focused on method abandonment as the likely cause of unwanted pregnancies, immediate switching of contraception has been a neglected reproductive health concern. For this reason, the call for a need to change direction from encouraging non-users to adopt a method of contraception to rather focus on consistent, or continuous use of contraception among users has for some time been suggested to be the best way to avoid unintended pregnancies and reduce high fertility (Freedman and Berelson 1976; Jain 1989; Jain 1999; Jain 2016). Moreover, improving the quality in the provision of family planning services rather than only encourage non-users to adopt a contraceptive method has also been suggested to be a better way through which consistent, or continuous use of modern contraception can be achieved (Jain 2016; Jain and Winfrey 2017).

Whereas some discontinuers of contraception will switch to other methods of contraception which may be associated with either positive, or negative reproductive health consequences, there is a lack of understanding of the key predictor factors of immediate contraceptive method switching, when possible different types of switching are considered. Finally, most previous studies on contraceptive use dynamics have focused mainly on ever-married, or currently married women, although some evidence suggest increased use of contraception and childbearing among even never-married women. Thus, a comparative analysis of the reproductive behaviour of all women irrespective of their marital status in East Africa is timely.

Considering the above, this thesis therefore aims to fill two specific gaps in the literature: First, this thesis aims to examine how women use modern contraception and the quality in the provision of family planning services in five East African countries. Second, this thesis aims to investigate consistent use, and immediate switching behaviour, thereby contributing to the existing literature.

3 DATA AND METHODS

“We assume that until better data become available, cautious use of existing data – with all its limitations – provides some perspective on the nature of the problem” (Freedman and Berelson 1976: 5).

3.1 Source of data

The data used for analyses in this study come from the Demographic and Health Surveys (DHS) programme, run by Measure DHS and most frequently funded by USAID. These surveys use nationally representative samples to provide up-to-date information on fertility, mortality, maternal and child health, knowledge and use of contraception, nutrition, and HIV/AIDS amongst other topics. The use of a standard instrument allows comparative analysis across both time and space. The surveys use a cluster sampling design to select the households for interview (Measure DHS 2017). This study uses the most recent (as of January 2017)²⁰ DHS surveys conducted for which the data are publicly available and for which calendar data on contraceptive use were collected to provide a comparative analysis of contraceptive use over time in the East African region. The surveys employed are those for Ethiopia (2011); Kenya (2014); Rwanda (2014/15); Tanzania (2015/16); and Uganda (2011). Although other data sources such as Performance, Monitoring, and Accountability (PMA2020) surveys are consistent with the Demographic and Health Surveys (DHS) in terms of being nationally representative, and also collect data on family planning annually, they were not used because they do not collect a detailed history of contraceptive use similar to the one collected by the DHS programme. Moreover, Rwanda and Tanzania are not part of the eleven countries (Burkina Faso, Cote d’Ivoire, DR Congo, Ethiopia, Ghana, India, Indonesia, Kenya, Niger, Nigeria, and Uganda) in which the PMA2020 surveys are conducted (Johns Hopkins University 2019).

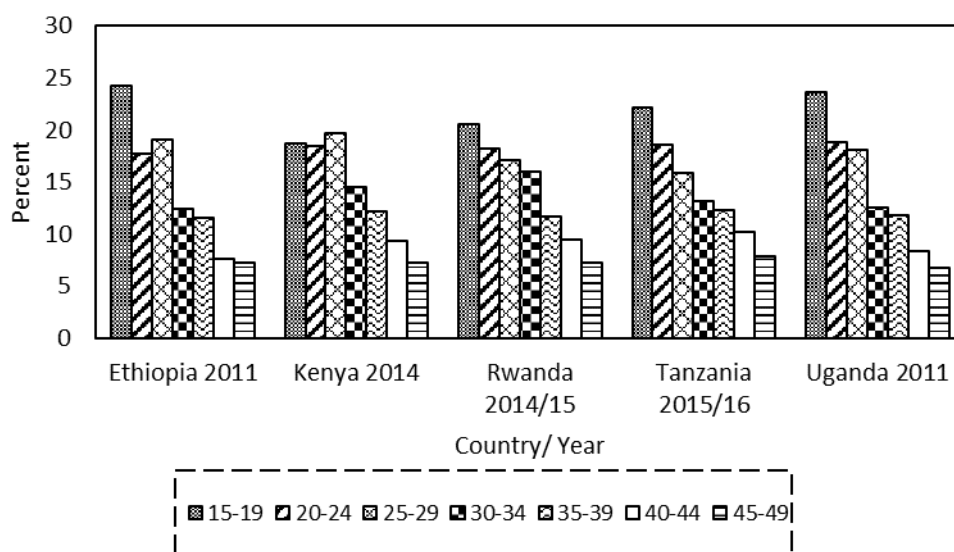
3.2 Samples selected for descriptive analyses

All the analyses presented make use of data on all women aged 15-49 years. Figure 3.1 shows that women from all countries have similar age structures. Whereas other studies that have used calendar data (Bradley *et al.* 2009; Ali *et al.* 2012; Ali *et al.* 2014) have focused on only ever-married women, the main reason for considering all women in the analysis is to allow for the possibility of

²⁰ The recent Ethiopia 2016 DHS and Uganda 2016 DHS were not used in the study because the data were released after the analyses were completed.

never-married women using a contraceptive method (Chandra-Mouli *et al.* 2014; Tsui *et al.* 2017).²¹ Further, as Curtis and Hammerslough (1995) also observe, it is important to consider all women for analyses because of the likelihood of marital status changing over time. This caters for women who may not be currently married at the time of the survey, but were married before. All single women who reported to have never been in a formal union were categorised as ‘never-married’ while the ‘ever-married’ category comprises of women who reported to be currently married, or cohabiting, widowed, divorced, or separated. However, the samples for the events-based analyses were reselected as described in Section 3.3.1.

Figure 3.1 Age distribution of women, aged 15-49 years by age group, five countries, 2011-2015/16 DHSs



3.3 Contraceptive calendar data in the DHS

Figure 3.2 shows a part of the calendar data form that is used to collect information about contraceptive biographies of individual women (Uganda Bureau of Statistics (UBOS) and ICF International Inc 2012). The calendar data are collected using a table that allows respondents to sequence events over time with the aim of reducing recall error (Callahan and Becker 2012) since respondents are likely to forget reporting all the events as they happened far back in the past. Information is recorded on a month-by-month basis with each cell reflecting the occurrence of an event happening in that month (Ali *et al.* 2012). In each month, the calendar data reflects the method of contraception used and – if this is not the same method as that used in the previous month – the reason for discontinuation of the previous method.

²¹ Earlier family planning programmes in sub-Saharan Africa targeted married women. Caldwell (1994) observes that unmarried women in East and Southern Africa were actively discouraged from making use of family planning programmes.

Interviewers are trained to complete the calendar, and further guides are provided on the questionnaire itself (see Figure 3.2). On the left side of Figure 3.2 are the instructions to aid the interviewer in filling in the form. Each contraceptive method is given a letter code which interviewers enter in the cell for each month.

The calendar also records periods of pregnancy, births as well as terminated pregnancies although there is no distinction made between spontaneous and induced abortion (Ali and Cleland 2010a). On the same side, letter codes are provided to encode for the reasons given by women for discontinuing contraception. On the right side is a graphical representation (depicting months per each year) of at least five years prior to the survey. Interviewers are then required to carefully fill in a letter code (from the key) that matches the contraceptive method used by a woman, or non-use of contraception. Episodes of use and non-use of a method are structured in such a way that method use that results in unexpected pregnancy is categorised as “method failure”; method abandonment after use for some time is categorised as “discontinuation of methods”; and changing of methods from one to another is categorised as “method switching” (Croft *et al.* 2017).²²

²² Croft *et al.* (2017) offer a detailed explanation on completing the questionnaire and the data structure of the contraceptive calendar data conducted in the DHS surveys.

Figure 3.2 Extract from DHS contraceptive use calendar, Uganda 2011

INSTRUCTIONS:
 ONLY ONE CODE SHOULD APPEAR IN ANY BOX.
 COLUMN 1 REQUIRES A CODE IN EVERY MONTH.

INFORMATION TO BE CODED FOR EACH COLUMN

COLUMN 1: BIRTHS, PREGNANCIES, CONTRACEPTIVE USE**

B BIRTHS
 P PREGNANCIES
 T TERMINATIONS

0 NO METHOD
 1 FEMALE STERILIZATION
 2 MALE STERILIZATION
 3 IUD
 4 INJECTABLES
 5 IMPLANTS
 6 PILL
 7 CONDOM
 8 FEMALE CONDOM
 9 DIAPHRAGM
 J FOAM OR JELLY
 K LACTATIONAL AMENORRHEA METHOD
 L RHYTHM METHOD/MOONBEADS
 M WITHDRAWAL
 X OTHER MODERN METHOD
 Y OTHER TRADITIONAL METHOD

COLUMN 2: DISCONTINUATION OF CONTRACEPTIVE USE

0 INFREQUENT SEX/HUSBAND AWAY
 1 BECAME PREGNANT WHILE USING
 2 WANTED TO BECOME PREGNANT
 3 HUSBAND/PARTNER DISAPPROVED
 4 WANTED MORE EFFECTIVE METHOD
 5 SIDE EFFECTS/HEALTH CONCERNS
 6 LACK OF ACCESS/TOO FAR
 7 COSTS TOO MUCH
 8 INCONVENIENT TO USE
 F UP TO GOD/FATALISTIC
 A DIFFICULT TO GET PREGNANT/MENOPAUSAL
 D MARITAL DISSOLUTION/SEPARATION
 X OTHER

			1	2
12	DEC	01		
11	NOV	02		
10	OCT	03		
09	SEP	04		
2	08	AUG	05	2
0	07	JUL	06	0
1	06	JUN	07	1
1	05	MAY	08	1
*	04	APR	09	*
	03	MAR	10	
	02	FEB	11	
	01	JAN	12	
12	DEC	13		
11	NOV	14		
10	OCT	15		
09	SEP	16		
2	08	AUG	17	2
0	07	JUL	18	0
1	06	JUN	19	1
0	05	MAY	20	0
*	04	APR	21	*
	03	MAR	22	
	02	FEB	23	
	01	JAN	24	
12	DEC	25		
11	NOV	26		
10	OCT	27		
09	SEP	28		
2	08	AUG	29	2
0	07	JUL	30	0
0	06	JUN	31	0
9	05	MAY	32	9
*	04	APR	33	*
	03	MAR	34	
	02	FEB	35	
	01	JAN	36	
12	DEC	37		
11	NOV	38		

Source: Uganda Bureau of Statistics (UBOS) and ICF International Inc (2012)

3.3.1 Analytic sample for events-based history analysis

The calendar data are stored in a string format. A file in single months was created by de-stringing the calendar data. This transformation creates a data file with person-month observations, where there is one record for every month of use, or non-use of contraception for a single woman. An events file was created with episodes of use, or non-use of contraception. The events file shows a record in the calendar for a specific duration of time. Episodes of use and non-use of contraception are collected from the start of the calendar up to the interview date. By definition, an episode is a period of uninterrupted use, or non-use of contraception (Ali and Cleland 2010b). However, a woman may have more than one episode of contraceptive use, or non-use of contraception during the period of observation in the calendar.

The DHS standard recode file provides the date for the start of the calendar period. However, women in the sample have different periods of observation, because of the varying dates of the interview, which makes the analysis of exposure time intricate (Bradley *et al.* 2009). To standardise the period of observation, all contraceptive biographies of women were maintained for the period between the start of the calendar to the date of the interview. However, in generating a file in single months for analysis, periods of observation were standardised to a period of 60 months prior to the interview date and – following Ali and Cleland (1995) – truncating the data to a point three months before the survey to avoid bias introduced by women not being aware of first trimester pregnancies (Ali and Cleland 1995). Further, the analysis did not consider episodes in progress at the start of the calendar to avoid selection bias, or left censoring (Ali and Cleland 1999), because we do not know when those episodes started.

Thus, based on this standardisation, a summary of the resulting person-months and episodes in the calendar is shown in Table 3.1. The total person-months for each survey represent the total number of events per month for all women for 60 months. The corresponding episodes are the total number of all episodes of events in the person-months file, for a period of 60 months. However, as indicated earlier, the analysis ignored episodes that started before the start of the calendar.

Table 3.1 Person-months and episode files for analyses, five countries, 2011-2015/16 DHSs

<i>Country/ Year of survey</i>	<i>Analytic sample</i>	<i>Person-months</i>	<i>Total Episodes in the data file</i>	<i>Episodes included in the analysis</i>
Ethiopia 2011	4,850	291,000	20,139	19,872
Kenya 2014	7,985	479,100	31,326	30,891
Rwanda 2014/15	6,067	364,020	26,488	26,032
Tanzania 2015/16	6,092	365,520	27,436	27,021
Uganda 2011	3,632	217,920	18,222	17,971

Note: Episodes shown in Table 3.1 are for all events in the respective calendars.

3.4 Methods of analysis

The calendar data used here are collected retrospectively in a manner that permits longitudinal analysis. This allows the use of survival models which are helpful for understanding changes in the demographic behaviour of individuals over time (Balán *et al.* 1969; Trussell and Guinnane 1991). Non-parametric models are used in the modelling of contraceptive use dynamics because they are well-suited to handling discrete data. This is because women are asked to report on their contraceptive use and the duration of use of a specific contraceptive method is recorded to the nearest whole number (in months of use in each year). However, there is no assumption made in the application of these models about the distribution of failure times and the effect of the covariates on the outcome (Cleves *et al.* 2010).

The data are not analysed according to the reasons for discontinuation given in the calendar. Five considerations motivate this decision: First, the inability of the DHS instrument to ascertain, or test the reliability of the reasons for stopping use of contraception may lead to invalid conclusions (Ali and Cleland 1999). Bongaarts and Bruce (1995) have referred to this as a “response error” resulting from providing a quick answer to a complicated question. Further, they observe that a single answer offered in most cases is too simplistic and may not offer a nuanced picture of the underlying reasons. For example, Blanc *et al.* (1999) have argued, couple separation is a likely cause of abandonment of methods yet these may not form part of the main reasons given for stopping use of a contraceptive method. Moreover, inconsistencies in reporting are likely to occur should women have more than one reason for stopping use (Curtis *et al.* 2011).

Second, not all women will provide a reason for stopping use of a contraceptive method. Therefore, in scenarios where results are based on the reasons for discontinuation, women who did not give reasons for discontinuation are likely to be omitted. This also means that classification of women according to the reason for discontinuation remains a challenge (Ali *et al.* 2014).

Third, almost all women will stop using contraception (for any reason other than wanting to become pregnant) at some point in time. These reasons can range from psychological, or biological (Ali and Cleland 2010b) to dissatisfaction, or poor service delivery (Ali *et al.* 2012). The concern therefore is to ascertain if women who stop using contraception for reasons other than wanting to have children immediately switch to other methods of contraception to avert unwanted pregnancy – the core focus for the present study.

Fourth, the observation that health concerns and side effects have been found to be the leading cause cited by women for stopping use of contraception (Ali and Cleland 1999; Steele and Curtis 2003; Ali and Cleland 2010b; Cleland *et al.* 2014) in most populations provides another justification as the majority of discontinuations are coded as being associated with health related concerns. Furthermore, in situations where women are too embarrassed to discuss sexual matters, or too polite to discredit family planning services, they may mention health concerns as a reason for not using contraception (Bongaarts and Bruce 1995) and, last, since our focus is not on the analysis of contraceptive failure, or discontinuation incorporating the reasons for discontinuing is less important.²³ Based on these reasons, it can be argued that transitions in contraceptive use which are not disaggregated by reason for discontinuation still offer a reasonable account of women’s contraceptive switching behaviour.

²³ The estimates that speak to side effects, or method related reasons as the leading cause of stopping use of contraception within the period of observation are presented for the available data in Table A.1, Table A.2, Table A.3, and Table A.4.

3.4.1 Kaplan-Meier estimation

The most important aspect of survival analysis is to model the time to the occurrence of the event of interest. This could be the time it takes for someone to adopt, or switch, methods of contraception. This can be modelled by use of the Kaplan-Meier method which is suitable for the study of survival analysis, and most especially suitable for non-parametric estimation (Kaplan and Meier 1958). In this thesis, the Kaplan-Meier method is employed to study durations of use of contraception since initiation over time.

However, in many studies where individuals are followed over time, it is likely that not all individuals will experience the event during the period of observation. The reasons for this can be partly due to the study design, changes in the objectives of the study, or on the part of studied individuals, a situation commonly referred to as censoring (Cleves *et al.* 2010).

Censoring takes two forms: right censoring and left censoring. Left censoring occurs when researchers have no idea about what happened to the individual before the start of the period of observation. On the other hand, right censoring is when individuals are either lost to follow-up, or experience the event of interest but after the study has ended (Kaplan and Meier 1958).

In this study, two implicit assumptions about censoring are required: First, censored individuals have the same survival chances as those not censored, because it is assumed that all individuals are similar in terms of composition and behaviour regardless of whether they are censored, or not.²⁴ This means that the behaviour of women who either adopt, or switch contraception outside the period of observation (60 months before the survey date) is the same as those who adopt, or switch contraception within the period of observation. Second, the survival probabilities for individuals that join the study early are assumed to be the same as for individuals who join the study at a later stage (Jager *et al.* 2008). This can imply that the chances of either adopting, or switching contraception is likely to be the same at any point in time during the period of observation.

3.4.2 Sequence analysis

Although event history techniques offer a rich way of analysing longitudinal data, such techniques are unable to offer a 'holistic perspective' of life course studies as a group (Billari 2001).²⁵ A holistic perspective is 'descriptive and exploratory' (Halpin 2010) but offers an understanding of when

²⁴ However, Jager *et al.* (2008) observe that such an assumption may be hard to test.

²⁵ Researchers such as Brzinsky-Fay and Kohler (2010) and Billari (2001) have observed that although sequence analysis and event history techniques are competing for dominance in the field of longitudinal data analysis because both methods use the same data, this may not be true. Sequence analysis looks at data as a unit and it is rather a complimentary statistical method to event history techniques. In addition, Aisenbrey and Fasang (2010) have also argued that sequence analysis and event history techniques go hand in hand.

events occurred, how they are ordered in a sequence and the amount of time spent in each state (Abbott and Tsay 2000). Billari and Piccarreta (2005) define a ‘holistic perspective’ as the “number of different states, or changes in states in a sequence” (Billari and Piccarreta, 2005: 90). In this research, sequence analysis is employed to help understand women’s past history of contraceptive use up to a point in time (Brzinsky-Fay *et al.* 2006). Abbott and Tsay (2000) note that sequence analysis methods were first introduced in the field of social sciences in the 1980s, a concept commonly applied in the field of biological sciences where they were first used to study DNA sequences. These methods have been applied to study employment, family, school and work sequences among other studies (Brzinsky-Fay *et al.* 2006; Brzinsky-Fay and Kohler 2010; Halpin 2010; Halpin 2017).

A sequence “is an ordered list of elements” (Brzinsky-Fay and Kohler, 2010: 360). Other authors have defined a sequence as a passage, or a transition (Martin *et al.* 2008). Sequences can either be recurrent, or non-recurrent. As the name suggests, recurrent sequences have repeated elements (events) while non-recurrent sequences do not have repeated elements (Billari and Piccarreta 2005). Some of the advantages that accrue from the application of sequence analysis include the provision of a trajectory analysis of longitudinal data; ability to understand the similarities and different behaviour of individuals; easy applicability of the method and with fewer assumptions on generating results; and ability to understand how different subgroups differ from one another (Aisenbrey and Fasang 2010; Brzinsky-Fay and Kohler 2010).

In this study, the elements – the events of either using, or not using a method of contraception in the calendar at any point in time – follow a recurrent sequence. Sequence analysis tools available in Stata were employed using the SADI ado macro developed by Halpin (2017), to compare changes in different states (contraceptive methods) over time. The changes in states are examined by use of chronograms – which permits an examination of when women either adopted, or switched contraception during the period of observation.

3.4.3 Discrete-time survival hazards models

Several methods have been suggested to model survival data but the choice of method depends on the nature of data available to the researcher and the objectives of the analysis (Hedges and Vevea 1998; Bell and Jones 2014). For example, the nature of the data collected in the field can be in either continuous, or discrete form. In the case of continuous survival data, survival time is structured in such a way that the time to the occurrence of the event of interest is measured in exact time units. The methods employed to model continuous data assume that survival and censoring times under continuous data are unique and that different individuals cannot have the same time of failure, or experience the event of interest at the same time (Rabe-Hesketh and

Skrondal 2008). In contrast, discrete-time survival data is measured in finite units with the possibility of different individuals sharing the same survival, or failure times – as the case is in this study where the data follows a discrete time format.

According to Singer and Willett (2003), most researchers end up working with discrete data because some data is collected with events of interest occurring at a discrete time, for example the number of women switching to a contraceptive method after one year. Further, most longitudinal studies use intervals to record time due to the inability of respondents to recall the exact times at which events occurred. In this study, the data used is in discrete form, that is, the number of months for use of a specific method of contraception, or number of months it takes a woman to switch between contraceptive methods. In this case, continuous-time approaches such as the Cox-proportional hazards models are inappropriate (Singer and Willett 2003). By contrast, discrete-time survival models are better at handling discrete data.

A discrete-time hazard model produces a conditional probability that the event of interest occurs at time t given that it has not yet occurred. The discrete-time hazard model is defined as

$$h_t = \Pr(T = t \mid T > t - 1) = \Pr(T = t \mid T \geq t) \text{ Equation 1}$$

where T is the time in months for a woman to switch contraception and $t = 1, 2, 3, \dots, n$, and n is n^{th} time.

3.4.4 Multilevel modelling

Multilevel models are statistical models designed to control for correlation in clustered data at different levels of analysis (Pebley *et al.* 1996; Teachman and Crowder 2002). The effects of the covariates (included in the study) on the outcome were modelled by fitting a multilevel logistic random intercept effects model which produces odds ratios of switching contraception. Such models assume that the difference in odds ratios between women with different background characteristics is constant over time (Rabe-Hesketh and Skrondal 2008). By definition, odds ratios provide the odds that an event will occur in the presence of a particular variable compared to an event occurring but in the absence of that particular variable (Szumilas 2010).

In running multilevel models, independence of the way events occur is assumed to hold. For example, this study assumes that women's behaviour in the way they use contraception, or characteristics is likely to be independent of each other. For independence to occur, it means that there is no correlation between and within studied groups of women.²⁶ However, this may not

²⁶ In other literature, terms such as aggregation and disaggregation as described by Woltman *et al.* (2012) are used to refer to ignoring within group and between group variation respectively.

always be the case especially for clustered data. Correlation is likely to occur in the case of clustered data because women who are in the same cluster may share the same characteristics and behave in similar ways and so the assumption of independence would be violated – implying that women within the same cluster are treated as homogeneous.

The level of correlation is likely to differ between and within clusters. For hierarchical data, the level of correlation between clusters is likely to be lower than within clusters. In contrast, correlation is likely to be high both between and within clusters for repeated data, such as our case where women are nested within a cluster. Whereas the assumption of independence is likely to be violated in both instances, independence is likely to be more violated within clusters because women within the same cluster are likely to share the same characteristics and behave in the same way than between clusters (StataCorp 2015). This leads to a reduction in the robustness of the resulting estimates, especially if simple multivariate statistical models are employed as was the case before the introduction of multilevel data analysis techniques in the 1970s (Woltman *et al.* 2012).

Although simple multivariate analysis techniques could be employed to analyse hierarchical, or repeated data, such methods disregard the possibility of having correlation in the data. Therefore, to still maintain the assumption of independence between and within clusters, possible correlation at two levels was controlled for – the first level is the cluster, and the second level is the individual with repeated observations, for different times. This multilevel model is referred to as a random intercept effects model because it assumes that unobserved correlation is constant across the studied individuals.

In this study, the logistic random intercept effects model of two levels, with maximum likelihood estimation was fitted to the data as defined below:

$$y_{ij} = B_1 + B_2 X_{2ij} + \dots B_k X_{kij} + \zeta_{ij} \text{ Equation 2}$$

where y_{ij} is the response variable for individual j with repeated observations in cluster i , B_1 is the random intercept, X_{2ij} and X_{kij} are covariates with coefficients B_2 and B_k respectively and ζ_{ij} is the residual.

The logistic random intercept effects model is preferred because of its ability to handle both time-constant and time-varying variables. These models produce robust standard errors that allow for clustering. Further, random intercept effects models are also good for handling both within and between effects and can accommodate changes in such effects across space and time (Bell and Jones 2014). Random intercept effects models assume that residuals are independent of the independent variables in the model and that the residuals are also assumed to be normally distributed (Stiratelli *et al.* 1984; Bell and Jones 2014). Other advantages for employing such models

are flexibility and ability to handle unobserved heterogeneity (Hedges and Vevea 1998) and the ability to make inferences about the population mean using a sample with both the cluster and individual units (Rabe-Hesketh and Skrondal 2008).²⁷ In general, multilevel models are useful because they do not require many assumptions (Woltman *et al.* 2012). However, for stronger statistical power, multilevel modelling requires a bigger sample size. In addition, multilevel data analysis techniques are time consuming compared to the conventional statistical models and, the guidelines supporting their application have been suggested to still be under development (Woltman *et al.* 2012).

However, although it is assumed that most of the variables included in the models are treated as time-invariant, there is need to acknowledge the limitations that come with making such a strong assumption. Whereas women's background characteristics can be linked to calendar data to study their effects on contraceptive use, it is important to note that women's characteristics are likely to change with time. For example, a woman's current place of residence during the interview might be different from her place of residence a few years before the interview. The same problem might also apply to other background characteristics such as educational attainment, household wealth, and intentions to use contraception as these are likely to change with time. Despite these limitations in the data, it is assumed that the effects of the variables measured at the date of the interview are likely to be representative of the changes that might occur in the five years before the survey (Polis *et al.* 2016a). The implication for these considerations is that the effects of background characteristics on the outcome should not be over interpreted.

In selecting reference categories for each variable, the largest category in each variable was used. A duration variable (time to the event of interest that is measured in months) was included in all the models. All the analyses performed in this study are done for each country separately but the results generated were compared across all five East African countries. All the results presented in the thesis are adjusted to take care of the appropriate weights (including the complex sampling survey weights) for representativeness to the whole population and for appropriate adjustments for non-response and missing values.

3.4.4.1 *Testing for multicollinearity*

Multicollinearity is said to exist if there is a linear relationship between two, or more background variables considered in the model (Alin 2010). The problem of multicollinearity is not because of the errors that might arise from running the model, but rather multicollinearity is likely to come up

²⁷ Trussell and Guinnane (1991) however note that the problem of unobserved heterogeneity cannot be solved completely since models can only capture unobserved heterogeneity that is independent of the covariates included in the model.

when the standard error of the coefficient of any predictor that is collinear with others gets inflated. This leads to a smaller t -statistic and a correspondingly less significant p -value (Alin 2010). As the degree of multicollinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients become wildly inflated and may even change in sign and magnitude. This means that the confidence intervals on the regression coefficients may be larger than expected (Grewal *et al.* 2004).

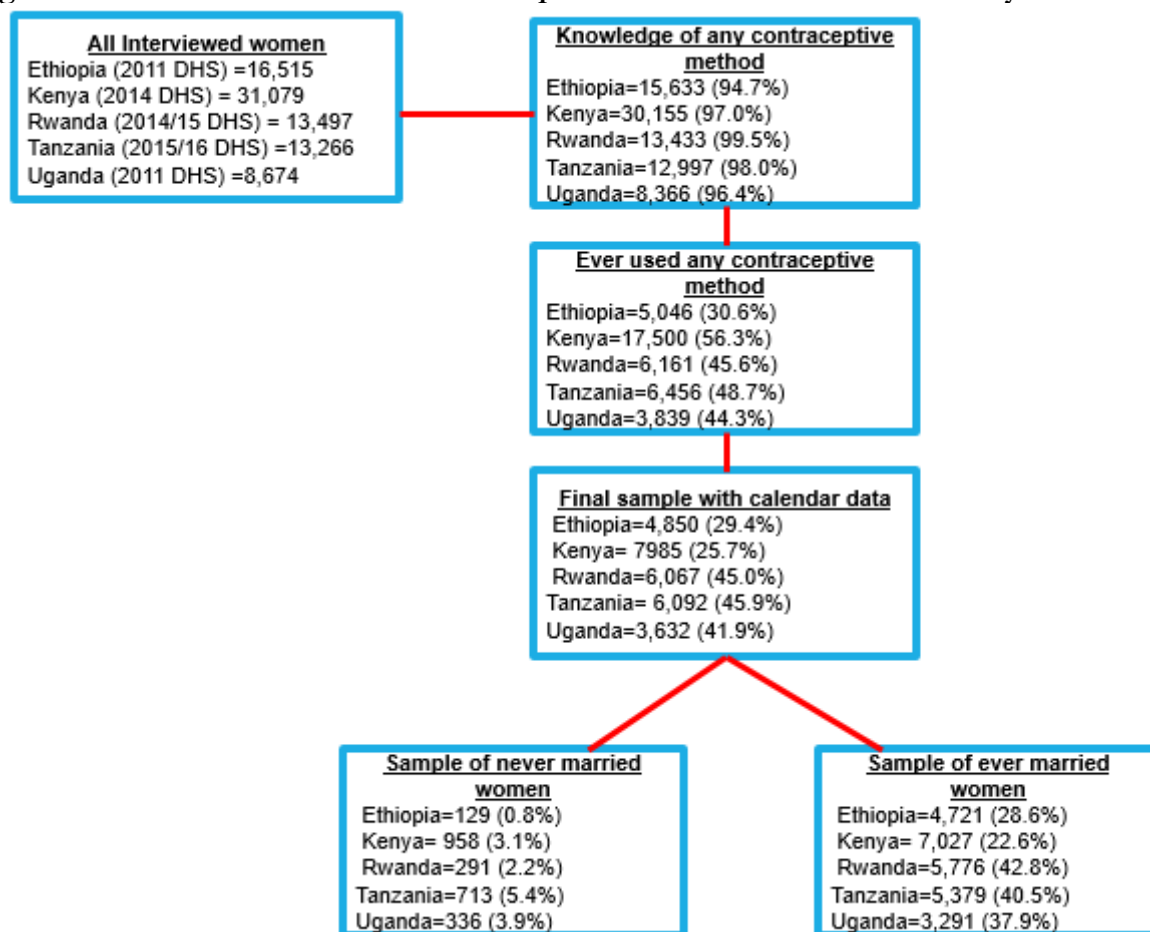
Unfortunately, Grewal *et al.* (2004) argue that it may not be possible to completely rule out multicollinearity among the independent variables once it is present. This is because, in most real-life observational research (as opposed to experimental research, where treatments can be randomized), a certain amount of multicollinearity is inevitable, as background variables researchers are usually interested in are correlated to some extent. An example of such a situation is a person's income and their level of education.

However, to ensure that there is absence of multicollinearity, a collinearity test (*collin*) which shows whether the predictor variables considered in regression models are independent from each other was performed and, results (shown in Table A.5) pointed to no, or minimal correlation as the estimated tolerance value – a collinearity diagnostic measure – is close to a value of one for all surveys and countries included in the study.

3.5 Procedure in sample selection for analysis

The standard woman recode file for women aged 15-49 years from each selected survey was used in the analyses. The sample size of the surveys varies substantially: Kenya had the largest number of women (31,079) that participated in the survey while Uganda had the smallest number of interviewed women (8,674). All interviewed women were then grouped into two categories: never-married and ever-married women. However, as there were very few episodes of contraceptive use among never-married women, the results in respect of never-married women should be interpreted with caution. Consequently, in all analyses (and in the regression models) data are not segregated by marital status.

Figure 3.3 Schematic selection of the sample included for events–based analyses.



The samples for the events-based analyses were filtered to retain only women who showed knowledge about any contraceptive method and who reported ever using any contraceptive method to either delay, or stop further childbearing. The DHS asks women if they have any knowledge about any contraceptive method, traditional, or modern.

The final sample used in the analysis is a group of women who have ever used contraception, and who have completed contraceptive calendars. A schematic of the final analytic sample is shown in Figure 3.3. Following the criterion presented in Figure 3.3, the largest final analytic sample for analysis is 7985 women from Kenya while 3632 Ugandan women constitute the smallest sample.

3.6 Coding and measurement of background factors

This section explains how the variables included in this study are coded and measured. Table 3.2 shows summary data of the variables in the analytic sample considered for analysis.

Table 3.2 Summary data of respondents considered for analyses of reproductive calendar data, five countries, all women (weighted)

<i>Background characteristics</i>	<i>Ethiopia 2011</i>		<i>Kenya 2014</i>		<i>Rwanda 2014/15</i>		<i>Tanzania 2015/16</i>		<i>Uganda 2011</i>	
	<i>Number</i>	<i>percent</i>	<i>Number</i>	<i>percent</i>	<i>Number</i>	<i>percent</i>	<i>Number</i>	<i>percent</i>	<i>Number</i>	<i>percent</i>
Age										
15-19	307	6.3	375	4.7	78	1.3	399	6.6	264	7.3
20-24	1005	20.7	1497	18.8	730	12.0	1182	19.4	741	20.4
25-29	1278	26.4	2079	26.0	1413	23.3	1303	21.4	912	25.1
30-34	908	18.7	1577	19.8	1557	25.7	1123	18.4	639	17.6
35-39	753	15.5	1214	15.2	1108	18.3	1000	16.4	563	15.5
40-44	383	7.9	766	9.6	793	13.1	690	11.3	351	9.7
45-49	215	4.4	476	6.0	387	6.4	395	6.5	163	4.5
Residence										
Urban	1498	30.9	3595	45.0	1087	17.9	2490	40.9	923	25.4
Rural	3352	69.1	4390	55.0	4980	82.1	3602	59.1	2709	74.6
Education										
No education	2579	53.2	253	3.2	915	15.1	744	12.2	331	9.1
Primary	1654	34.1	4271	53.5	4371	72.0	4015	65.9	2060	56.7
Secondary	318	6.6	2445	30.6	636	10.5	1236	20.3	970	26.7
Higher	299	6.2	1016	12.7	145	2.4	97	1.6	270	7.4
Wealth index										
Poorest	586	12.1	773	9.7	1193	19.7	728	12.0	370	10.2
Poorer	802	16.5	1399	17.5	1244	20.5	961	15.8	568	15.7
Middle	851	17.5	1622	20.3	1212	20.0	1117	18.3	665	18.3
Richer	957	19.7	1878	23.5	1216	20.1	1450	23.8	791	21.8
Richest	1654	34.1	2312	29.0	1202	19.8	1836	30.1	1237	34.1
Number of surviving children										
0	502	10.4	695	8.7	39	0.6	509	8.4	293	8.1
1-3	2570	53.0	4865	60.9	3724	61.4	3403	55.9	1520	41.9
4 or more	1777	36.6	2425	30.4	2304	38.0	2180	35.8	1819	50.1
Media										
Not exposed	1388	28.6	708	8.9	879	14.5	839	13.8	373	10.3
Exposed	3460	71.4	7277	91.1	5181	85.5	5253	86.2	3258	89.7
Access to family planning										
No	1562	32.3	380	4.8	376	6.2	755	12.4	344	9.5
Yes	3281	67.7	7604	95.2	5691	93.8	5336	87.6	3287	90.5
Work status										
No	2683	55.3	2131	26.7	732	12.1	1193	19.6	899	24.8
Yes	2162	44.6	5847	73.3	5331	87.9	4899	80.4	2728	75.1
Ideal family										
3 or fewer	1244	25.7	4525	56.7	3260	53.7	1574	25.8	571	15.7
4	1777	36.6	2251	28.2	1831	30.2	1835	30.1	1508	41.5
5 or more	1390	28.7	1106	13.9	922	15.2	2491	40.9	1466	40.4
Non-numeric	438	9.0	102	1.3	54	0.9	192	3.2	82	2.3
Total	4850	100	7985	100	6067	100	6092	100	3632	100

The majority of women included in the sample for the analysis of calendar data in each country live in rural areas, have media exposure, and have access to family planning services. The majority were aged 25-29 years and disproportionately in the richest household wealth index at the time of the interview in all countries but Rwanda. Although this stratification suggests a potential bias of the results since it may imply that it is the majority richest women who have ever used contraception, and hence contributed to the calendar data, this may not however, influence the behaviour of switching between methods because other factors are likely to play a role. Table 3.2 also shows that the greatest proportion of women have primary education, and are currently employed, in all countries but Ethiopia. Women with three or fewer living children constitute the majority in Ethiopia, Kenya, Rwanda, and Tanzania compared to Uganda with four or more living children. Finally, most women in Ethiopia and Uganda have an ideal family size of four children,

less than four children for Kenyan and Rwandan women, and more than four children for Tanzanian women.

3.6.1 Background variables

Two reasons guide the selection criteria for the variables considered in the analysis. First, the demographic (age, number of living children), socio-economic (type of place of residence, household wealth, level of education, work status), and motivational (intention for using a method, whether last child is wanted or not, access to family planning services) have been reported to be significant factors for contraceptive use continuation and switching (Ali and Cleland 1999; Steele and Curtis 2003; Bradley *et al.* 2009; Ali and Cleland 2010a). Second, the variables used in this study are based on Bulatao's (1989) framework on contraceptive method choice, categorised in four broad themes; contraceptive access (type of place of residence, household wealth, media exposure, access to family planning, and work status), contraceptive competence (level of education), contraceptive evaluation (age), and contraceptive goals (intention for using a method, ideal family size, wanted last child or not, number of living children). Almost all the distal determinant variables used in this study are treated as categorical variables.

3.6.1.1 Level of education

A variable that measures women's highest level of education was considered in this study. This variable classifies women who have never attended school, primary, secondary, and tertiary education. However, for analysis of calendar data, women with secondary and tertiary education were combined to permit meaningful analysis by educational level since very few women in any of the surveys had tertiary education. Women were thus classified as having no education, primary, or secondary and higher education.

3.6.1.2 Age at exposure

Although the women included in the analyses are a sample of women aged 15-49 years at the time of the interview, the age at exposure – that is, the age of the woman at the time of each event was computed – to know the age of the woman at which events in the calendar occurred during the period of observation. However, since some women that were aged 15 years at the time of the survey experienced events before they turned 15 years, a 10-14 years' age group was created to cater for them. Age was further regrouped into ten-year age groups since some five-year age groups were small.

3.6.1.3 Place of residence

The type of place of residence at the date of the survey is a dichotomous variable; urban versus rural residence. As mentioned earlier (and considering the structural limitation of DHS data), the

implicit assumption is that women have not changed their place of residence in the five years preceding the survey. Moreover, differences in the definitions of what constitute an urban area may matter – leading to different results between urban and rural areas by country. However, this thesis does not get into precise definitions of each country.

3.6.1.4 *Household wealth index*

The DHS programme uses an asset-based approach to proxy the socio-economic status of a household by reference to the assets owned in the household. The household wealth index is a composite index that measures the household's cumulative standard of living. It is calculated using data collected on household ownership of some selected items such as bicycle, car, television, materials used to construct a house, source and type of drinking water, and sanitation services. The household wealth index, which is based on the number of people living in a household (and not the distribution of households), is derived using the Principal Component Analysis (PCA) where each individual is given a score of their household. The final household wealth index is then reached at by dividing the number of people in a household into five 20-percent quintiles (Rutstein and Johnson 2004).

The asset-based approach that is used to measure the wealth index in the DHS programme is preferred to other approaches such as the income and expenditure approaches because the questions included in the measurement of the wealth index are direct and simple to comprehend, some questions related to the housing materials can even be answered, or ascertained using the direct observation, and due to the nature of such questions, for example housing materials used to construct the dwelling unit, there is less occurrence of recall, or social desirability biases (Howe *et al.* 2008). Moreover, Rutstein and Johnson (2004) observe that a significant proportion of people are less likely to disclose their true household income to interviewers because they are either hiding it, or they do not know. Rutstein and Johnson (2004) also note that concealment of household income occurs in most cases when respondents realise, or suspect interviewers to come from a government institution. Further, in situations where the household engages in self-employment, home production of goods and services, and where the household has several sources of income, respondents are less likely to report their true income because they are less likely to keep track of the costs of production and depreciation.

Despite the DHS wealth index being the most important proxy measure for socio-economic status and health wellbeing of a household, it faces several limitations. Since the wealth index is a household index, its applications to individuals implicitly assumes that the resources of the household are at the disposal of individuals which may not be, particularly in complex household forms. Further, Rutstein and Staveteig (2014) note that the index is both country- and

time-specific. This means that comparisons across countries and over time may lead to misleading results and conclusions. For example, a very poor country may have a relatively poor household placed in a high wealth quintile which may not be the case with another richer country. In addition, the prices of assets in the wealth index may vary over time and across countries. Therefore it may be misleading to compare the wealth of a household based on these assets should they be acquired, or purchased at different times. Moreover, the quantity and quality of assets, for example, number or type of cars and trucks, are not captured by DHS surveys. Such observations have led to the call for a wealth index measure that can be used for comparisons across countries and over time (Rutstein and Staveteig 2014).

However, the reason for including the wealth index in this study is not to compare amongst countries but rather to compare amongst individual women within the same country – and its possible relationship to contraceptive use and method switching. Household wealth index has five categories in the standard recode file; poorest, poorer, middle, richer, and the richest household wealth quintile. Again, to avert excessive fragmentation of the data, these five categories were collapsed into three: poor category (the poorest and poorer households); middle; and rich (by combining the richer and richest categories).

3.6.1.5 Current employment status

The current working status of respondents is a dichotomous variable. Women are classified into two groups; either currently working, or not working at the time of the survey. Again, the implicit assumption is that women's employment status has not changed in the five-year period before the survey.

3.6.1.6 Number of living children

As a measure of fertility, the number of living children was preferred to children ever born because family formation strategies are determined more by surviving children. This provides a better measure of fertility for the measurement of contraceptive use dynamics as parents tend to be more interested in surviving children as opposed to births (Becker 1960). Moreover, earlier fertility declines observed in Botswana, Kenya, and Zimbabwe were significantly associated with improved child survival from birth to age five years (Caldwell 1994) – implying that the number of children ever born is likely to be higher when child survival is low and vice versa. Women were categorised into three groups: childless women; those with 1-3 living children; and women with more than three living children, because we want to know how the switching behaviour of childless women compares to that of parous women.

3.6.1.7 *Ideal family size*

Women's reported ideal family size was categorised as follows: three or fewer; four children; five or more; and non-numeric. The non-numeric category comprises of women who are fatalistic, or who said, 'up to God, or Allah' when asked to give a numeric response to their desired family size, although this is only numerically substantial in Ethiopia.

3.6.1.8 *Media exposure*

Two main sources of media (listening to radio, or watching television) were considered to compute the media exposure variable, because they are important sources of disseminating family planning messages (Ali *et al.* 2003; Bradley *et al.* 2009). Women who either listened to a radio, or watched television in the last 12 months before the survey were considered to have exposure to family planning messages while women who did not have access to either sources were regarded not to have any exposure.

3.6.1.9 *Accessibility to family planning services*

The distance, cost of family planning services, visits to a health facility, and time of travel can be used as measures of accessibility (Hermalin and Entwisle 1985; Ketende *et al.* 2003). However, because of the inability of our data to measure all these variables, this study makes use of only the distance and visits to a health facility as proxy measures for accessibility to family planning services, since it is likely that women who face no problem with the distance to a health facility are also more likely to make visits to a health facility. Thus, women who declared not to have any problems with the distance between home and health facility are more likely to have access to family planning services than their counterparts who have problems with the distance to a health facility. This hypothesis is based on previous studies (Bradley *et al.* 2009) that observed increased abandonment of short-term methods such as the injectable and pill among women with no access to family planning services.

3.6.1.10 *Motivation for using contraception*

According to Timæus and Moultrie (2008), women use contraception for either stopping, spacing, and postponing births. However, the DHS programme is not really set up to identify postponement on an individual level. For this reason, this thesis places women into two categories: spacing, or limiting. In this research, women who said they wanted another child at a specified future time, and those who were not sure of the timing of their next child although they expressed a desire to have another child were assumed to be using a method to space births. Women who reported not wanting another child and the sterilised, were assumed to be using a contraceptive method for limiting purposes. Although sterilised women are not at risk of switching

contraception, we considered them in the analyses, as done in previous studies (Bradley *et al.* 2009; Ali and Cleland 2010a), because they provide useful information about adoption of sterilisation and switching to sterilisation methods. However, women who did not respond to any of the questions on desire for more children were not categorised. Again, this information is based at the time of interview yet fertility preferences are likely to change over time. In other words, women's fertility preferences at any given point in time might be different from that declared at the time of the interview. Polis *et al.* (2016a) observe that because of the possibility of intentions changing within 60 months prior to the survey date, they assume that the effect of intentions at the time of the survey on the dependent variable is representative of all changes that occur within 60 months before the survey. In this research, we make the same assumption, and assume that the effect of intentions on the outcome variable at the time of the survey is representative of all possible changes within 60 months before the survey.

3.6.1.11 *Wantedness of last child*

Women were asked if they wanted to have their last child. Women are classified into three groups; wanted a child then, wanted a child later, or did not want additional children. Again, because of possible changes in preferences over time, we assume that the effects on the outcome measured at the time of the survey are representative of the changes that may occur within 60 months before the survey.

3.6.2 **Switching variable**

A dichotomous switching status variable was created as the dependent variable. All possible forms of switching contraception were considered. In this study, we follow the approach employed by Barden-O'Fallon *et al.* (2018) that limits the period of switching to one month because longer periods of not using contraception as a result of delayed switching may lead to unintended pregnancy.²⁸ This type of switching has been referred to as "continuation", where a new method is immediately used in the month that follows discontinuation of the previous method (Sambisa and Curtis 1997). Thus, an immediate switch is defined as occurring when the method of contraception in month x is different from the method of contraception in the previous month ($x-1$). Both descriptive results (shown by the proportions of women by method mix) and calendar data indicate that women in all the five countries prefer to use the injectable as opposed to other modern reversible methods of contraception. For this reason, although other switches were

²⁸ Barden-O'Fallon and Speizer (2011) observe that switching immediately in the month that follows discontinuation minimises the chances of having an unintended pregnancy than if discontinuers took a longer time before switching to other contraceptive methods.

considered, greatest attention was paid to the switching status of women following discontinuation of using the injectable.

Three switching scenarios were investigated through which a woman can be considered a switcher of contraception. The first scenario of switching considers the likelihood of women switching from a traditional method, or non-use of contraception, to a modern method of contraception. The second scenario is a switch from the injectable to a less effective method of contraception. Finally, we consider switches from the injectable to other more effective contraceptive methods. The categorisation of contraceptive methods according to the level of effectiveness is presented in Table 3.3. However, there is an overlap between categories. For example, a switch from a traditional, or non-use of contraception to a modern method considers all modern methods irrespective of the level of effectiveness. Further, a switch from the injectable to a less effective method considered all methods in the least effective and effective (pill) categories.

Table 3.3 Classification of the effectiveness of methods

<i>Method of contraception</i>	<i>Effectiveness of contraception</i>		
	<i>Most effective</i>	<i>Effective</i>	<i>Least effective</i>
Sterilisation	✓		
IUD	✓		
Norplant	✓		
Injectable	✓		
Pill		✓	
Condom			✓
Foam and jelly			✓
Withdrawal			✓
Abstinence			✓
LAM			✓

Source: Adapted from Cleland *et al.* (2006b)

Note: IUD =Intrauterine device and LAM=Lactational amenorrhoea

Although this study places greater emphasis on the reporting of modern contraception, the calendar includes all methods of contraception and therefore all methods are considered for analyses because each method would represent a segment of use. For analysis, the IUD and Norplant are both categorised as long-acting reversible contraceptives (LARCs) – because they are not user-dependent and do not require administration on a daily basis, or before, or after a sexual encounter (Winner *et al.* 2012). Although the injectable is also not a user-dependent contraceptive method, it was not categorised under LARCs because it is a medium-term method of contraception (Wilson *et al.* 2013; Ross *et al.* 2015) – implying that the mean-length of use may be shorter than LARCs. In addition, the level of effectiveness from using the injectable has been observed to be lower than that of the IUD (Roberts *et al.* 2010).

3.7 Data quality

Although calendar data are an improvement of the way contraceptive use data is collected in developing countries (Strickler *et al.* 1997) compared to earlier data collection techniques such as the collection of contraceptive use within a birth interval (Goldman *et al.* 1989b), the procedure is not free of bias, or error. Error may arise from the considerable burden placed on women to recall events retrospectively. Such an exercise leads to a likelihood of some events not being reported, or over-reported (and even misplaced), leading to duration heaping and inconsistencies (Ali *et al.* 2003). Inconsistencies would be identifiable if the estimates from current-status data and calendar data are not the same.

Since it is inevitable for discrepancies to emerge from two different means of collecting similar information, it is important to note that estimates from both sources (current contraceptive use and in the calendar data) should be comparable for the data to be of meaningful use.²⁹ Following Curtis and Hammerslough's procedure, consistency in reporting of calendar data is assessed by comparing current contraceptive use of women in the latest and the previous survey. Because the samples considered for analysis are representative of the total population, the estimates generated represent the composition of the population at a point in time. To ensure comparability, the samples considered in generating contraceptive prevalence estimates from the current-status data (previous survey) and the calendar data (latest survey) constitute all women. The reason for adopting this criterion is because marital status is likely to change between dates (Curtis and Hammerslough 1995). By doing so, it is assumed that a change in marital status during the period of investigation would not lead to changes in estimates and conclusions since all women in the two samples were considered.

Table 3.4 compares estimates of current contraceptive use from an earlier survey to estimates of contraceptive use in a later survey at a corresponding point in time. Following Curtis and Hammerslough (1995), women aged 20-49 years in a later survey would be younger in an earlier survey by the difference in years between the two surveys. For example, if the 2011 Uganda DHS and 2006 Uganda DHS survey dates were September 2011 and July 2006 respectively, it means that the exact number of years between the two surveys is 5.17 years. The implication is that women aged 15-44 years in an earlier survey (2006) in Uganda would be aged 20-49 years in a survey conducted 5.17 years later in 2011.

²⁹ For the estimates to be comparable it means that the two data sources should have similar characteristics in terms of composition. To achieve this, all women were considered in the two data sources irrespective of the marital status.

Table 3.4 Percentage of all women using any method of contraception from an earlier survey (current-status data) and from calendar data from the same cohort of women reported in an earlier survey

	<i>Ethiopia</i>		<i>Kenya</i>		<i>Rwanda</i>		<i>Tanzania</i>		<i>Uganda</i>	
	<i>Calendar data 2011</i>	<i>CS data 2005</i>	<i>Calendar data 2014</i>	<i>CS data 2008/09</i>	<i>Calendar data 2014/15</i>	<i>CS data 2010</i>	<i>Calendar data 2015/16</i>	<i>CS data 2010</i>	<i>Calendar data 2011</i>	<i>CS data 2006</i>
<i>Method/Ages</i>	<i>20-49</i>	<i>14-43</i>	<i>20-49</i>	<i>15-44</i>	<i>20-49</i>	<i>16-45</i>	<i>20-49</i>	<i>14-43</i>	<i>20-49</i>	<i>15-44</i>
Pill	1.0	2.0	5.3	4.4	4.6	3.8	3.7	4.9	2.0	2.3
IUD	0.2	0.1	2.1	0.9	0.7	0.2	0.7	0.4	0.3	0.1
Norplant	2.1	0.1	6.8	1.2	4.6	3.4	4.9	1.8	1.6	0.3
Injectable	12.6	6.4	16.6	14.3	13.5	14.1	8.6	8.1	9.3	7.4
Condom	0.3	0.3	3.0	2.4	1.7	1.8	2.9	4.1	2.3	3.1
Sterilisation	0.4	0.1	2.3	2.3	0.8	0.4	2.5	1.5	2.1	1.3
Traditional	0.8	0.7	3.4	4.0	3.0	3.0	5.0	5.6	2.4	3.3
Othermodern	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.3	0.5
Total	17.2	9.7	39.6	29.5	28.9	27.1	28.4	26.5	20.4	18.3
DHS (15-49)	19.6	10.3	42.6	32.0	30.9	28.6	35.9	28.8	23.6	19.6
N (between surveys) in years	5.67		5.50		4.08		5.67		5.17	

Note: CS=Current-status. The category 'traditional methods' includes abstinence, withdrawal, and lactational amenorrhea. The condom and sterilisation methods are for both female and male.

Table 3.4 that shows consistency in reporting of calendar data indicates that respondents tended to slightly under-report current-status data especially for methods such as the injectable (in all countries but Rwanda), IUD (in all countries), and sterilisation (except for Kenya) than in the calendar. The results from the calendar data and current-status data from Rwanda, Tanzania, and Uganda are almost in perfect agreement with about a two-percentage point difference.

In contrast, the estimates in Table 3.4 point to under-reporting of some events in the calendar than in current-status data. The pill was slightly under-reported in the calendar for Ethiopia, Tanzania, and Uganda. Similarly, traditional methods were underreported in the calendar in Kenya, Tanzania, and Uganda. Whereas reporting of condom use appears to be the same for Ethiopia and Rwanda, there was slight underreporting in the calendar for Tanzania and Uganda. Underreporting of contraceptive episodes in the calendar is likely to be caused by the failure of respondents to keep track of all episodes (especially user-dependent contraceptive methods) of use (and when they occurred) – thereby leaving out some episodes unreported. The implication of underreporting of events in the calendar is that the resulting estimates may be underestimated thereby leading to erroneous conclusions.

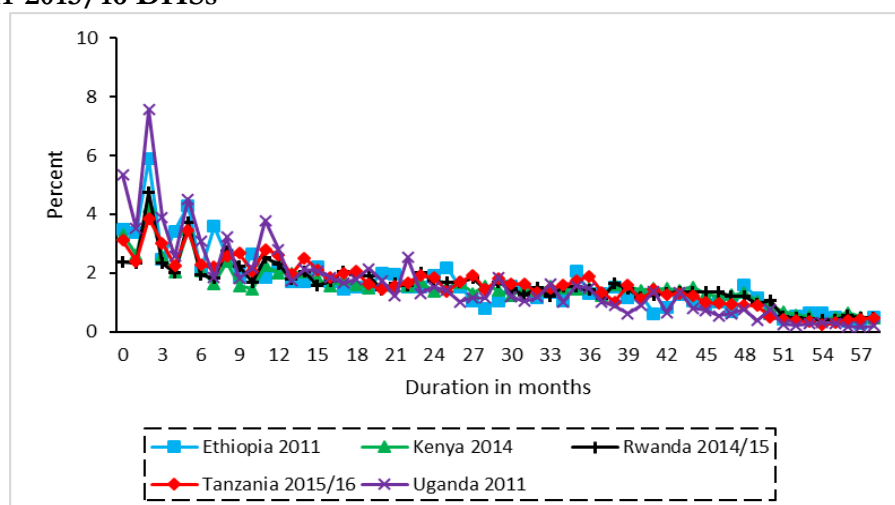
3.7.1 Heaping of episodes

Heaping in the reporting of events in the calendar was investigated as a way of verifying the consistency of reported data in the calendar. As women retrospectively report events as they occurred for every month, heaping may occur. Heaping arises when respondents report the duration of contraceptive use on preferred digits such as 3, 6, 12 months and is often caused by an inability to recall events precisely as they occurred. The problem of recall error is made worse in

societies with no record and date keeping and where documents about demographic events such as birth and deaths is not a requirement (Magadi *et al.* 2001).³⁰

Figure 3.4 shows heaping of contraceptive episodes on selected preferred digits in all countries and for all contraceptive methods, other than sterilisation.³¹ Heaping of contraceptive episodes as shown in Figure 3.4 is more significant for durations of use of 3, 6, and 12 months just before the survey than for longer durations, although the proportion of women reporting contraceptive use for a duration of 12 months is less than for durations of 3 and 6 months.

Figure 3.4 Distributions of reported durations of contraceptive episodes, five countries, 2011-2015/16 DHSs



3.7.2 Indices of heaping

Another approach to investigating the issue of heaping is to derive indices of heaping of contraceptive episodes. Curtis (1997) suggests one such index:

$$\text{Index} = \frac{4N_x}{(N_{x-2} + N_{x-1} + N_{x+1} + N_{x+2})} \quad \text{Equation 3}$$

Where N_x is the number of episodes of use of x -months duration reported in the contraceptive calendar.

An index equivalent to one indicates no heaping in the data while an index that is greater than one points to heaping of contraceptive episodes on preferred digits (Curtis 1997). Table 3.5 shows the index on selected digits reveals more heaping on digits 3, 6, and 9 months, in all countries. This observation confirms that because the information in the calendar is reported

³⁰ It is important to note that with the expansion of primary schooling and increased numeracy in developing countries, problems regarding record and date keeping of important documents concerning demographic events are increasingly less important.

³¹ The reason for excluding permanent contraceptive methods is because women cannot discontinue sterilisation.

retrospectively, respondents may be unable to report all events as they occurred in the past, due to recall bias.

Table 3.5 Indices of heaping on selected digits, five countries, 2011-2015/16 DHSs

Country/ Year	Indices of heaping on preferred digits									
	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months
Ethiopia 2011	1.844	0.583	0.930	1.483	0.604	1.319	1.019	0.695	1.249	0.882
Kenya 2014	1.622	0.826	0.659	1.674	0.868	0.693	1.412	0.813	0.715	1.269
Rwanda 2014/15	2.085	0.732	0.628	1.838	0.759	0.684	1.418	1.025	0.689	1.246
Tanzania 2015/16	1.429	1.012	0.718	1.410	0.868	0.802	1.120	1.108	0.774	1.204
Uganda 2011	1.974	0.856	0.540	1.590	1.011	0.583	1.450	0.662	0.744	1.777

Consequently, some durations of use of contraceptive episodes are likely to be reported on preferred digits. The implication of such a behaviour is that contraceptive use in the calendar, to include either adoption, or switching, may be more pronounced on some digits such as 3, 6, or 9 months compared to other digits. Thus, considering the durations of contraceptive use for each month, heaping would be visible on durations of contraceptive use that are mostly preferred.

4 QUALITY IN PROVISION AND USE OF CONTRACEPTION

The analyses presented in this chapter set out to achieve the first two objectives of the thesis: 1) to examine method skew as a measure of contraceptive method availability and quality in the provision of family planning services; and 2) to assess whether contraceptive use is dependent on information exchange between family planning service providers and clients. These objectives will be achieved by examining the patterns of current contraceptive use and method mix of women using current-status data, and by examining the information solicited from the three questions regarding receiving knowledge on the availability of other contraceptive methods, possible side effects, and how they can be managed. Section 4.1 provides a socio-economic and demographic profile of respondents included in the study. The next section, Section 4.2, examines trends in contraceptive use over time. Section 4.3 examines method skew and Section 4.4 examines method information exchange as proxy measures used in assessing quality in the provision of family planning services. In the concluding section (Section 4.5), an overview of the way respondents are stratified by use of contraception as well as a discussion of the quality in the provision of family planning services is offered.

4.1 Women's survey characteristics

Effective use of modern contraception is associated with lower fertility (and in most cases, lower unmet need for family planning). Use of contraception among women who want to space, limit, or even postpone births reduces the likelihood of having unintended pregnancies thereby having lower fertility. Table 4.1 shows total fertility derived from the latest surveys in each country, is highest in Uganda (6.2 children per woman) and lowest in Kenya (3.9 children per woman).

Table 4.1 Survey characteristics of interviewed women

Country/ Year of survey	Married 15-49						Ever practiced contraception		All women
	All women		Currently using		Unmet need (%)	Demand for modern FP satisfied	Currently married	Single	Literacy rate
	No of women	TFR	Any method (%)	Modern method (%)					
Ethiopia 2011	16515	4.8	28.6	27.4	26.3	51.0	46.3	12.7	38.4
Kenya 2014	31079	3.9	58.0	53.2	17.5	75.2	77.1	40.6	88.0
Rwanda 2014/15	13497	4.2	53.2	47.5	18.9	71.5	76.2	14.1	80.3
Tanzania 2015/16	13266	5.2	38.0	32.0	23.0	58.2	59.7	20.1	76.8
Uganda 2011	8669	6.2	30.0	26.3	34.3	43.4	55.9	30.0	64.2

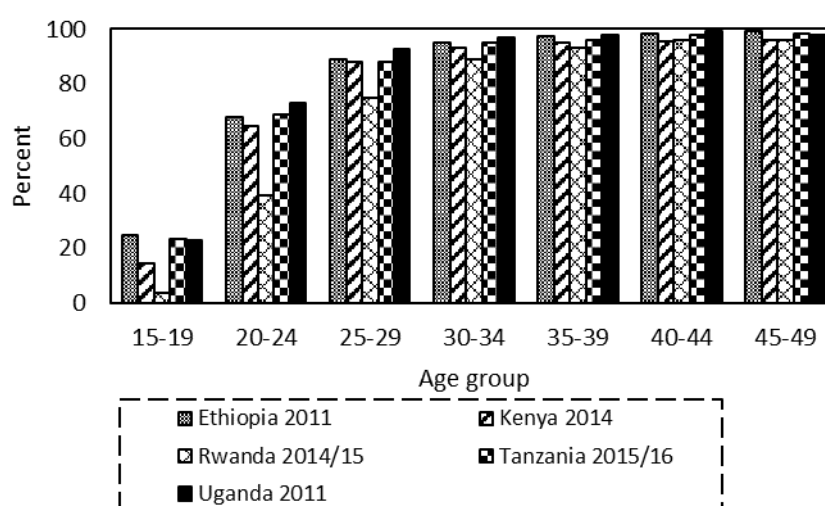
Note: Literacy rates are proportions of women who can either read, or write. The DHS programme asks women if they can read of which those who can read are categorised as literate otherwise not. FP implies Family planning.

The results in Table 4.1 also indicate the low Contraceptive Prevalence Rate (CPR) among currently married women in countries with high fertility as the case is in Uganda (26.3 percent) but with a high CPR in countries with relatively low total fertility rate, for example in Kenya (53.2 percent).³² The proportion of women reporting ever-use of contraception is always higher than the proportion reporting current use, as it should be.

4.1.1 Current marital status by age group

Figure 4.1 shows a similar shape of marital status by age in all countries. The proportion of ever-married women increases with age up until age 35 years, by which age it is near-universal.

Figure 4.1 Proportion of ever-married women aged 15-49 years, by age group, five countries, 2011-2015/16 DHSs



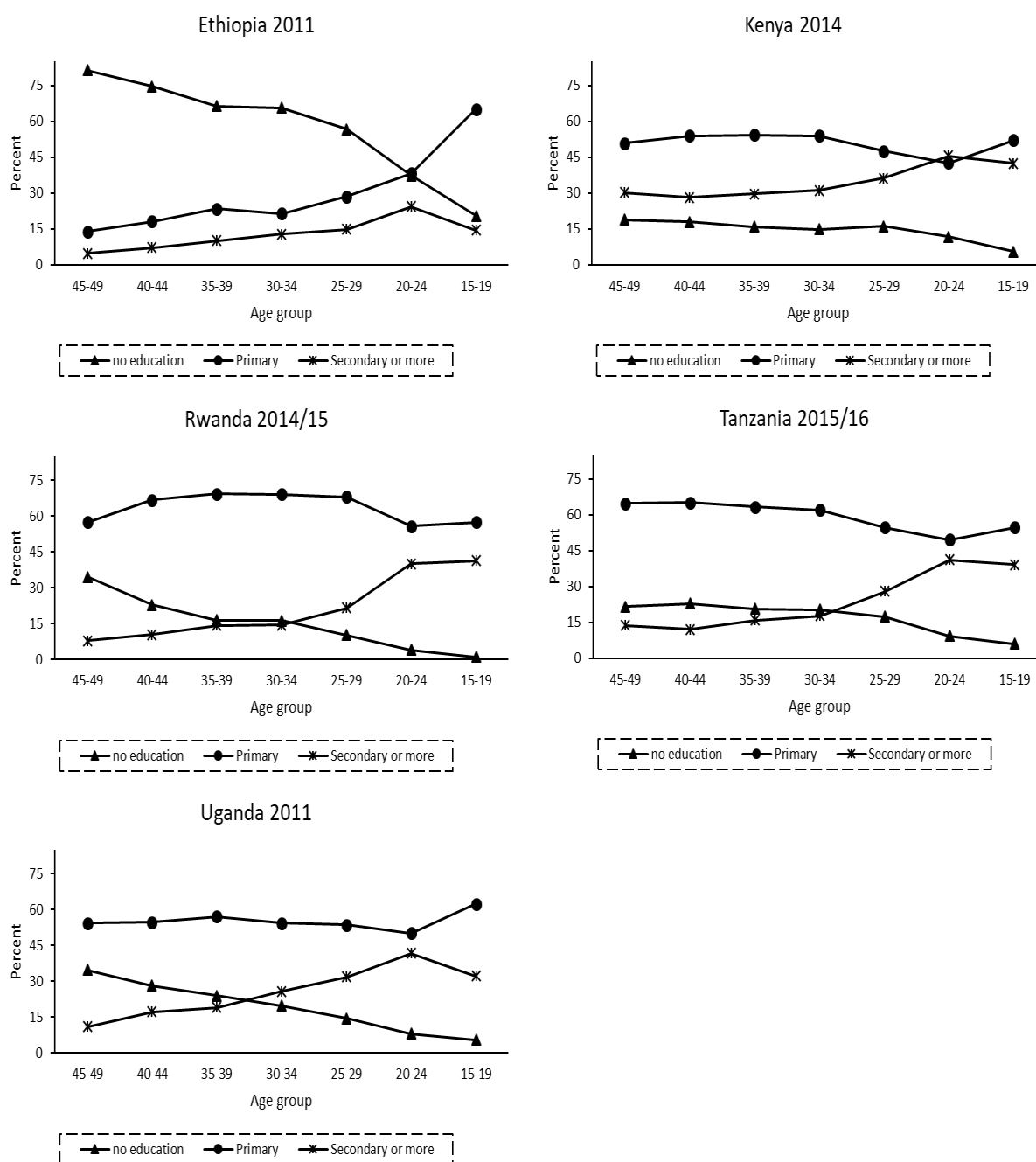
4.1.2 Level of education by age group

Women with greater educational attainment are expected to have better practices and knowledge about modern contraceptive use (Kravdal 2002; Bongaarts 2010). The results shown in Figure 4.2 indicate that the proportion of women who never attended school increases with age, which reflects past gains in increasing access to education. This pattern is similar in all the five countries under study, with Ethiopia having the largest proportion (81.3 percent) of older women with no education.

The bump in the age group 20-24 reflects the increased proportions of women who have completed secondary or higher, education. Proportions of women aged 15-19 years with completed secondary or higher education, are – by definition – lower.

³² In some of the literature, Modern Contraceptive Prevalence Rate (MCPR) is used interchangeably with Contraceptive Prevalence Rate (CPR).

Figure 4.2 Percentage distribution of women aged 15-49 years by educational attainment, five countries, 2011-2015/16 DHSs



4.1.3 Motivation to use contraception by age group

The use of modern contraception to either space, or limit births, are the two distinct motives considered in the study to understand how contraceptive method adoption, or immediate switching vary by the motivation to use contraception. Although Timæus and Moultrie (2008) note that spacing has to be contingent on the age of the youngest child, data limitations related to the way questions are asked and the responses collected in the DHS surveys make it hard to measure this. Nonetheless, this study makes use of information collected on the desire for additional

children, although we are aware of the changes that might occur in women's fertility preferences with time.

Thus, women who want another child within and after two years, and women who were not sure of the timing of their next child (but still wanted to have another child) were assumed to be using contraception for spacing while women who said they do not want to have additional children, or those that were using permanent methods of contraception as using to limit births. Figure 4.3 shows results of these two distinct motives by woman's age.

Figure 4.3 Proportion of women aged 15-49 years, by age group and motivation to use contraception, five countries, 2011-2015/16 DHSs

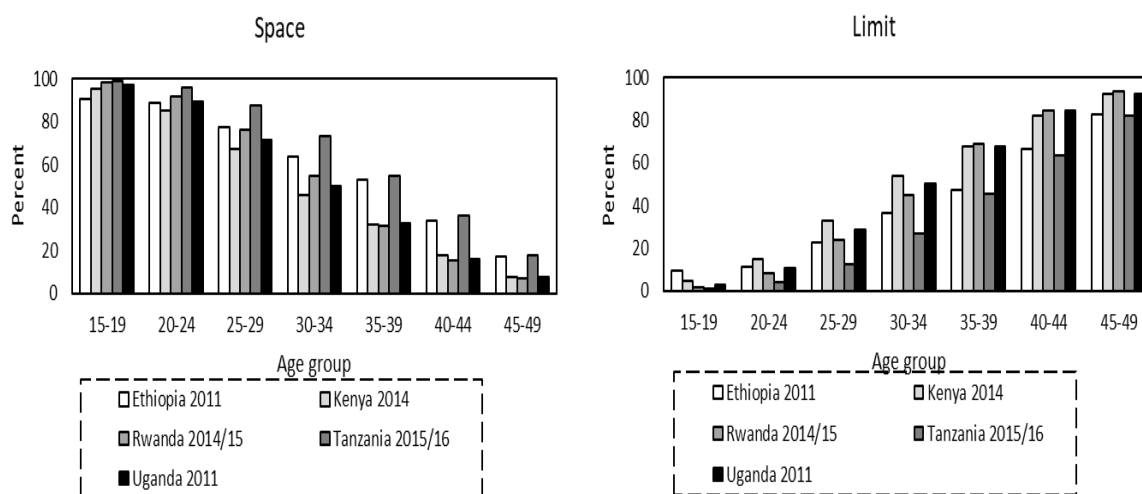


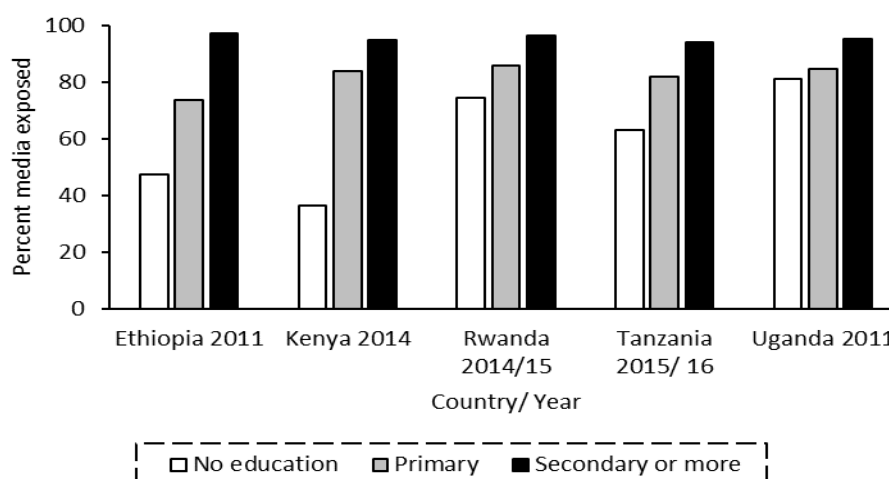
Figure 4.3 shows similar patterns of spacing, or limiting births by age in all countries. Most women aged 15-19 years in all countries were using contraception to space births but the proportion of these spacers decreases substantially with age. In contrast, most older women aged 45-49 years in all countries were using contraception to limit births, but the desire to limit births is lower among younger women.

4.1.4 Media exposure by level of education

Figure 4.4 shows that media exposure is associated with the level of education which may imply having access to information on birth control and family planning. The results from the DHS data indicate that most women either listen to the radio, or watch television in the five East African countries under study. In this research, we use these as proxy measures of media exposure to family planning messages. Figure 4.4 shows a positive correlation between media exposure and level of education in all countries. There is close to universal exposure to family planning messages among women with secondary or higher, education. Less than half of women with no education in Ethiopia and Kenya reported to have been exposed to the media in 12 months preceding the

survey. However, over 80 percent of Ugandan women had exposure to the media irrespective of their level of education.

Figure 4.4 Proportion of women exposed to the media by level of education, five countries, 2011-2015/16 DHSs



4.2 Trends in current contraceptive use with time

Although the Contraceptive Prevalence Rate (CPR) estimate gives a snapshot of what is happening at a point in time, the trends in the estimates provide us with an idea of how countries are progressing in terms of adoption of modern contraception.

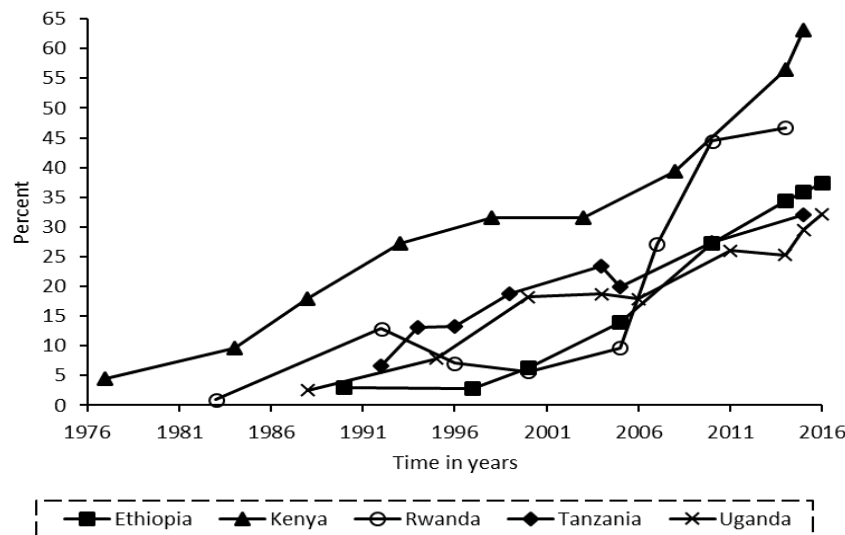
Using data from UN Population Division (2017), Figure 4.5 shows how use of modern contraception has changed among currently married women aged 15-49 years in the five East African countries over time. Figure 4.5 shows that use of modern contraception has increased in all countries. However, slower increases are observed in Ethiopia, Tanzania, and Uganda. The overall increase in use of modern contraception in these countries is attributable to an increase and improvement in the provision of a wide range of different types of contraceptive methods.

The estimates shown in Figure 4.5 indicate that all countries have experienced a stagnation in the use of modern contraception at some point in time. In Uganda, a stagnation in the use of modern contraception is observed in the periods 2000-2006 and 2011-2014. Government's major focus on promoting awareness and prevention messages about the spread of HIV/AIDS could have led to a stagnation in the use of modern contraception in the period 2000-2006, while campaigns that aimed at promoting population growth as a driver of economic development, market, and modest funding, are likely to be responsible for a stagnation in the use of modern contraception in Uganda in the period 2011-2014.

Although the two data points (1992 and 2000) are a snapshot in time, Figure 4.5 shows a decrease in the use of modern contraception in Rwanda in the period 1992 and 2000, an

observation largely attributed to the 1994 genocide – but proportions of women using modern contraception fell until 1998, or so, and then started rising slowly thereafter. The tremendous increase in the use of modern contraception in Rwanda thereafter has largely been attributed to the government’s commitment to making family planning programmes a priority (Bongaarts and Casterline 2013; Bongaarts 2017).

Figure 4.5 Trends in Contraceptive Prevalence Rate (CPR) estimates, 1977-2016, five East African countries



Source: United Nations, Population Division (2017)

In Ethiopia, the two data points, that is, 1990 and 1997, indicate no change in the use of modern contraception during that period. It should be noted that Ethiopia never had a National Population Policy (NPP) with clear plans to promote family planning programmes until 1993, when the first country’s National Population Policy was enacted. This is likely to have led to a stagnation, as government’s commitment to promoting family planning programmes was weak. However, Bongaarts and Casterline (2013) observe that use of modern contraception increased after 2000s when government commitment to promoting family planning programmes took centre-stage.

Kenya experienced a stagnation in the use of modern contraception between 1998 and 2003 (31.5 percent). In Tanzania, no change in the use of modern contraception is observed in the period 1994-1996 (13 percent) while there was a sharp decline in the proportion using modern contraception between 2004 and 2005.³³ The emergence of health concerns such as HIV/AIDS in Kenya and Tanzania, with a high incidence in the late 1990s led to a shift in focus away from

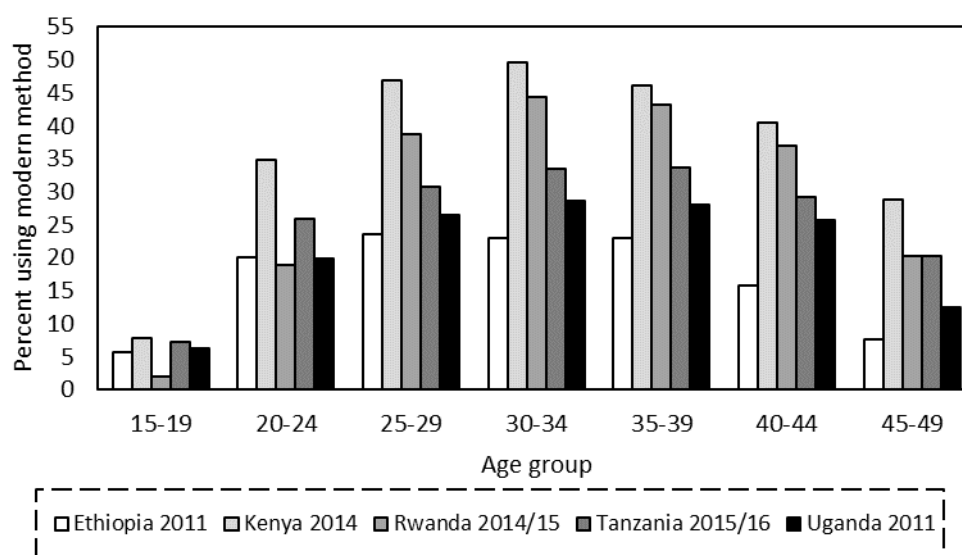
³³ It should be noted that the two data points may not exhaustively reflect all the changes that could have happened during the period because they are a snapshot in time.

promoting the use of family planning programmes to creating awareness and preventing the spread of the epidemic. This is likely to have led to a decline, or stagnation in the use of modern contraception in the respective countries.

4.2.1 Current use of modern contraception by age group

Figure 4.6 shows an age effect in the use of modern contraception – fewer women using modern contraception at younger ages and older ages but higher proportions at the mid-ages. Pronounced contraceptive use is expected at the peak ages of childbearing, that is 25-39 years, because of the desire to either space, postpone, or limit births.

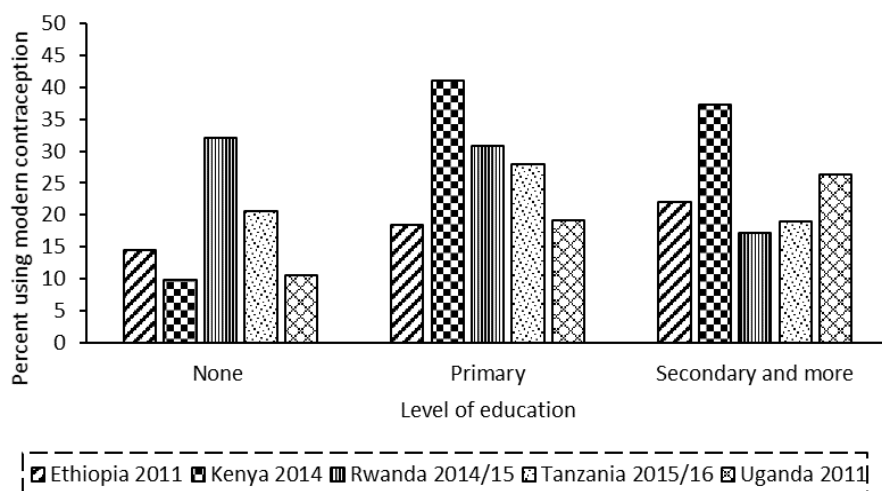
Figure 4.6 Proportion of women aged 15-49 years currently using modern contraception, five countries, 2011-2015/16 DHSs



4.2.2 Contraception use and level of education

It is important to know how the use of modern contraception varies with the level of education. Greater use of modern contraception was more pronounced among women with more than primary education (see Figure 4.7). In Ethiopia (18.4 percent), Kenya (41 percent), Tanzania (28 percent), and Uganda (19.2 percent), most women with primary education used modern contraception compared to their counterparts with no education. Kenyan women (37.3 percent) with secondary or higher education still constituted the majority who used modern contraception relative to women from other countries.

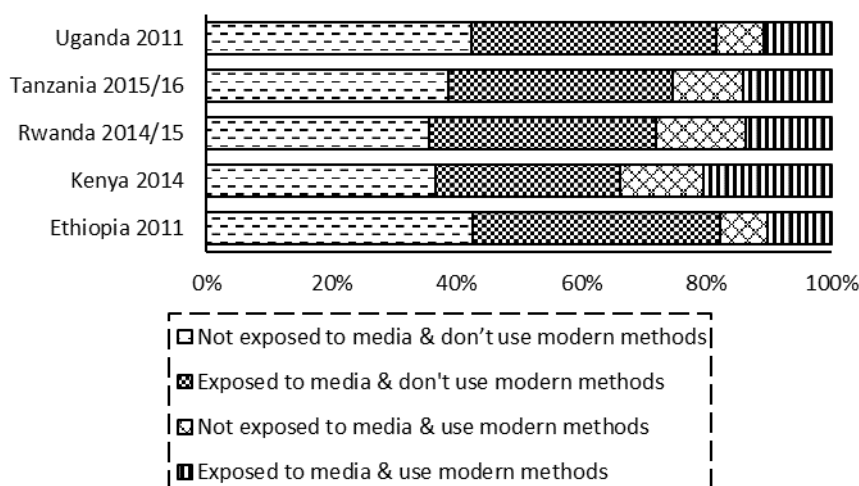
Figure 4.7 Current use of modern contraception by woman's level of education, five countries, 2011-2015/16 DHSs



4.2.3 Contraceptive use and media exposure

Figure 4.8 shows that most women who are not exposed to the media do not use modern contraception. However, use of modern contraception remains low even among women who reported to have been exposed to the media in the 12 months preceding the survey – with more than half of women with media exposure not using modern contraception.

Figure 4.8 Current use of modern contraception by media exposure, five countries, 2011-2015/16 DHSs

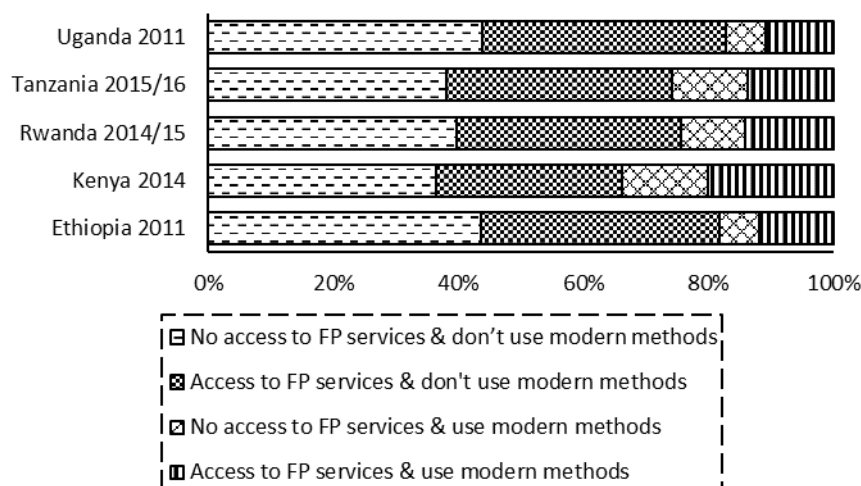


4.2.4 Contraceptive use and access to family planning services

Having access to health facilities is a proxy measure of ability to access and utilise family planning services. Increased use of effective modern contraception is expected in situations where women can visit health facilities for family planning services (and probably counselling). This is especially so for methods that require clinical administration such as the IUD, Norplant, and the injectable. It

is then not surprising as shown in Figure 4.9 that most women with no access to family planning services were unable at the same time to use modern contraception.

Figure 4.9 Current use of modern contraception and access to family planning services, five countries, 2011-2015/16 DHSs



However, although the use of modern contraception is associated with access to family planning services, Figure 4.9 shows that use of modern contraception remains low even among women who have access to family planning services – with more than half of women who have access to family planning services not using any method of modern contraception in all countries. These results call for increased promotion to use modern contraception but also further improve the quality in the provision of family planning services – because of lower adoption of modern contraception even among women with access to family planning services.

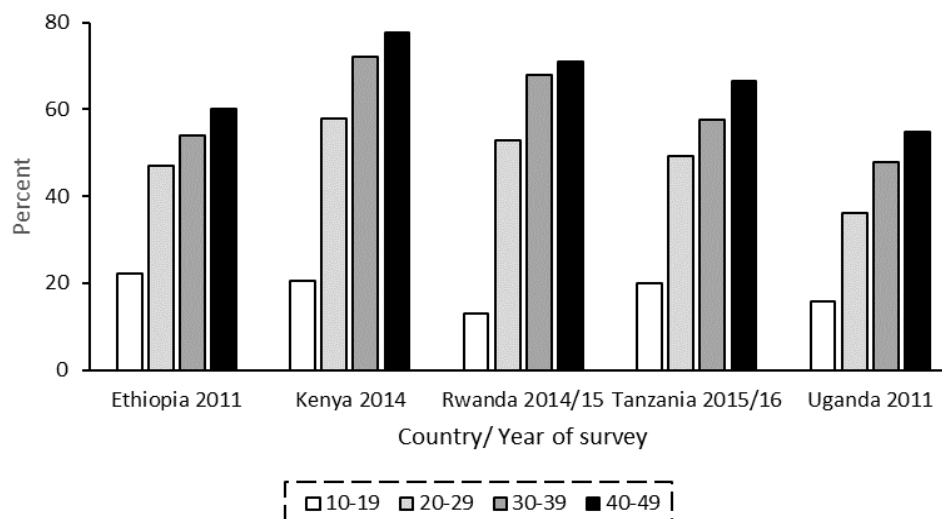
4.3 Identifying method skew

This section examines method skew in the method mix in all countries – a proxy measure used to assess the quality in the provision of family planning services. Method skew refers to a situation where the proportion of users of any particular contraceptive method in any population group exceeds 50 percent (Ross *et al.* 2015). Method skew can be of concern to policy makers and family planning providers, because it may imply that users of contraception do not have a wide range of methods to choose from. By contrast, an absence of method skew implies that users of contraception do not have to rely on a single method which points to an improvement in method availability and quality.

Figure 4.10 provides evidence of women who rely on more than one contraceptive method throughout their reproductive lifespan. The gradient observed in Figure 4.10 points to higher use of modern methods among older women than younger women in all countries. However, the most

important conclusion drawn from Figure 4.10 is that more than half of users in all countries have used at least four modern methods of contraception by age 50, especially so in Kenya and Rwanda.

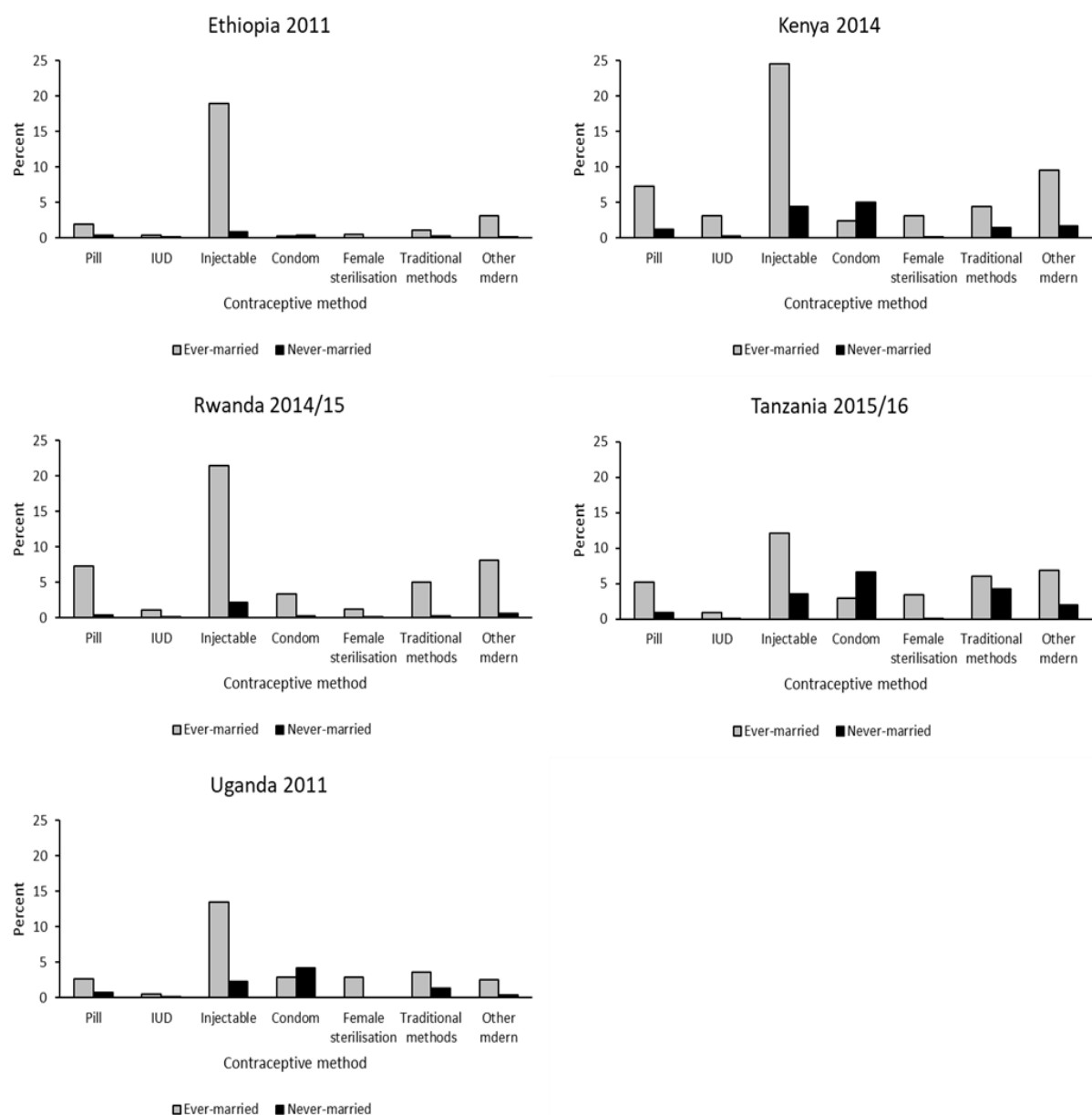
Figure 4.10 Proportion of women using more than four modern contraceptive methods during their reproductive lifespan, five countries, 2011-2015/16 DHSs by age



Conventionally, when contraceptive prevalence rates based on all women are derived method skew is not identified in any country (see Figure 4.11) – because large numbers of women are using no method. The IUD was the least used modern contraceptive method among all women and very few never-married women used the method in any country. Overall, more ever-married Kenyan women used the pill (7.2 percent), injectable (24.6 percent), and IUD (3.1 percent) relative to women in other countries. Most Tanzanian women used the condom whereas use of modern contraception among ever-married women was lowest in Ethiopia especially for the pill (1.9 percent), IUD (0.3 percent), and condom (0.3 percent).

Figure 4.12 shows that use of contraception varies by current marital status and by contraceptive method type. The estimates presented in Figure 4.12 are for only current users of a contraceptive method classified by current marital status. Estimates of current use by method in Figure 4.12 show that the injectable and condom were the most preferred contraceptive methods by East African women. Preference for the injectable was among ever-married women as opposed to the condom that is more pronounced among never-married women. It should be noted that the use of the condom among never-married women can be attributed to the desire to prevent themselves against contracting sexually transmitted infections but also to avoid pregnancy.

Figure 4.11 Current contraceptive method mix by current marital status, five countries, 2011-2015/16 DHSs

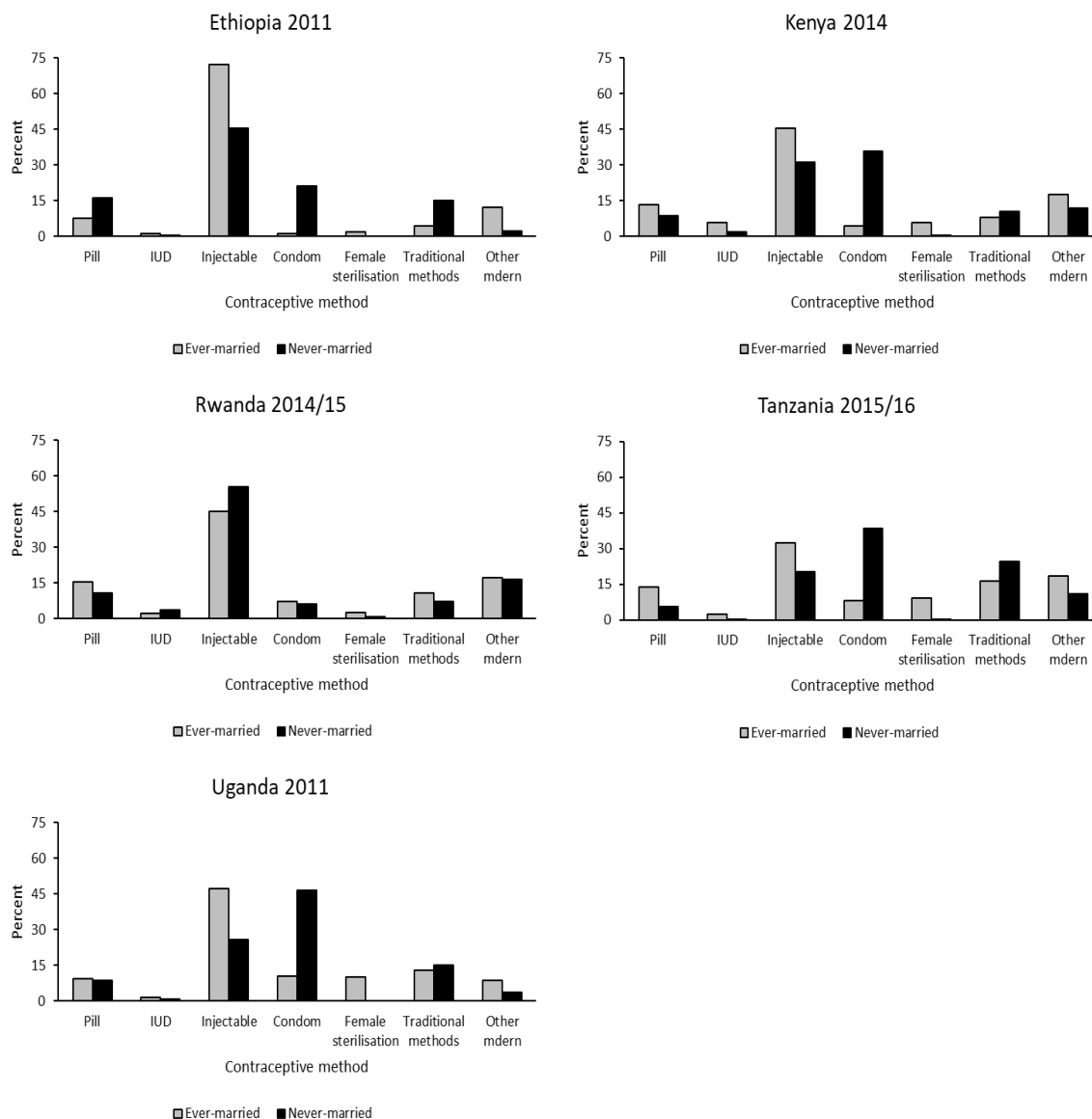


Note: The 'other modern' contraceptive category includes male sterilisation, Norplant, female condom, foam and jelly, and standard days method. Traditional methods of contraception include abstinence, withdrawal, and lactational amenorrhea (LAM).

Nonetheless, estimates of only users of contraception in Figure 4.12 are compared to the estimates shown in Figure 4.11 for all women to examine the extent to which method skew can be identified among only users of contraception. Figure 4.12 shows no method skew in Kenya, Tanzania, and Uganda. In Ethiopia, method skew is noticed among ever-married women using the

injectable (72 percent) and a minimal method skew (55 percent) among never-married Rwandan women.³⁴

Figure 4.12 Current contraceptive method mix among only users of contraception by current marital status, five countries, 2011-2015/16 DHSs



Note: The 'other modern' contraceptive category includes male sterilisation, Norplant, female condom, foam and jelly, and standard days method. Traditional methods of contraception include abstinence, withdrawal, and lactational amenorrhea (LAM).

³⁴ It is important to note that when family planning programs had just been rolled out, it was easier to observe method skew, with traditional methods dominating the method mix in sub-Saharan Africa. However, with the emergence of other modern methods of contraception, a method mix is broadened, and as users switch from traditional methods to modern methods, it becomes hard to identify method skew as defined by the 50 percent rule.

4.4 Method Information Index

The Method Information Index (MII) has been identified by FP2020 to be one of the 18 indicators used to track progress in the provision of family planning services in the world's 69 poorest countries (Family Planning 2020 (FP2020) 2017). The Method Information Index (MII) is estimated using information from responses from the three questions asked in the DHS among current users of contraception at the start of their last episode of contraceptive use: 1) was the woman told about the availability of other contraceptive methods; 2) was the woman told about possible side effects from using their chosen contraceptive methods; and 3) was the woman informed how to manage side effects should they arise. The Method Information Index is derived from the proportion of women who were currently using a contraceptive method and answered in affirmative to all three questions (Family Planning 2020 (FP2020) 2017).

The Method Information Index is also regarded as one of the six core elements incorporated in a framework that is used to measure the quality of care in the provision of family planning services (Bruce 1990; RamaRao and Jain 2016). The need to improve the quality of care through monitoring the information exchanged between clients and family planning service providers is underscored by women being more likely to continuously use contraception as quality in provision of contraception improves. Continuity in use of contraception means that discontinuation of contraception reduces as women know the source and availability of other contraceptive methods, how to use different types of contraception, where to go for additional contraception once earlier supplies are finished, possible side effects, and how to manage health complications should they occur (Jain 2016).

Increasing the choice of methods by adding new methods to the existing ones is likely to boost continuous use of contraception. Moreover, Jain (2016) emphasises the need to promote LARCs that are associated with higher continuation and longer use than short-term methods. Thus, a Method Composition Index (MCI) – which measures the ratio of women using LARCs, or permanent methods to those using any modern method of contraception (Jain and Winfrey 2017) – provides an indication of what proportion of the population is likely to continuously use contraception. Further, the MCI can be a useful indicator that can be used to track the proportion of users in a population that adopt LARCs, or permanent methods over time. An index of 0 indicates no use of either long-acting, or permanent methods while a score of 100 implies that all users of contraception are using either long-acting reversible contraceptives, or permanent methods. Table 4.2 shows that about half of Tanzanian users of contraception are using LARCs, or permanent methods, as compared to only 18 percent in Ethiopia.

Following Jain (2016), the results presented in Table 4.2 about method-specific information indices and overall MII are for currently married, or cohabiting women, and who either used the

pill, IUD, injectable, female sterilisation, or the Norplant but limited to a period of use that is not more than five years since initiation. Two reasons inform the decision to limit use of a method to a period not more than five years since initiation: First, the approach employed in this research largely follows the method applied by Jain (2016), that also considered a period of not more than five years. Second, we wanted to maintain consistency (since the analysis of calendar data in the subsequent chapters was also limited to a period of not more than five years). The index can range from 0 to 100 where a lower index indicates poorer information exchange between family planning service providers and clients. However, as discussed in Chapter 2, the index is not free from bias – the accuracy of the index is likely to be affected by recall bias, socially-desirable response bias, misrepresentation of reported information, and selectivity bias.

Table 4.2 shows method-specific information indices by country, and indicates that information exchange between service providers and clients varies by contraceptive method and country. Rwanda had the highest overall method information index (56.3 percent) while results indicate that Ethiopian women received poorer information (17.1 percent) relative to other countries studied. However, all countries had the same pattern of method-specific information index – highest for LARCs (Norplant in Ethiopia and IUD in the rest of the countries). Other than Ethiopia and Kenya where short-term methods (the injectable and pill) had the lowest index, permanent methods (female sterilisation) had the lowest index in the rest of the countries.

Table 4.2 Method-specific information and composition indices, five countries, 2011-2015/16 DHSs

<i>Country/ Year</i>	<i>Method Information Index (MII)</i>					<i>Overall MII</i>	<i>MCI</i>
	<i>Pill</i>	<i>IUD</i>	<i>Injectable</i>	<i>Female sterilisation</i>	<i>Norplant</i>		
Ethiopia 2011	22.0	20.2	14.3	25.8	29.8	17.1	18.2
Kenya 2014	34.3	64.3	39.0	36.8	56.1	43.6	42.5
Rwanda 2015/15	51.9	66.7	57.5	21.0	59.5	56.3	29.1
Tanzania 2015/16	39.6	67.3	39.7	37.2	63.7	46.4	49.0
Uganda 2011	45.3	67.9	36.0	25.6	64.5	40.8	27.8

Note: MII stands for Method Information Index.

The results in Table 4.2 lend themselves to the conclusion that users of LARCs, or permanent methods are likely to have more information exchange than users of short-term methods. Although such a pattern may lead to an increase in the method composition index, as more women adopt LARCs, or permanent methods, we argue that this is likely to be because LARCs, or permanent methods are clinical methods as opposed to the pill which can be easily obtained even outside of clinical settings. Although LARCs, or permanent methods may not be popular methods in these countries as compared to short-term methods, women who use them are more likely to be motivated to do so.

Information exchange was also examined to establish how it varies by women's background characteristics (see Table 4.3).

Table 4.3 Method information index by women's (users) background characteristics, five countries, 2011-2015/16 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Total	17.1	43.6	56.3	46.4	40.8
Age at exposure					
15-19	12.2	29.1	41.5	30.5	35.2
20-24	16.0	39.7	55.9	44.5	35.6
25-29	17.3	41.7	53.8	45.2	43.1
30-34	20.2	48.8	56.5	52.1	42.4
35-39	17.4	45.5	57.0	48.0	42.4
40-44	20.6	48.5	60.6	49.8	39.1
45-49	10.0	40.1	66.1	34.8	39.9
Residence					
Urban	26.0	46.8	48.6	47.7	41.6
Rural	13.2	41.0	57.9	45.8	40.5
Level of education					
No education	10.8	47.1	58.9	41.8	37.2
Primary	18.5	38.4	56.9	45.6	37.0
Secondary or more	39.3	50.5	49.9	54.4	48.7
Wealth Index					
Poor	11.5	38.8	56.9	46.1	42.1
Middle	12.4	40.0	59.3	40.9	43.0
Rich	21.3	47.6	54.0	49.1	39.3
Motivation to use					
Space	18.1	42.1	54.3	45.3	41.3
Limit	15.6	44.9	58.8	48.6	40.3
Number of living children					
0	20.6	42.1	84.2	14.2	30.3
1-3	18.2	43.0	55.4	43.9	39.8
4 or more	14.8	44.8	57.8	50.5	41.6
Media exposure					
Not exposed	10.5	39.5	50.2	38.9	29.3
Exposed	19.8	44.0	57.3	47.7	42.2
Access to family planning services					
No	13.1	39.3	45.2	40.9	33.2
Yes	19.1	43.8	57.0	47.2	41.4
Currently working					
No	13.4	41.0	48.5	41.7	35.6
Yes	22.0	44.6	57.4	47.4	42.3
Ideal family size					
3 or fewer	16.7	43.5	58.3	43.7	45.9
4	19.5	43.0	54.6	47.3	46.0
5+	16.5	45.3	52.3	47.0	34.5
Non-numeric	9.1	46.9	41.7	45.2	27.4

Women who were exposed to the media, or have access to family planning services reported more information exchange than their counterparts. Similarly, employed women reported to have received more information than unemployed women in all countries. A plausible explanation is that employed women are likely to have economic power to afford health care, and to obtain clinical methods. The same explanation would hold for women in either middle, or richer household wealth quintiles than those in poorer quintiles. Higher indices among women exposed to the media might speak to the likelihood of women reporting information they know of, but

from other sources such as the media, which may not be necessarily the places where they obtained contraception – a limitation pointed out earlier.

Further, women living in urban areas are expected to have higher indices of information exchange because of better family planning services in urban areas and closer proximity than among rural women – although the results in Table 4.3 show higher indices in urban areas in all countries but Rwanda. However, the results in Table 4.3 suggest that services may be well-balanced around the country in Tanzania and Uganda.

A caveat in the data that should however be noted is that indices are not based on the type of place of residence where one received information about contraception. Instead, respondents are only asked to report on whether they received information, or not. This observation might imply the possibility of rural Rwandan women receiving information from urban health facilities and not necessarily in rural areas where they live.

4.4.1 Predicting family planning method information exchange

The results presented in Table 4.4 are odds ratios from a binary logistic regression model predicting family planning information exchange. Women who answered yes to all three questions were assumed to receive information, otherwise no. The outcome variable is binary, coded “1” for had information exchange, and “0” for no information exchange. The model controlled for unobserved heterogeneity by controlling for clustering.

The results presented in Table 4.4 show that users of long-acting reversible contraceptives (LARCs) are significantly more likely to receive information in Ethiopia (OR=3.4; $p<0.001$), Kenya (OR=2.1; $p<0.001$), Tanzania (OR=2.2; $p<0.001$), and Uganda (OR=3.4; $p<0.001$) than users of the injectable. These results agree with those presented in Table 4.2 that show higher indices of information exchange among users of LARCs than users of short-term methods. In Ethiopia, urban women are 1.7 times ($p<0.01$) more likely than rural women to receive information, which is expected.

Information exchange is observed to be associated with an increase in the level of education in Ethiopia, Kenya, Tanzania, and Uganda – shown by a positive association between the odds of receiving information exchange and the level of education. Household wealth is significant at predicting information exchange in Kenya and Uganda, although women in the poor, or middle household wealth quintiles in Kenya are less likely to receive information compared to their counterparts in the rich household wealth quintile.

On the other hand, Ugandan women in the poor, or middle household wealth quintiles are more likely to receive information than those in the rich household wealth quintile. As expected, women who are not exposed to the media are less likely than their counterparts who are exposed

to the media in Ethiopia (OR=0.7; $p<0.05$), Rwanda (OR=0.7; $p<0.01$), Tanzania (OR=0.7; $p<0.01$), and Uganda (OR=0.6; $p<0.05$) to have information exchange. Further, women with no access to family planning services in Ethiopia (OR=0.6; $p<0.01$) and Rwanda (OR=0.6; $p<0.01$) were less likely to have family planning information exchange than their counterparts with access to family planning services.

Table 4.4 Odds ratios from a binary logistic regression model for predicting family planning information exchange, five countries, 2011-2015/16 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Contraceptive method (RC= injectable)					
Pill	0.9694	0.8226*	0.7421***	1.0337	0.9313
LARCs	3.4167****	2.0903****	1.1500	2.1857****	3.4215****
Sterilisation	1.2230	0.7802	0.2136****	0.7679	0.4724**
Age (RC= 25-29)					
15-19	0.4768***	0.9041	1.1755	0.8133	0.6837
20-24	0.8332	1.0297	1.1162	1.0387	0.8750
30-34	1.3313*	1.1858*	1.1594	1.2751*	1.3782*
35-39	1.2371	1.1776	1.2426	1.0884	1.4888*
40-44	1.8807**	1.0268	1.4065*	1.0930	1.4795
45-49	0.8048	1.0360	1.7673**	0.7462	2.2847*
Residence (RC= Rural)					
Urban	1.6770***	1.0586	0.7509**	1.0179	1.3411*
Education (RC= Primary)					
No education	0.6139***	1.2552	1.1799	0.8795	0.7010
Secondary or more	1.5008***	1.7385****	0.8747	1.3197**	1.5009**
Wealth Index (RC= Rich)					
Poor	1.1101	0.7867**	1.0418	0.9206	1.7929***
Middle	1.1437	0.8298*	1.0673	0.7717**	1.4883**
Motivation to use (RC= Space)					
Limit	0.8076*	1.0444	1.1092	1.0533	0.8466
Number of living children (RC= 1-3)					
0	1.3303	0.9625	1.7539	0.7165	0.9554
4 or more	1.0574	1.0543	0.9386	1.1539	1.1851
Media exposure (RC= Exposed)					
Not exposed	0.7180**	1.0600	0.6921***	0.7082***	0.6185**
Access to family planning services (RC= Yes)					
No	0.6138***	0.9671	0.5677***	0.8935	0.7289
Currently working (RC= Yes)					
No	0.8639	0.9355	0.7427**	0.7943*	0.9489
Ideal family size (RC= 4)					
3 or fewer	0.9094	0.8715*	1.1734*	0.8365	1.0749
5+	0.9634	1.2143*	0.7753*	0.9712	0.5659****
Non-numeric	0.7489	0.9129	0.4356*	1.1870	0.6082
Constant	0.2345****	0.5293****	1.3160**	0.7357**	0.5058***
N	16515	31079	13497	13266	8674

Note: Reference categories in parentheses; *= $p<0.10$; **= $p<0.05$; ***= $p<0.01$; ****= $p<0.001$

Although the factors that predict information exchange are largely country-specific, the results presented in Table 4.5 indicate that the type of a contraceptive method is significant in all countries. However, age is observed to be an important factor in only Ethiopia. The type of place of residence is a key factor at predicting information exchange in most of countries (Ethiopia, Rwanda, and Uganda) while the level of education is significant in all countries except for Rwanda. Household wealth is significant in only Kenya and Uganda while media exposure emerged to be an important predictor of information exchange in all countries except in Kenya.

Table 4.5 Main predictors of family planning information exchange, five countries, 2011-2015/16 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Contraceptive method	0.0000****	0.0000****	0.0000****	0.0000****	0.0000****
Age	0.0058***	0.5548	0.3888	0.2202	0.2079
Type of place of residence	0.0006****	0.4487	0.0075***	0.8700	0.0490**
Level of education	0.0000****	0.0000****	0.1917	0.0253**	0.0039***
Household wealth	0.7652	0.0227**	0.8496	0.1070	0.0022***
Motivation to use	0.1037	0.6034	0.2919	0.6595	0.2811
Number of living children	0.3138	0.8517	0.5451	0.3026	0.6354
Media exposure	0.0400**	0.6045	0.0013***	0.0045***	0.0211**
Access to family planning	0.0009****	0.8288	0.0003****	0.3886	0.1814
Currently working	0.1804	0.3911	0.0114**	0.0458**	0.7181
Ideal family size	0.6794	0.0195**	0.0025***	0.3876	0.0006****

Note: *= $p < 0.10$; **= $p < 0.05$; ***= $p < 0.01$; ****= $p < 0.001$

The results in Table 4.5 also show that the ideal family size is significant in most of countries (Kenya, Rwanda, and Uganda) while employment status is observed to be significant in only Rwanda and Tanzania. Finally, access to family planning services emerged to be a key factor at predicting information exchange in Ethiopia and Rwanda.

4.5 Conclusion

This chapter has provided a demographic and socio-economic profile of women included for analyses in the study – providing a basis for analyses in the subsequent chapters that utilise reproductive calendar data. The main objective of this chapter was to assess the quality in provision and use of modern contraception by examining method skew and method information index as proxy measures of quality in the provision of family planning services. This chapter also investigated if the use of modern contraception disaggregated by method type and women's background characteristics can be dependent on information exchanged between clients and family planning service providers. Trends in the estimates of current contraceptive use, method mix and method type by women's background characteristics using current-status data were also examined. The results presented in this chapter shed light on the dynamics of contraceptive method adoption among East African women.

The results from the analyses show an increasing trend in current use of modern contraception in all countries with time. Moreover, a higher proportion of women aged 25-39 years, those with primary education, ever-married, women with access to family planning services, and women who reported to be exposed to the media are observed to be using contraception more than their counterparts. Continuation in the use of modern contraception after adoption is an important aspect in the realisation of faster fertility transition and lowering unwanted pregnancy. However, there is still low use of modern contraception among women of certain socio-economic and demographic categories such as women with no education, no access to family planning services, and women who have no access to the media – which then calls for intensified

promotion, education, counselling, and better information about the use of modern contraception. In Ethiopia where the literacy rate is lower relative to other countries under study, more women are not currently using modern contraception – although when compared with other countries, Ethiopia's TFR may not easily be explained by the current Contraceptive Prevalence Rate (CPR).

Method skew as a measure used to evaluate the quality in the provision of family planning services points to improvements in family planning systems in the respective countries. Although the results about the method-specific information index show that users of LARCs had the highest information index compared to short-term methods, the method composition indices indicate that use of LARCs, or permanent methods is below 50 percent in all countries. These results suggest weak health systems, non-availability, limited provision, and low motivation in using long-acting reversible contraceptives, or permanent methods compared to short-term reversible methods such as the pill, condom, injectable, that are associated with poor information exchange. This finding calls for intensified channels through which users of any method of contraception can obtain all necessary information regarding the availability of contraception, possible health concerns and how to manage them.

Whereas the main factors that influence information exchange are largely country-specific, the results indicate that the type of a contraceptive method is an important predictor of information exchange in all countries – suggesting that focusing on information exchange is necessary if family planning programs want to increase contraceptive adoption. Based on this, we observe that this finding may highlight a weakness in the quest to increase contraceptive uptake when the effort to provide useful and accurate information to all users of contraception is unbalanced.

The DHS data provides some evidence of better quality in the provision of family planning services when method skew and method information exchange as proxy measures of quality are examined. However, that users of LARCs – used by the minority – have more information exchange than users of short-term methods – preferred – should be a concern in the reproductive health sector. Although concerted efforts to ensure that users of LARCs, or permanent methods receive adequate information exchange so as to promote continuity in use, there is need to also provide adequate counselling and correct information to the larger proportion of women who use short-term methods. To this end, continuity in use of modern contraception will be realised.

The results presented in this chapter shed light on the patterns of how East African women in the five countries studied use contraception, and the factors that are likely to influence adoption. These results provide a basis for the analysis of calendar data in the subsequent chapters – the

scene set in this chapter when current-status data is employed provide a direction to the behaviour by which women use contraception over time – when calendar data is employed.

5 EPISODES, ADOPTION, AND DURATION OF USE OF CONTRACEPTION

The main objective of this chapter is to examine contraceptive method adoption and duration of use of contraception. Section 5.1 describes the distribution of contraceptive episodes by method mix and current marital status. Section 5.2 examines current monthly contraceptive prevalence for the 60 months preceding the survey as well as contraceptive method adoption, while Section 5.3 examines duration of use. The final part of this chapter (Section 5.4) provides an overview of the dynamics by which East African women initiate use of contraception, and how long they are likely to use a method before either abandoning, or switching to other contraceptive methods.

5.1 Contraceptive episodes in the calendar by method mix and current marital status

5.1.1 All women

Table 5.1 shows contraceptive episodes per woman, with some countries having more episodes per woman by contraceptive method than others. This could mean either more consistent use of a particular contraceptive method (for fewer episodes per woman), or more switching between contraceptive methods (for more episodes per woman). The estimates of contraceptive episodes for all women shown in Table 5.1 indicate that the injectable had the highest number of reported contraceptive episodes in the entire calendar in all countries, with episodes per woman ranging from 0.41 in Tanzania to 0.74 in Ethiopia. By contrast, withdrawal (or coitus interruptus, categorised as a traditional method) was the least reported in the calendar in Ethiopia (0.01 episodes per woman) and Kenya (0.02 episodes per woman) while the fewest women reported use of the IUD in Rwanda (0.02 episodes per woman), Tanzania (0.02 episodes per woman), and Uganda (0.01 episodes per woman). The IUD is the least-used modern method of contraception in all countries. Preference for the pill – a second choice – is higher than that of LARCs.³⁵

Whereas it might be true, according to the results, that few women used traditional methods, it may also indicate less reporting, a socially-desired response bias described by Callahan and Becker (2012). Also, it should be noted that over-reporting of other modern contraceptive methods cannot be ruled out.

The results presented in Table 5.1 speak to those reported in Chapter 4 – indicating higher motivation for using short-term reversible modern contraceptive methods particularly the

³⁵ 'Preference' is used here and throughout the thesis with an assumption that women were in position to choose a contraceptive method of their choice in the presence of other contraceptive methods. Although we make a case in Chapter 4 that there is an increase in the quality of provision of contraceptive methods – with a method mix and skew as one of the dimensions used to measure quality, we appreciate the possibility of women being unable to find a contraceptive method of their choice at a family planning facility, and instead adopt what is available.

injectable and the pill among East African women compared to long-acting reversible contraceptives, or permanent methods, although the results indicate significant use of contraception among Kenyan and Rwandan women relative to Ugandan women.

Table 5.1 Distribution of contraceptive episodes by method in the calendar for a period of 60 months, all women, five countries, 2011-2015/16 DHSs

Country/ Method	<i>Ethiopia 2011</i>		<i>Kenya 2014</i>		<i>Rwanda 2014/15</i>		<i>Tanzania 2015/16</i>		<i>Uganda 2011</i>	
	<i>Episodes</i>	<i>Episodes / woman</i>	<i>Episodes</i>	<i>Episodes / woman</i>	<i>Episodes</i>	<i>Episodes / woman</i>	<i>Episodes</i>	<i>Episodes / woman</i>	<i>Episodes</i>	<i>Episodes / woman</i>
Pill	776	0.17	1406	0.20	1267	0.23	954	0.17	496	0.15
IUD	50	0.01	269	0.04	113	0.02	107	0.02	42	0.01
Injectable	3347	0.74	3618	0.52	3180	0.57	2307	0.41	1736	0.51
Condom	164	0.04	650	0.09	355	0.06	513	0.09	436	0.13
Norplant	335	0.07	978	0.14	676	0.12	913	0.16	179	0.05
Abstinence	196	0.04	604	0.09	240	0.04	525	0.09	142	0.04
Withdrawal	33	0.01	140	0.02	277	0.05	333	0.06	223	0.07
LARCs	385	0.09	1247	0.18	789	0.14	1020	0.18	221	0.07
Total episodes	4901	1.09	7665	1.10	6108	1.10	5652	1.00	3254	0.96
Women (15-49)	4511		6988		5571		5646		3393	

Note: The total number of all women (15-49) shown in Table 5.1 excludes women whose episodes started before the start of the calendar, and were in progress up to a point the data were truncated three months before the interview.

5.1.2 Ever-married women

Estimates of contraceptive episodes for ever-married women only, shown in Table 5.2, point to the same pattern as that observed among all women in Table 5.1 – more ever-married women reported to using the injectable in the calendar than any other contraceptive method. Similarly, episodes of using the IUD were the lowest in Rwanda, Tanzania, and Uganda while withdrawal was lowest in Ethiopia and Kenya. Again, the results indicate that the IUD was the least preferred modern method of contraception in all countries.

Table 5.2 Distribution of contraceptive episodes by method in the calendar for a period of 60 months, ever-married women, five countries, 2011-2015/16 DHSs

Country/ Method	<i>Ethiopia 2011</i>		<i>Kenya 2014</i>		<i>Rwanda 2014/15</i>		<i>Tanzania 2015/16</i>		<i>Uganda 2011</i>	
	<i>Episodes</i>	<i>Episodes / woman</i>	<i>Episodes</i>	<i>Episodes / woman</i>	<i>Episodes</i>	<i>Episodes / woman</i>	<i>Episodes</i>	<i>Episodes / woman</i>	<i>Episodes</i>	<i>Episodes / woman</i>
Pill	728	0.17	1327	0.21	1234	0.23	913	0.18	455	0.15
IUD	49	0.01	266	0.04	105	0.02	105	0.02	40	0.01
Injectable	3257	0.75	3419	0.55	3022	0.57	2167	0.43	1650	0.54
Condom	108	0.03	321	0.05	339	0.06	319	0.06	262	0.09
Norplant	331	0.08	926	0.15	643	0.12	868	0.17	173	0.06
Abstinence	196	0.05	604	0.10	240	0.05	525	0.10	142	0.05
Withdrawal	31	0.01	132	0.02	274	0.05	316	0.06	202	0.07
LARCs	380	0.09	1192	0.19	748	0.14	973	0.19	213	0.07
Total episodes	4700	1.09	6995	1.12	5857	1.11	5213	1.03	2924	0.96
Women (15-49)	4316		6247		5293		5075		3045	

Note: The total number of ever-married women (15-49) shown in Table 5.2 excludes women whose episodes started before the start of the calendar, and were in progress up to a point the data were truncated three months before the interview. The total number of episodes shown by contraceptive method excludes those that were in progress at the start of the calendar.

5.1.3 Never-married women

The results of contraceptive episodes from never-married women, presented in Table 5.3, show a slightly different pattern from ever-married women shown in Table 5.2, and all women shown in Table 5.1. Reported use of the male condom among never-married women was highest in Kenya

(0.44 episodes per woman), Tanzania (0.34 episodes per woman), and Uganda (0.50 episodes per woman). This pattern has been reported elsewhere by Cleland *et al.* (2006a) who observed higher use of the condom among single women than among married women. Because most never-married women are young, it is true that use of the condom is also largely by young and unmarried women (Radovich *et al.* 2017). The condom being readily available, accessible, but also relatively cheaper compared to other contraceptive methods, are some of the plausible reasons that might explain the high use of the condom among young people (Chandra-Mouli *et al.* 2014). Despite this, the condom being a short-term contraceptive method may be associated with higher discontinuation rates than long-acting reversible contraceptives.³⁶ However, after excluding women who abstained for the entire period of observation but whose episodes started before the start of the calendar, and all episodes of abstinence that started before the start of the calendar, no additional episodes of abstinence were found in the calendar among never-married women. The obvious reason is that abstinence among most never-married women may happen because they have not yet started sexual activity, rather than abstinence being used as a contraceptive method among sexually active women.

Table 5.3 Distribution of contraceptive episodes by method in the calendar for a period of 60 months, never-married women, five countries, 2011-2015/16 DHSs

Country/ Method	<i>Ethiopia 2011</i>		<i>Kenya 2014</i>		<i>Rwanda 2014/15</i>		<i>Tanzania 2015/16</i>		<i>Uganda 2011</i>	
	Episodes	Episodes / woman	Episodes	Episodes / woman	Episodes	Episodes / woman	Episodes	Episodes / woman	Episodes	Episodes / woman
Pill	48	0.25	79	0.11	33	0.12	41	0.07	41	0.12
IUD	1	0.01	3	0.00	8	0.03	2	0.00	2	0.01
Injectable	90	0.46	199	0.27	158	0.57	140	0.25	86	0.25
Condom	56	0.29	329	0.44	16	0.06	194	0.34	174	0.50
Norplant	4	0.02	52	0.07	33	0.12	45	0.08	6	0.02
Abstinence	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Withdrawal	2	0.01	8	0.01	3	0.01	17	0.03	21	0.06
LARCs	5	0.03	55	0.07	41	0.15	47	0.08	8	0.02
Total episodes	201	1.03	670	0.90	251	0.90	439	0.77	330	0.95
Women (15-49)	195		741		278		571		348	

Note: The total number of never-married women (15-49) shown in Table 5.3 excludes women whose episodes started before the start of the calendar, and were in progress up to a point the data were truncated three months before the interview. The total number of episodes shown by contraceptive method excludes those that were in progress at the start of the calendar.

However, the injectable remained the most preferred contraceptive method in Ethiopia (0.46 episodes per woman) and Rwanda (0.57 episodes per woman). Similarly, Table 5.3 shows that the IUD was the least used modern contraceptive method among never-married women. Interestingly, countries such as Kenya, Tanzania, and Uganda whose most preferred contraceptive method was the male condom, reported the injectable to be the second most preferred choice while the pill and

³⁶ Although discontinuation of the condom can have different interpretations, this study refers to discontinuation in the context of the condom as abandoning use in a particular month as reported by the respondent.

Norplant (0.12 episodes per woman) are the second most reported contraceptive methods in Rwanda whose first choice is the injectable. As noted earlier, the use of the condom among never-married women may be associated with the desire to protect themselves against sexually transmitted diseases as opposed to using it for purposes related to family size regulation. However, although protection against STIs might be a major motivation for using condoms among some women, a higher desire to prevent pregnancy among users of the condom than to prevent themselves from contracting sexually transmitted infections has been observed in some populations (Cleland *et al.* 2006a; Minnis *et al.* 2010).

The distribution of contraceptive episodes in the calendar confirm to what is expected and known before. That is, the injectable constitutes the largest number of episodes in the calendar, which implies that most users of contraception adopt the injectable. This conforms with current-status data that shows the injectable as the most used modern method of contraception. Further, the distribution of episodes by current marital status also confirms what is expected, as it is ever-married women with the largest proportion of contraceptive episodes in the calendar compared to never-married women. This finding is similar to current-status data that show significant use of contraception among ever-married women compared to never-married women.

5.1.4 Censored events

As explained in Chapter 3, censoring can take on more than one dimension: that is left, or right censoring. However, for any event, or subject to be censored, it means that their survival time is unknown. This applies to both left and right censored events, or subjects. It is important to adequately handle censored events in any study that involves following up subjects, or individuals. In this research, we examine the distribution of right-censored events to have an understanding of the distribution of events that were still on-going by the end of the observation period.

Right censoring is associated with the inability of the researcher to know whether the studied subject either experienced, or did not experience, the event of interest after the end of the observation period. This is because either the study ends before the subject could experience the event of interest, or is lost to follow-up. In this research, all events that were on-going by the end of the observation period would be right-censored because we do not know whether, or when they switched contraception.

However, the distribution of on-going events presented in Table 5.4 is based on only traditional, or modern methods of contraception, and does not consider episodes of non-use of contraception, permanent methods, pregnancy, terminations, or births. Table 5.4 shows the

distribution of right-censored events that were still ongoing by the end of the observation period.³⁷ The estimates presented in Table 5.4 indicate a similar pattern in all countries, with the injectable constituting the largest proportion of ongoing episodes, ranging from 32.4 percent in Tanzania to 74.5 percent in Ethiopia while the IUD constituted the lowest proportion in all countries, ranging from 1.1 percent in Ethiopia to 5 percent in Kenya. This is expected as more users of the injectable are observed in the calendar while the minority are users of LARCs. The condom was the second lowest in all countries but Uganda where the Norplant was the second lowest.

Table 5.4 Distribution of right-censored episodes by method, all women, five countries, 2011-2015/16 DHSs

<i>Event/ country/ year</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Pill	5.5	13.4	16.2	13.4	10.5
IUD	1.1	5.0	2.2	2.2	1.7
Injectable	74.5	42.4	47.3	32.4	48.6
Condom	1.2	8.5	6.1	12.1	14.4
Norplant	12.5	19.6	16.3	19.2	9.0
Other modern	0.0	0.2	0.0	0.2	1.5
Traditional	5.2	10.9	11.9	20.6	14.3
Total (%)	100	100	100	100	100
Total women (15-49)	2446	4430	3363	3094	1550

Note: Condom is for both male and female. The category “other modern” includes fertility awareness methods, standard days methods, and emergency contraception. Traditional methods include withdrawal, LAM, and abstinence.

The estimates in Table 5.4 further reaffirm the results shown earlier, which point to preference of some contraceptive methods – more preference for the injectable, LARCs, and the pill compared to other methods of contraception. This is because episodes of contraceptive methods in the calendar may be a function of choice and use – an assumption we make in this study.

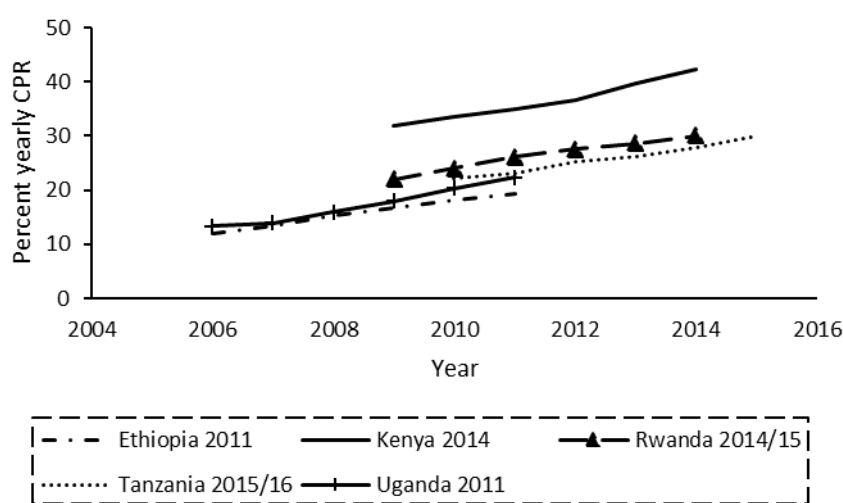
On the other hand, left censoring happens when a researcher does not know what the studied subject might have experienced before the start of the observation period. Events of interest that may have occurred to the studied subject but before the start of the period of observation are not eligible for analysis, because they were not under observation. Therefore, in order to avoid the selection bias that may occur from longer periods of observations, this study applied left censoring to the data by limiting the analytical sample to episodes that began within the study period covering the calendar. Thus, episodes that were in progress at the start of the calendar were excluded because we do not know when they started.

³⁷ It should be noted that in this study, the end of the observation period signifies a point where data was truncated three months prior to the survey because women may not be aware of their first trimester pregnancies.

5.2 Contraceptive prevalence rates in the calendar

Figure 5.1 shows average yearly contraceptive prevalence rates of using any method of contraception for a period of 60 months before each survey in the calendar. The estimates presented indicate a steady increase in the use of contraception with time. Although adoption of contraception may vary between countries in terms of pace, and proportion of women starting to use contraception, Figure 5.1 points to a general picture of increasing adoption of contraception with time in all countries. Moreover, the slope for each country indicates a steady pace in adoption of contraception with time.

Figure 5.1 Yearly contraceptive prevalence of any method in the calendar, all women, five countries, 2011-2015/16 DHSs



However, given the nature of the calendar data used in the analysis, Figure 5.1 shows general trajectories of using contraception with time for each country, but the graphs do not offer an opportunity to compare use of contraception at a particular point in time among all countries as one moves far back in time. This is because each country has different times for which calendar data was collected, which is brought about by differences in survey dates. Having said this, high rates of contraceptive method adoption provide an indication of increased ability for women to protect themselves against unwanted pregnancy thereby reducing unwanted fertility. In Uganda where adoption of contraception remains lower, it is not surprising therefore, that fertility has at the same time remained higher in relation to other countries under study. On the other hand, fertility is observed to be lower in countries such as Kenya and Rwanda where adoption of contraception is higher.

5.2.1 Initiation of contraception among non-users

Table 5.5 presents estimates of adoption rates for selected contraceptive methods among non-users.³⁸ The largest proportion of East African women who were not using a contraceptive method adopted the injectable within a year, with estimates ranging between 27.2 percent in Tanzania and 39.6 percent in Ethiopia. It is apparent that the injectable is the most preferred reversible modern method of contraception in East Africa. The results show that the proportion of women who adopted the pill is the second most preferred modern contraceptive method, with the percentage of adopters ranging from 6.7 percent in Ethiopia to 12.8 percent in Rwanda.

Table 5.5 Initiating use of a contraceptive method within 12 months, five countries, 2011-2015/16 DHSs

<i>Method</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Pill	6.7	9.3	12.8	9.4	8.0
Injectable	39.6	34.7	39.0	27.2	32.7
Condom	0.9	3.0	3.1	4.4	4.9
LARCs	3.3	8.8	7.0	11.0	3.7
Any reversible modern	51.5	56.2	62.4	52.8	50.0
Permanent methods	0.1	0.6	0.1	0.6	0.9
Short-term modern	48.2	47.4	55.4	41.8	46.3
Traditional	2.2	5.9	4.8	11.5	5.6

Note: Permanent methods are for both female and male sterilisation; short-term modern includes the pill, injectable, diaphragm, male and female condom, foam and jelly, and standard days method; and traditional includes withdrawal, abstinence, and lactational amenorrhea.

However, caution should be exercised when interpreting the results on the use of all short-term methods because of the possibility of underreporting use, or mis-stating the date of initiation. Overall, short-term methods (pill and injectable) are more adopted than long-acting reversible contraceptives other than in Tanzania where adopters of LARCs (11 percent) are more than adopters of the pill (9.4 percent). The lowest proportion of non-users adopted permanent methods – although adoption of modern contraception is increasing with time, adoption of traditional methods is still evident among non-users, but quite wide variation between countries.

5.3 Duration of use of contraception

This section examines how long women use contraception before they either abandon use, or immediately switch to other contraceptive methods. Women were considered to have abandoned use if there was non-use of any contraceptive method in the immediate month following use; women who immediately switched contraception in the following month are not considered to have abandoned, but are considered to be immediate switchers. This section presents continuation

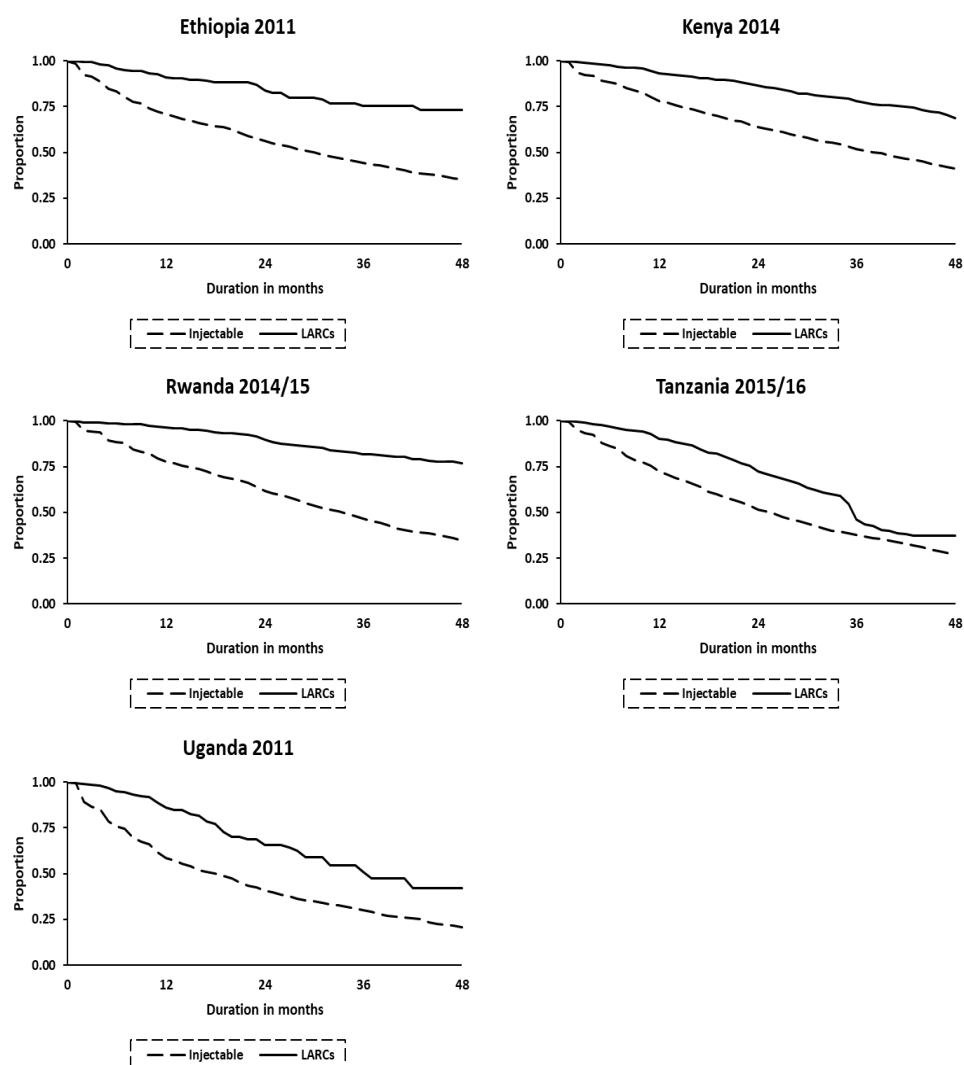
³⁸ Estimates of the diaphragm, foam and jelly, and standard days method are not shown separately in Table 5.5 because a smaller proportion of non-users adopt them, but they form part of the category, 'short-term modern'.

rates of only the injectable and LARCs, because the injectable is observed to be the most preferred short-term method of contraception while the Norplant is the most preferred among long-acting reversible contraceptive methods. However, because of the need to study the dynamics of using LARCs, the IUD and Norplant are considered as LARCs.

5.3.1 Continuation rates of using the injectable and LARCs with time

Figure 5.2 presents Kaplan-Meier survival functions of women using the injectable and LARCs before they either stopped, or immediately switched to other methods of contraception. Over 70 percent of Ethiopian, Kenyan, Rwandan, and Tanzanian women were still using the injectable after a year compared to about 58 percent in Uganda.

Figure 5.2 Use of the injectable and LARCs by month elapsed since initiation, five countries, 2011-2015/16 DHSs



However, the proportion using the injectable fell to 56 percent in Ethiopia, 64 percent in Kenya, 62 percent in Rwanda, 52 percent in Tanzania, and 41 percent in Uganda. Figure 5.2 shows that about a third were still using the injectable after four years in Ethiopia and Rwanda compared to about 40 percent in Kenya, 27 percent in Tanzania, and 21 percent in Uganda. However, the use of LARCs follows a different pattern from that of using the injectable – as expected, the survival functions of women using LARCs are markedly higher than those using the injectable. For example, over 90 percent of women in Ethiopia, Kenya, Rwanda, and Tanzania were still using LARCs after a year compared to 86 percent in Uganda. Moreover, a significant proportion of women are still using LARCs after 48 months compared to users of the injectable – with over 70 percent still using LARCs in Ethiopia, Kenya, and Rwanda while over 35 percent were still using in Tanzania and Uganda. These results suggest that whereas LARCs are associated with longer durations of use than the injectable in all countries, the use of contraception continuously among Tanzanian and Ugandan women is lower than among Ethiopian, Kenyan, and Rwandan women. Figure 5.2 suggests that promoting and encouraging women to use LARCs is likely to offer much benefits to reducing unintended pregnancies than if women relied on only short-term methods.

5.4 Conclusion

This chapter has examined reported episodes in the calendar, patterns of contraceptive method adoption and how long women use contraception before either abandoning, or immediately switching to other contraceptive methods. The analyses in this chapter supplement those in Chapter 3 and Chapter 4. The results on reported contraceptive use in the calendar indicate that use of contraception is more prevalent among ever-married than never-married women except for users of the condom. Contraceptive use among never-married women is quite low and this is common to all countries. As argued earlier, it is likely that the higher desire to either space, limit, or postpone births by a significant proportion of ever-married than never-married women, who are more likely to use contraception to postpone their first birth, is likely to drive this pattern.

Obviously, although reported episodes of contraceptive use in the calendar imply use of contraception, a high number of reported episodes may also point to frequent abandonments in-between durations of use. Reproductive calendar data shows that the injectable still emerges as the most adopted reversible contraceptive method among non-users of contraception, as the case is with current-status data in Chapter 4. On the contrary, LARCs continue to be the least preferred method, although women appear to prefer the Norplant to the IUD. Despite strong preference for short-term reversible modern contraception, especially the injectable, the results shown in Figure

5.2 however, indicate that a significant proportion of women use it for a shorter duration, which is different for users of long-acting reversible contraceptive methods. However, since most users of reversible contraception are less likely to continuously use a method for more than 24 months (Ali and Cleland 1995), an investigation into the comparison between consistent users of the injectable for at least two years and inconsistent users of the injectable is performed in the next chapter.

The high number of reported episodes of condom use among never-married women may lead to theorising that women may be using the condom to prevent themselves against contracting sexually transmitted diseases than prevent unwanted pregnancy. Such a conclusion has been argued elsewhere by Eeckhaut (2017), that the use of the male condom has been largely due to the desire to prevent sexually transmitted diseases. Moreover, the inconsistencies embedded in the reporting of the condom use (that are user-dependent) may lead to inaccurate conclusions relating pregnancy prevention and condom use (Bradley *et al.* 2015). Women are more likely to remember longer durations of contraceptive use which are largely associated with LARCs than shorter episodes of contraceptive use associated with short-term methods of contraception (Curtis and Blanc 1997). Although this might be true, the results in this chapter should be interpreted more on the side of shorter durations of use being associated with short-term methods as opposed to the inability to remember all episodes of using short-term methods of contraception.

The results presented in this chapter provide additional confirmation to those presented in Chapter 4 – that whereas contraceptive adoption is steadily increasing with time in all countries, the largest proportion of users adopt short-term reversible methods of contraception as opposed to long term methods. Reasons such as infrequent sex especially among young people (Chandra-Mouli *et al.* 2014), incorrect information and misconceptions (Williamson *et al.* 2009) have been observed to be some of the reasons why women opt for short-term methods. Moreover, high proportions of reported contraceptive episodes in the calendar may not necessarily speak to consistency, or continuity, in use but rather abandonments in-between episodes of use of methods. A high proportion of women who abandon use and do not immediately switch contraception is likely to lead to a high rate of unintended pregnancies. Although it is unlikely to have a similar family planning strategy, applied in every country at the same time, it is important that countries learn from each other, or even share successful ideas (Williamson *et al.* 2009). At this point, encouraging the use of LARCs is likely to promote continuity in use, especially among women who are less likely to immediately switch contraception. The results in this chapter provide a basis for an investigation into contraceptive transitions, or consistent use of contraception in Chapter 6.

6 CONSISTENT USE AND TRANSITIONS IN CONTRACEPTIVE USE

This chapter examines consistent use and transitions in contraceptive use among East African women. The first section, Section 6.1 begins with an examination of how consistent users and inconsistent users of the most used contraceptive method – the injectable, vary by country. This information is helpful to the understanding of the risk of unwanted pregnancy. The results presented in Chapter 4 and Chapter 5 reveal the injectable to be the most used method of contraception among the five East African countries. Consequently, we examine how consistent users of the injectable vary by background characteristics, and the factors that are likely to predict consistent use of the injectable. Section 6.2 examines universal comparisons of transitions in the use of contraception for the 60 months preceding the survey. Section 6.3 investigates transitions in contraceptive use following uninterrupted use of a method, and how non-users of contraception who adopt the injectable are stratified by women's background characteristics. Because continuous use is an important reproductive health practice to avoiding an unwanted pregnancy, the analyses in this chapter provide insights and clarity to consistent use of contraception among women in the five East African countries – important reproductive health dimensions to consider in promoting contraceptive use.

6.1 Consistent and inconsistent users of the injectable

Whereas immediate switching of contraception is a good reproductive health practice, as it reduces the risk of unwanted pregnancy, continuous and effective use also offers good protection from unwanted pregnancy. In this study, uninterrupted use of the injectable for at least two years is referred to as 'consistent use' otherwise not. This is because continuous use of reversible contraceptives has been observed to be minimal after two years (Ali and Cleland 1995; Ali and Cleland 2010b). Whereas there is a considerably reduced risk of unwanted pregnancy among consistent users, inconsistent users of contraception bear the highest risk of unwanted pregnancy should they be sexually active.

Table 6.1 shows how consistent users compare with inconsistent users of the injectable of all women who used the injectable during the period of observation. The results in Table 6.1 however, show a similar pattern in all countries. All countries under study had the lowest percentage of women with uninterrupted use of the injectable for at least two years, of all women

who at some point used the injectable during the period of observation (60 months before the survey).³⁹

Table 6.1 Consistent and inconsistent users of the injectable, five countries, 2011-2015/16 DHSs

<i>Country/ DHS survey year</i>	<i>Percentage of consistent users of the injectable for at least 24 months of all injectable users</i>	<i>Percentage of consistent non-users of the injectable of all women (injectable users)</i>	<i>Total</i>	<i>Total number of women (injectable users) who used the injectable during the period of observation</i>
Ethiopia 2011	29.8	70.2	100	2975
Kenya 2014	32.0	68.0	100	3174
Rwanda 2014/15	34.3	65.7	100	2934
Tanzania 2015/16	23.3	76.7	100	2131
Uganda 2011	19.9	80.1	100	1566

Note: The total number of women that used the injectable during the period of observation excludes women whose episodes were in progress up to a point the data were truncated three months before the survey but who started using the injectable before the start of the calendar.

6.1.1 Predicting consistent use of the injectable

Consistent users of the injectable merits an examination, because the results indicate that the majority of contraceptive users in East Africa adopt it. A similar pattern in the way consistent users of the injectable vary by background characteristics is observed for some background factors (see Table 6.2). That is, a greater proportion of consistent users of the injectable were rural women, ever-married, exposed to the media, or with access to family planning services in all countries. These results are in agreement with what is expected.

However, other than in Rwanda, a greater proportion of consistent users of the injectable in the rest of the countries were rich. It is expected for the rich to use family planning services because they can afford. However, because of the poorly developed health infrastructure in most rural areas, the inconvenience of having to visit health facilities for additional supplies means that most women would end up not either accessing, or using family planning services. Thus, the use of the injectable that does not require daily visits might explain why the largest proportion of consistent users of the injectable were rural women.

³⁹ The categorisation presented in Table 6.1 follows that women who used the injectable without any interruption for at least 24 months are consistent users, otherwise consistent non-users. The percentages of consistent users and non-users of the injectable are based on the total number of women who used the injectable for at least once during the five years before the survey.

Table 6.2 Percentage distribution of consistent users of the injectable of all women by background characteristics, five countries, 2011-2015/16 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Age					
15-19	2.7	1.0	-	1.5	2.9
20-24	18.7	16.5	10.0	14.1	11.5
25-29	28.4	33.3	28.7	26.4	26.4
30-34	21.9	25.0	30.2	25.0	25.8
35-39	16.4	15.8	17.0	18.0	19.5
40-44	7.9	6.4	10.5	10.4	12.4
45-49	4.0	2.1	3.5	4.6	1.6
Residence					
Urban	33.8	37.9	10.8	37.5	29.7
Rural	66.2	62.1	89.2	62.5	70.3
Level of education					
No education	56.1	2.3	15.4	13.7	8.1
Primary	34.7	64.6	78.4	76.0	60.3
Secondary or more	9.2	33.1	6.1	10.3	31.5
Wealth index					
Poor	25.4	30.0	44.9	31.2	21.0
Middle	19.0	26.2	23.3	21.6	14.9
Rich	55.5	43.8	31.8	47.2	64.0
Marital status					
Never-married	1.0	4.7	3.6	5.3	3.1
Ever-married	99.0	95.3	96.4	94.7	96.9
Motivation to use					
Space	53.5	48.3	53.5	67.7	47.9
Limit	46.5	51.6	46.4	32.3	52.1
Number of living children					
0	4.2	1.2	0.1	0.8	2.5
1-3	57.0	67.6	68.5	58.6	39.8
4 or more	38.8	31.2	31.4	40.6	57.7
Media exposure					
Not exposed	27.3	10.3	15.7	15.0	9.5
Exposed	72.7	89.7	84.2	85.0	90.5
Access to family planning services					
No	29.1	4.6	8.9	12.9	12.3
Yes	70.9	95.4	91.1	87.1	87.7
Respondent currently working					
No	57.1	21.9	10.0	14.8	22.5
Yes	42.9	78.1	89.8	85.2	77.5
Ideal family size					
3 or fewer	25.3	51.1	52.9	18.6	17.0
4	41.0	33.6	31.7	29.6	43.8
5+	26.5	13.7	14.9	48.7	38.4
Non-numeric	7.2	1.6	0.5	3.1	0.8
Consistent users of the injectable	879	967	989	515	296
Total users of the injectable	2975	3174	2934	2131	1566

6.1.1.1 Inconsistent use of the injectable

It is important to understand how inconsistent users of the injectable vary by background characteristics, because this provides useful information on how to promote continuous use of contraception. Inconsistent users are operationalised as women who did not use the injectable without interruption for at least two years. Identifying groups at greater risk of not consistently using contraception provides guidance to policy makers in the design and implementation of family planning programmes. Table 6.3 shows that the largest percentage of inconsistent users of the injectable in all countries are women aged 25-29 years, rural, ever-married, spacers, exposed to the media, or those with access to family planning services, and women with 1-3 living children.

Table 6.3 Percentage distribution of inconsistent users of the injectable of all women by background characteristics, five countries, 2011-2015/16 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Age					
15-19	8.8	4.6	1.7	6.0	5.8
20-24	26.0	28.0	18.5	26.4	25.7
25-29	27.5	34.8	30.7	26.5	33.7
30-34	17.3	16.7	25.7	18.6	15.9
35-39	12.0	11.0	13.8	14.2	10.8
40-44	5.6	3.8	7.3	6.0	6.2
45-49	2.9	1.3	2.3	2.2	1.9
Residence					
Urban	23.6	43.0	14.5	33.3	21.4
Rural	76.4	57.0	85.5	66.7	78.6
Level of education					
No education	54.9	3.5	15.5	15.3	8.3
Primary	34.3	56.5	74.4	66.3	61.1
Secondary or more	10.8	40.1	10.1	18.5	30.5
Wealth index					
Poor	34.2	33.6	48.8	30.8	31.3
Middle	18.7	20.6	20.3	23.1	19.2
Rich	47.0	45.9	31.0	46.1	49.5
Marital status					
Never-married	2.0	7.2	5.8	6.9	4.6
Ever-married	98.0	92.8	94.2	93.1	95.2
Motivation to use					
Space	62.4	55.4	53.8	73.9	60.2
Limit	37.5	44.4	45.8	26.1	39.4
Number of living children					
0	12.9	4.1	0.4	3.8	3.0
1-3	54.6	70.0	69.6	62.9	49.7
4 or more	32.5	25.8	30.0	33.3	47.3
Media exposure					
Not exposed	33.0	10.3	16.4	15.7	9.8
Exposed	67.0	89.7	83.5	84.3	90.2
Access to family planning services					
No	35.1	5.1	6.6	10.4	8.1
Yes	64.7	94.8	93.4	89.5	91.8
Currently working					
No	57.6	29.4	12.4	19.4	25.3
Yes	42.3	70.5	87.5	80.6	74.4
Ideal family size					
3 or fewer	25.7	55.6	57.3	22.3	13.7
4	35.4	29.8	28.6	29.7	43.7
5+	30.0	13.6	13.2	44.3	39.9
Non-numeric	8.9	0.9	0.9	3.7	2.4
Consistent non-users of the injectable	2096	2207	1945	1616	1270
Total users of the injectable	2975	3174	2934	2131	1566

However, these results may relate to the underlying composition of women considered in the analyses (sample), where the majority of women are those that reported to have been exposed to the media, or have access to family planning services. Further, the observation that it is still rural and ever-married women who are inconsistent users of the injectable suggest that these two background characteristics (rural and ever-married women) constitute the largest composition of users of the injectable.

The desire to have additional children among spacers, or those aged 25-29 years could explain why the majority of inconsistent users of the injectable are in those categories. However,

women with 1-3 children who may not want additional children may be opting to adopt, or switch to more effective methods such as permanent methods, or long-acting reversible contraceptive methods. Because the largest percentage of inconsistent users of the injectable are with access to family planning services, reaffirms the notion that access and availability do not necessarily translate into use. However, this raises the questions of whether the available family planning products are the ones wanted, or whether women are not motivated enough to use contraception, or because of limited information exchange associated with using contraception – although all these may be plausible reasons, we argue – based on the results presented in Chapter 4 – that method information exchange is an important indicator of contraceptive adoption.

Because the results show that the injectable is the most used modern method of contraception in the five East African countries, there is need to understand the factors that determine consistent use of it. The results presented in Table 6.4 are odds ratios from a binary logistic regression model predicting consistent use of the injectable. Women who consistently used the injectable for at least two years are categorised as consistent users, otherwise no. The outcome variable is binary, coded “1” for consistent use and “0” otherwise. In this model, unobserved heterogeneity was taken care of by controlling for clustering.

Whereas the majority of East African women use the injectable, the likelihood of consistently using it is age-specific. Table 6.4 shows higher odds of consistently using the injectable among women older than 35 years compared to those younger than 35 years, implying that the likelihood of consistently using the injectable increases as women age. However, urban women are positively and significantly associated with consistent use in only Ethiopia (OR=1.6; $p<0.01$). This can suggest having access to family planning services in urban areas compared to rural areas. Women with secondary or higher education are significantly less associated with consistent use in Kenya (OR=0.7; $p<0.01$), Rwanda (OR=0.7; $p<0.01$), and Tanzania (OR=0.6; $p<0.001$) compared to their counterparts. Ali and Cleland (2010b) reason that more educated women are more knowledgeable about the different types of modern contraceptive methods and health facilities, and therefore they may be more likely to try different methods, or switch between methods.

Household wealth emerged significant only in Uganda although women in both poor and middle household wealth quintiles were less likely (OR=0.6; $p<0.05$) to consistently use the injectable compared to those in the rich household wealth quintile. This finding suggests that having resources may facilitate affordability to obtain contraception – leading to subsequent consistent use of contraceptive methods. Limiters in Rwanda were significantly less likely (OR=0.8; $p<0.01$) to predict consistent use of the injectable while women with no access to family planning services were significantly more likely (OR=1.4; $p<0.05$) to consistently use the injectable

compared to their counterparts. This suggests that consistent use of contraception may be influenced by other factors as having access to family planning services does not necessarily lead to use of modern contraception. However, limiters may be reluctant to consistently use the injectable because they want to switch to more effective methods of contraception such as LARCs, or permanent methods.

Table 6.4 Odds ratios from a binary logistic regression model predicting consistent use of the injectable, five countries, 2011-2015/16 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Age (RC= 25-29)					
15-19	0.4515***	0.1929****	-	0.1793****	0.3747**
20-24	0.7495**	0.5581****	0.5749****	0.5721***	0.4908****
30-34	1.3801***	1.4807****	1.5267****	1.5705***	2.5556****
35-39	1.5241***	1.4885***	1.8917****	1.8459***	3.2398****
40-44	1.6966***	1.6721***	2.6869****	2.7674****	3.3023****
45-49	1.5857	1.9646**	2.9166****	3.6543****	1.1963
Residence (RC= Rural)					
Urban	1.6382****	0.9481	0.8778	1.2996*	1.2824
Education (RC= Primary)					
No education	0.9850	0.6060**	0.9074	0.7878	0.7506
Secondary or more	0.7849*	0.7328***	0.6751***	0.5596****	0.9350
Wealth Index (RC= Rich)					
Poor	0.7746**	0.9035	0.8266*	1.1423	0.5888**
Middle	1.0437	1.1919	1.0190	1.0883	0.6131**
Motivation (RC= Space)					
Limit	0.9659	0.9495	0.7614***	0.8077	1.1089
Number of living children (RC= 1-3)					
0	0.4778****	0.5654	0.5595	0.7586	1.0694
4 or more	0.9477	0.8149*	0.6698***	0.7268**	0.6873**
Media exposure (RC= Exposed)					
Not exposed	0.8789	0.9414	0.9628	0.9475	1.2691
Access to family planning services (RC= Yes)					
No	0.9922	1.0636	1.3755**	1.2118	1.3994
Currently working (RC= Yes)					
No	0.8844	0.9252	0.9033	0.8306	1.0104
Ideal family size (RC= 4)					
3 or fewer	1.0227	1.0125	1.0276	1.0475	1.2807
5+	0.6885***	0.7592**	1.0018	0.9619	0.8524
Non-numeric	0.5670***	0.8604	0.3926*	0.8154	0.3641*
Constant	0.5290****	0.6272***	0.6079****	0.3125****	0.2456****
N	2975	3174	2934	2131	1566

Note: Reference categories in parentheses; *= $p<0.10$; **= $p<0.05$; ***= $p<0.01$; ****= $p<0.001$

Women with four or more children were significantly less likely to consistently use the injectable in Rwanda (OR=0.7; $p<0.01$), Tanzania (OR=0.7; $p<0.05$), and Uganda (OR=0.7; $p<0.05$) compared to women with 1-3 children. Again, there is a possibility that women with four or more children have reached their desired family size, and so they want to limit births by switching to more effective methods of contraception. However, women with no living children in Ethiopia were significantly less likely (OR=0.5; $p<0.001$) to consistently use the injectable than their counterparts with 1-3 surviving children. This is expected because there could be a desire to have children, and so users of the injectable with no children may be inclined to stop use of it.

However, the results presented in Table 6.4 show that media exposure does not matter at predicting consistent use of the injectable.

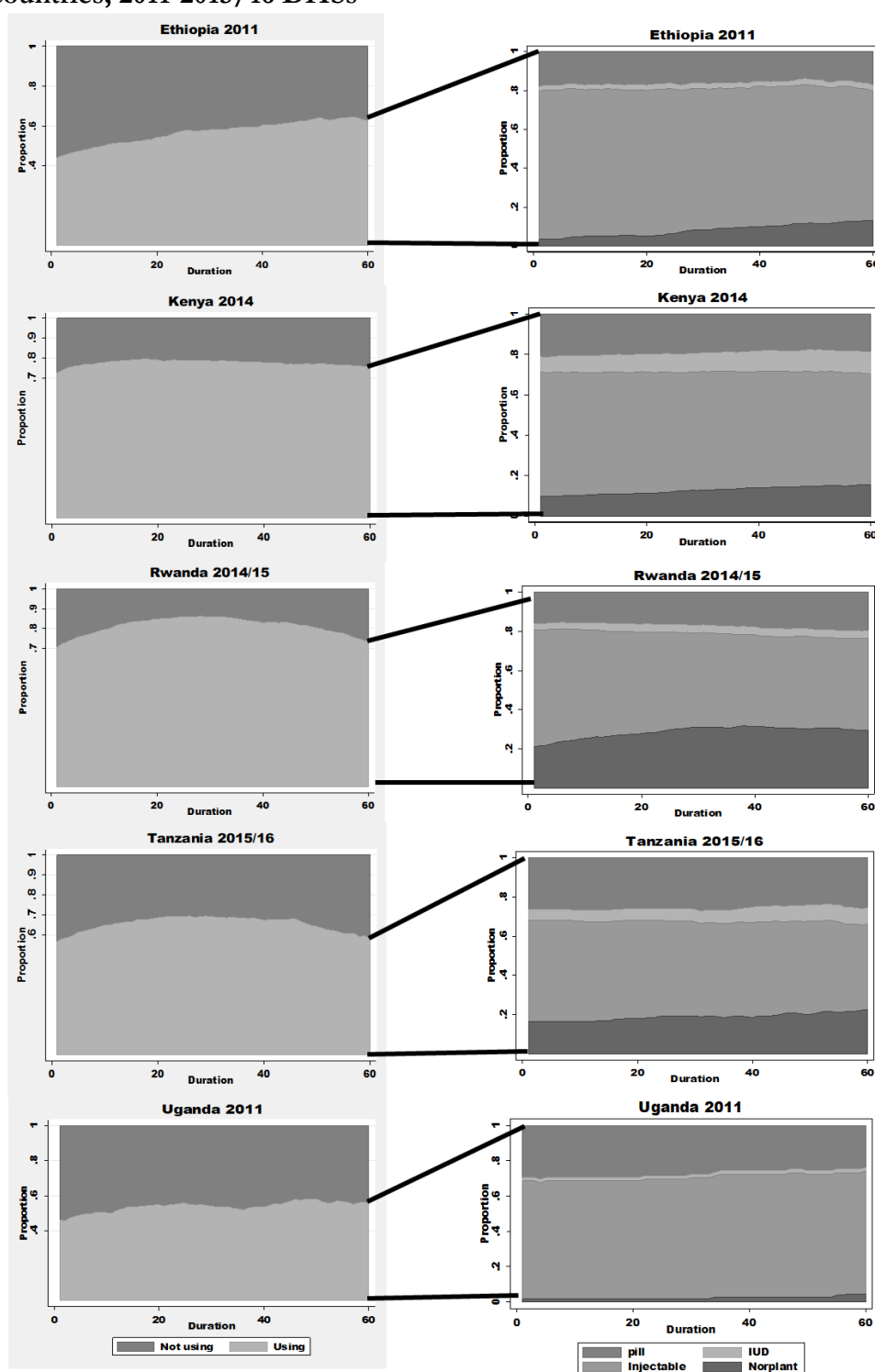
Although the predictor factors of consistent use of the injectable varied by country, the age of a woman emerged consistent in all countries. The number of living children was a significant factor at predicting consistent use of the injectable in Ethiopia, Rwanda, Tanzania, and Uganda. Access to family planning services was significant in only Rwanda while ideal family size was significant in Ethiopia and Kenya. The level of education emerged to be an important factor in Kenya, Rwanda, and Tanzania while household wealth was a key factor in Ethiopia and Uganda. Finally, the type of place of residence emerged an important predictor of consistent use of the injectable in Ethiopia while the motivation for using the injectable was key in Rwanda.

6.2 Holistic comparisons of transitions in contraceptive use over time

As explained in Chapter 3, although time to event history techniques offer a better way of looking at longitudinal data, these methods fall short of providing a holistic (universal) picture of the changes of a studied phenomenon in a group of people. Billari (2001) observes that sequence analysis techniques have the power to offer a holistic perspective of lifetime studies as a group. A holistic perspective is a descriptive and exploratory way of looking at how events change with time in a studied group of people. Therefore, by employing a holistic approach, we are able to know how events occurred, how they are ordered, and the time spent in a particular state (Abbott and Tsay 2000). Thus, sequence analysis allows us to study the history of individuals, or a group of people up to a point in time.

Figure 6.1 shows holistic comparisons of users and non-users of contraception, and the distribution of users of contraception by method (injectable, pill, IUD, and Norplant) with time. The objective is to compare the history of the most adopted short-term methods (pill and injectable) and LARCs, but also examine how non-users of contraception compare with users of contraception with time. Figure 6.1 that is based on reported events in the calendar indicates that the proportion of users of contraception is higher than that of non-users in all countries for 60 months. On the other hand, an examination of only users of contraception in Figure 6.1 shows that the injectable constitutes the biggest proportion for every country for the entire 60 months duration.

Figure 6.1 Universal comparisons in the use of contraception by duration of use, 5 countries, 2011-2015/16 DHSs



An increase in method choice is likely to offer other contraceptive options to women as they switch to other methods of contraception. The history behaviour as observed in Figure 6.1, suggests increasing proportions of women adopting the Norplant in all countries with time, although use of the method (Norplant) remains quite low in Uganda. The increase in the use of the Norplant is likely to be because of the roll-out of the method – contributing to the existing method

mix – with an aim of encouraging women to adopt long-acting reversible modern methods. Other reasons for increased use of the Norplant/ Implant in most sub-Saharan African countries are; reductions in cost, increase in supply of the contraceptive method, and efforts made by respective governments to increase method choice (Jacobstein 2018). The variation in the use of the pill among all women for a period of 60 months is observed to be small.

However, a similar pattern – about the same proportion of users – is observed among users of the IUD in Ethiopia, Rwanda, and Uganda, which is different in Kenya and Tanzania, where proportions of users are observed to increase with time. Because users of the Norplant are observed to increase by duration of use compared to users of the injectable, could suggest that the injectable may be used as a medium to the use of the Norplant – long-acting reversible contraceptives.

Although remarkable differences exist among the five East African countries under study, the results presented in Figure 6.1 point to three broad observations: First, adoption of modern contraception among non-users is observed to increase with time. Second, Figure 6.1 provides evidence that the injectable is the most used short-term method among all users of modern contraception, and last, users of modern contraception are increasingly adopting the Norplant, which may be largely due to an increase in method choice or government intervention.

6.3 Transitions in contraceptive use in the calendar

This section investigates transitions in a single month among those who used a method and without interruptions for at least 12 months. We considered a cut off period of 12 months because users of hormonal methods are more likely to discontinue use within 12 months (Ali and Cleland 2010a; 2010b). Specifically, this section covers the immediate switching patterns from not using any methods of contraception to using any contraceptive method. Further, since the results in Chapter 4 and Chapter 5 show that most women adopt the injectable and the pill, we also examine immediate switching patterns from use of these methods. That is, switches from the injectable to another contraceptive method; and switches from the pill to another contraceptive method.

6.3.1 Initiating use of a contraceptive method after uninterrupted non-use

Table 6.5 shows transitions in the month following uninterrupted non-use of any form of contraception for at least a year. According to Table 6.5, the injectable is the most adopted method of contraception by uninterrupted non-users of contraception, with the percentage of adopters ranging from about 27 percent in Kenya to 47.5 percent in Ethiopia. Although becoming pregnant among non-users of contraception may indicate challenges associated with method adoption, or

pregnancy prevention, the results in Table 6.6 indicate that most non-users reported to have wanted their last child.

Table 6.5 Transition in the month after uninterrupted non-use of contraception for at least a year, five countries, 2011-2015/16 DHSs

<i>Country/ Year</i>	<i>Pill</i>	<i>Injectable</i>	<i>LARCs</i>	<i>Condom</i>	<i>Traditional</i>	<i>Pregnant</i>	<i>Permanent</i>	<i>Total</i>	<i>N</i>
Ethiopia 2011	3.8	47.5	3.9	0.7	0.9	43.2	-	100	1747
Kenya 2014	5.2	26.6	7.3	4.7	3.4	52.5	0.4	100	1940
Rwanda 2014/15	6.4	36.0	3.7	3.0	4.2	46.8	-	100	1709
Tanzania 2015/16	9.0	27.9	10.0	3.1	3.7	46.0	0.5	100	2233
Uganda 2011	4.9	28.0	3.5	3.1	4.2	55.5	0.7	100	1718

Note: Traditional methods include abstinence, withdrawal and lactational amenorrhea.

However, a response bias – where parents claim after giving birth, that the child was wanted has been observed in most data of developing countries (Casterline and Sinding 2000). Non-users of contraception who either wanted to have their last child later, or who did not want to have additional children but became pregnant highlights the need to emphasise promotion campaigns of immediately switching to effective contraception to avert unwanted pregnancy. Further, non-users who became pregnant but did not want additional children, or wanted later still indicates an unmet need for contraception, since these women either want to space, or limit births but are not able to do so with the use of contraception.

Table 6.6 Wantedness of the last child among women who became pregnant in the month following non-use of contraception for at least a year, five countries, 2011-2015/16 DHSs

<i>Country/ Year</i>	<i>Wanted then</i>	<i>Wanted later</i>	<i>Wanted no more</i>	<i>Total</i>	<i>N</i>
Ethiopia 2011	60.9	27.1	12.0	100	736
Kenya 2014	52.9	30.7	16.4	100	966
Rwanda 2014/15	49.1	32.8	18.1	100	756
Tanzania 2015/16	57.7	36.0	6.3	100	1041
Uganda 2011	48.7	35.3	15.8	100	930

Note: Missing cases as a result of either refusing to answer the question to wantedness of the last child, or being non-parous are not part of the computation.

The results in Table 6.5 show that permanent methods continue to be the least adopted by non-users of contraception. That is, a very small proportion of non-users switched to permanent methods of contraception in Kenya (0.4 percent), Tanzania (0.5 percent), and Uganda (0.7 percent) while none switched to permanent methods in Ethiopia and Rwanda. Reasons such as permanent methods being uncommon, or having to make a big decision to adopt them may account for limited adoption. The results presented in Table 6.5 suggest that preference for the short-term methods (pill, injectable and condom) among adopters is higher than for long-acting reversible contraceptives, or permanent methods.

6.3.2 Transitions from use of the injectable to another form of contraception

The results presented in Table 6.7 show that the vast majority of women who stopped using the injectable for an uninterrupted period of at least 12 months did not switch to any other contraceptive method immediately. Switching to other modern methods varied by country. However, it is worth noting that there was no transition to a permanent method in all countries among consistent users of the injectable (not shown). Switching to the condom was non-existent in Ethiopia but limited as well in the rest of the countries. However, this is not the case in South Africa where the condom is the most commonly used method among young people. Four plausible reasons may explain this observation.

First, although the HIV incidence is high in sub-Saharan Africa, HIV prevalence estimates from the UNAIDS online database with country fact sheets of 2017 indicate South Africa with the highest HIV prevalence in the world (23.7 percent) among women age 15-49 years compared to Ethiopia (1.2 percent), Kenya (6.2 percent), Rwanda (3.4 percent), Tanzania (5.5 percent), and Uganda (7.3 percent) (United Nations Programme on HIV and AIDS (UNAIDS) 2019). Although a number of factors are likely to influence condom use among young people in South Africa, high HIV prevalence among South African women aged 15-49 may explain why the condom is the mostly used method among young people. This may be coupled with government intervention where the South African government has made tremendous progress in terms of promoting the use of the condom, and making it readily available in public places at no cost. In contrast, respective governments in the five East African countries under study have not replicated the same practice as in South Africa – partly because of the cultural aspect that does not support promoting the use of the condom among young people. Further, East African countries in most cases lack programmes that promote the supply of condoms for free. Second, although low HIV prevalence among women in East Africa is likely to be a plausible reason for limited use of the condom (compared to South Africa), the nature of the data used in this thesis (calendar data) that requires respondents to report on their contraceptive use episodes as and when they happened for the period of five years preceding the survey means that the data collected may not be free from recall bias – respondents are likely not to remember all episodes of condom use in the calendar. Third, given the AIDS pandemic in sub-Saharan Africa, users of the condom may choose not to report it as a family planning method but rather a barrier method that is only used to prevent themselves from contracting the virus and last, married women using the injectable may not be comfortable to switch to a user-dependent contraceptive method such as the condom. However, this thesis suggests that further studies that investigate condom use in the context of HIV/AIDS in sub-Saharan Africa may offer deeper insights into the way the condom is used in the presence of HIV/AIDS pandemic.

Table 6.7 Transition in the month after uninterrupted use of the injectable for at least a year, five countries, 2011-2015/16 DHSs

<i>Country/ Year</i>	<i>Not using</i>	<i>Pill</i>	<i>LARCs</i>	<i>Condom</i>	<i>Traditional</i>	<i>Pregnant</i>	<i>Total</i>	<i>N</i>
Ethiopia 2011	69.1	7.6	9.6	-	0.7	12.7	100	825
Kenya 2014	62.0	12.2	10.5	2.0	1.6	11.5	100	972
Rwanda 2014/15	66.2	9.8	7.0	1.7	2.4	12.9	100	1045
Tanzania 2015/16	78.5	6.7	4.9	1.0	1.8	6.9	100	737
Uganda 2011	75.7	3.7	1.9	4.4	1.3	12.9	100	460

Note: Traditional methods include abstinence, withdrawal and lactational amenorrhea.

Although the majority of non-users became pregnant in all countries other than Ethiopia (see Table 6.5), the situation is different for users of the injectable. Misunderstanding of the duration of protection may account for pregnancy in the month following stopping the use of the injectable. However, user fees have also been observed to be an impediment to the use of modern contraception in Africa (Gilson 1997; Bankole and Malarcher 2010) – which may cause delay to immediately switch contraception.

6.3.3 Transitions from use of the pill to another form of contraception

Table 6.8 shows that the largest immediate switch from uninterrupted use of the pill was to non-use of contraception in all countries. Regarding an immediate switch to a modern method of contraception, majority of discontinuers of the pill in all countries switched to the injectable. However, none switched to permanent methods in all countries (not shown).

Table 6.8 Transition in the month after uninterrupted use of the pill for at least a year, five countries, 2011-2015/16 DHSs

<i>Country/ Year</i>	<i>Not using</i>	<i>Injectable</i>	<i>LARCs</i>	<i>Condom</i>	<i>Traditional</i>	<i>Pregnant</i>	<i>Total</i>	<i>N</i>
Ethiopia 2011	50.1	19.1	2.3	1.0	0.5	27.0	100	152
Kenya 2014	42.4	17.0	11.7	2.2	2.3	23.9	100	383
Rwanda 2014/15	54.2	14.4	2.3	2.8	3.3	23.0	100	349
Tanzania 2015/16	61.0	9.0	6.4	0.7	4.0	18.6	100	314
Uganda 2011	68.3	6.2	4.7	1.0	3.3	16.5	100	135

Note: Traditional methods include abstinence, withdrawal and lactational amenorrhea.

Pregnancy in the month following stopping use of the pill is observed to be highest in Ethiopia (27 percent) and lowest in Uganda (16.5 percent). Reasons such as incorrect use, or failure to immediately switch to another method of contraception for reasons other than wanting to have a child may account for pregnancy in the transition month after uninterrupted use of the pill. However, the possibility of women to intentionally stop use of the pill because they want to become pregnant cannot be ruled out.

6.3.4 Stratification of non-users of contraception that adopted the injectable

In this section, we focus on the injectable because the majority of non-users in the five East African countries adopted it, which makes it important to understand the distribution by background characteristics. Further, results indicate that adoption of modern contraception by

non-users is increasing over time. Specifically, we analyse how the transition to the injectable after uninterrupted non-use of contraception for at least a year varies by women's background characteristics.

In most cases, transitions from uninterrupted non-use of contraception for at least a year to the injectable varied by country and background characteristics. However, a similar direction in the way non-users of contraception adopt the injectable is observed by type of place of residence, marital status, exposure to the media, or having access to family planning services in all countries. The results presented in Table 6.9 show that the largest proportion of non-users in rural areas, switched to the injectable compared to their counterparts in urban areas. As earlier argued, non-users in rural areas may be more likely to adopt the injectable than non-users in urban areas because they want to avoid the inconvenience of having to visit the health facilities more frequently.

The results in Table 6.9 also show that the largest proportion of non-users with media exposure, or with access to family planning services switched to the injectable compared to non-users with no media exposure, or access to family planning services. Although having access to family planning services, or media exposure does not necessarily imply adoption, we argue that these conditions may facilitate increased adoption in some settings. Knowledge exchange about the use of contraception is likely to be higher among women with media exposure, or with access to family planning services than those without. However, the only limitation to this (as stated in Chapter 4) is that the information received and reported by women may not necessarily be that from family planning practitioners, or providers but rather from other sources, which may not be accurate. Further, as earlier noted, the results that speak to media exposure, or access to family planning services may reflect the baseline composition of women included in the sample, where the majority of them have media exposure, or access to family planning services. Therefore, the results presented in Table 6.9 may not be definitive in terms of which category of women (non-users) adopted the injectable more than the other, and thus, results about media exposure, or access to family planning services should be interpreted with caution.

Table 6.9 A switch to the injectable in the month following uninterrupted non-use of contraception for at least a year by background characteristics, five countries, 2011-2015/16 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Age at exposure					
15-19	2.4	2.6	1.4	2.4	2.3
20-24	20.2	23.0	12.8	27.7	20.5
25-29	27.0	35.7	27.4	22.2	32.5
30-34	20.9	19.0	26.3	21.6	21.1
35-39	18.8	11.8	18.8	15.3	13.6
40-44	7.0	5.4	10.4	8.1	8.0
45-49	3.7	2.4	2.9	2.8	2.1
Residence					
Urban	10.0	33.8	10.1	29.4	18.9
Rural	90.0	66.2	89.9	70.6	81.1
Level of education					
No education	67.9	4.2	20.4	18.4	10.2
Primary	28.1	66.3	74.7	66.7	66.8
Secondary or more	4.0	29.5	4.9	14.9	23.0
Wealth index					
Poor	41.1	42.8	55.0	33.1	36.3
Middle	22.8	22.6	22.6	24.3	22.3
Rich	36.1	34.6	22.5	42.6	41.4
Marital status					
Never-married	1.1	10.1	8.2	8.3	3.5
Ever-married	98.9	89.9	91.8	91.7	96.3
Motivation to use					
Space	53.5	53.8	47.1	73.0	54.4
Limit	46.5	46.2	52.9	27.0	45.6
Number of living children					
0	1.4	1.9	0.1	0.4	0.6
1-3	50.5	60.7	59.7	61.6	42.5
4 or more	48.2	37.4	40.2	38.0	57.0
Media exposure					
Not exposed	39.9	17.2	16.6	16.8	10.0
Exposed	60.1	82.8	83.4	83.2	90.0
Access to family planning services					
No	38.3	4.7	7.2	12.5	9.4
Yes	61.7	95.3	92.8	87.5	90.6
Currently working					
No	58.2	22.2	12.4	14.4	24.3
Yes	41.6	77.8	87.6	85.6	75.5
Ideal family size					
3 or fewer	21.8	45.4	50.2	21.5	11.2
4	28.6	31.0	29.8	27.4	42.9
5+	37.7	22.3	18.7	46.1	43.0
Non-numeric	11.9	1.2	1.3	5.0	2.7
Total	100	100	100	100	100
Number of adoptions	786	534	616	601	488

Although the majority of non-users that adopted the injectable in Tanzania (42.6 percent) and Uganda (41.4 percent) are from rich households, it is rather the majority poor non-users in Ethiopia (41.1 percent), Kenya (42.8 percent) and Rwanda (55 percent) that adopted the injectable. Despite of the possibility of family planning programmes in Kenya and Rwanda to subsidise family planning products to promote adoption of contraception, it is also likely that majority of the rich Kenyan and Rwandan women are already using the injectable. It is important to note that while the decision to adopt a contraceptive method may largely depend on an individual, or a couple (depending on the childbearing desires), the government's commitment and involvement towards

the promotion of family planning programmes is essential to realise faster uptake. The results in Table 6.9 also indicate that the majority of non-users who are spacers adopted the injectable in all countries other than Rwanda. This implies that the need for using modern contraception among non-users but who do not want children in the near future is of importance to avoiding unwanted pregnancy.

6.4 Conclusion

This chapter has examined consistent use of contraception and transitions in a single month after uninterrupted use, or non-use of contraception in five East African countries. Emphasis is placed on the use of the injectable, because the results indicate that the majority of East African women in the five countries under study adopt it. This information is helpful in identifying riskier groups but also sheds light on the likelihood of women conceiving unintended pregnancies, should they have sexual relations without the use of contraception.

The results presented in this chapter concur with the ones presented in the previous chapters that show a significant proportion of non-users of contraception adopting the injectable. Although the results show that long acting reversible contraceptives (LARCs) are the least adopted methods by non-users of contraception, the increase in the use of LARCs particularly, the Norplant with time may suggest increased roll-out of the method. Inconsistent use of the injectable is more pronounced among women living in rural areas, ever-married as well as women with access to family planning services, or the media. However, as earlier argued, having access to family planning services may not necessarily lead to adoption. Reasons related to preferred choice and information exchange are likely to play a role in the process of adopting contraception.

The distribution of consistent use of the injectable conforms with the results in Chapter 5 which indicate that the largest proportion of women adopt the injectable. The results suggest that aging women are more likely to consistently use the injectable than younger women, because of increasing odds of using with age. This we think may be because older women particularly those older than 40 years, have completed childbearing and they feel the need to effectively use modern contraception to avoid an unwanted pregnancy. Another reason that may account for consistent use of the injectable among older women is wanting to achieve longer birth intervals.

However, the results from the analysis suggest limited immediate switching among users of contraception, especially the injectable. For this reason, pregnancy in the month following uninterrupted use may happen. Although, some women who became pregnant in the month following uninterrupted non-use of a contraceptive method report wanting their last child, it is important to note that women may be less likely to report children wanted at some later date as unwanted children. Johnson-Hanks (2007) observes that the practice of having children soon than

at a preferred later-date may be a result of reasons such as contraceptive breakdown, failure to incorporate men's views on fertility intentions, changes in fertility intentions with time, and poor measurement of fertility intentions probably due to desirability bias.

Ali and Cleland (2010b) observe that failure to immediately switch to another contraceptive method, or switching to a less effective method is responsible for an unplanned pregnancy. Further, the results also suggest that the use of the injectable may be used as a transition to the use of LARCs, and this is more evident in Ethiopia, Kenya, and Tanzania. However, majority users of the injectable in Kenya, Rwanda, Tanzania, and Uganda switched to short-term modern methods, the pill and condom. Although it is likely that LARCs may be uncommon methods of contraception among some users in the countries under study, the long-standing tradition of using short-term methods since the inception of family planning programmes may influence adoption patterns. However, a recent paper by Jacobstein (2018) observes that the increase in use of LARCs in sub-Saharan Africa, particularly the Norplant, is largely because of government policy that aims to promote the use of long-acting reversible contraceptives, and reduction in costs of services. This observation may relate with the results in this research, that indicate an increase in the adoption of LARCs among users of contraception in Ethiopia, Kenya, and Tanzania.

The analyses presented in this chapter lead to four observations: First, the injectable continues to be the most preferred reversible modern contraceptive method used by East African women. A significant proportion of women adopting it in the presence of other contraceptive methods provide evidence to this assertion. Although method skew is not identifiable (as observed in Chapter 4), several factors such as those discussed by Sullivan *et al.* (2006) that are associated with method skews for example, characteristics of clients, availability of methods, history, government policies, may be plausible explanations for the high preference for the injectable in East Africa. Despite this, consistent use remains limited in all countries, and this may contribute to unwanted pregnancy.

Second, although immediate switching to permanent methods among users of short-term methods of contraception is limited, transitions in contraceptive use indicate that users of contraception are increasingly adopting LARCs particularly in Ethiopia, Kenya, and Tanzania. Promoting the use of LARCs is likely to lead to continuity in the use of contraception thereby providing better protection against unwanted pregnancy. For example, in Kenya, family planning programmes such as the "Tupange project" aimed at promoting the use of LARCs have been reported to be successful in reducing unwanted pregnancy especially among the urban poor (Muthamia *et al.* 2016). Further, reducing the price of LARCs so as to increase the choice of

methods, demand, but most importantly, promote affordability has also been suggested (Demeny 1975; Rademacher *et al.* 2016).

The third observation points to a possible disconnect between contraceptive method availability and the use of modern contraception. Even though there is evidence that indicate increased contraceptive method availability in East Africa, most women continue not to use contraception despite having access to it. This situation is likely to imply several things: for example, women not getting enough and correct counselling in form of information exchange; non-availability of a preferred choice of contraception; lack of promotion campaigns in the use of modern contraception are likely to be some of the factors for non-use of contraception.

Finally, whereas the results suggest limited immediate switching in all the five East African countries under study, adoption of the injectable by non-users of contraception, stratified by women's background factors points to no uniform pattern in all countries except for marital status, media exposure, or access to family planning services, and type of place of residence. The implication for such results is that the predictors of immediate contraceptive switching, or adoption of modern contraception may be country-specific. Moreover, the results also imply that respective governments may have different strategies employed in order to increase coverage in the use of family planning services.

However, identifying key indicators of immediate switching in the five East African countries follows in Chapter 7. This is important because we are able to identify the categories of women at greater risk of unwanted pregnancy that may result from failure to immediately switch contraception. Further, the results from the analysis guide family planning providers in designing strategies that call for more effort in promoting contraceptive use, and at the same time encouraging consistent use especially among vulnerable groups.

This chapter sets out to identify the key predictors of contraceptive immediate switching among women from five East African countries. Three types of switching were considered: a switch from using a traditional method, or non-use of contraception to a modern method of contraception; a switch from using the injectable to a less effective method of contraception; and a switch from the injectable to a more effective method of contraception. Again, a switch from the injectable to another contraceptive method was considered because most users of modern contraception in East Africa were using the injectable.

7.1 Predictor factors of immediate contraceptive method switching

As explained in Chapter 3, discrete-time survival models were used for two reasons: First, the events of interest in our study occurred at discrete times. Second, it is possible that different women shared the same event and at the same time. However, because of clustering, women are likely to share similar characteristics, or behave in the same way within the same cluster. In order to control for unobserved heterogeneity, multilevel models of two levels, with the first level controlling for clustering within the cluster, and the second level for repeated observations on an individual, were fitted to the data.

7.1.1 Contraceptive method switching from a traditional method, or non-use of contraception to a modern method

Table 7.1 shows the results from a multilevel model on switching from using a traditional method (abstinence, withdrawal, and lactational amenorrhoea), or non-use of contraception to a modern method of contraception (pill, IUD, injectable, Norplant, diaphragm, condom, sterilisation, foam and jelly, and standard days methods). By this classification, switching from a traditional method to another traditional method, or even from one modern method to another modern method was not considered a switch.

Since the intention was to follow-up women using traditional methods, or the non-users of contraception, episodes of modern contraceptive use happening for the entire duration were excluded from the analysis, since they are not exposed to the risk of switching from a traditional, or non-use of contraception to a modern method. Further, episodes of pregnancy, termination, and births were also excluded from the analysis since they are not at risk of switching. However, episodes of consistent use of traditional methods, or consistent non-use of contraception up to the time of the survey were retained in the analysis, because they are exposed to the risk of changing methods during the period of observation. Episodes that began before the calendar start date were

ignored. Finally, a switch was determined if there was change of methods from either a traditional method, or non-use of contraception to a modern method. The switching variable is a dichotomous variable; switchers (coded as 1) versus non-switchers (coded as 0). Other than the duration variable that was included in the model as a continuous variable, the other variables are categorical.⁴⁰ As explained in Chapter 2, the selection of the factors included in the model are based on Bulatao's (1989) framework that considers four broad factors that are likely to influence the choice of contraceptive methods; contraceptive goals, contraceptive access, contraceptive competence, and contraceptive evaluation.

The results in Table 7.1 indicate that the odds of switching increase with age in all countries, suggesting a higher likelihood of switching from a traditional method, or non-use of contraception to a modern method among older women particularly those aged 40-49 years than among younger women (20-29 years), and these relationships are statistically significant ($p < 0.05$) in all countries other than Uganda. This finding suggests that older women are likely to have completed child bearing, and therefore they feel motivated to switch to effective modern methods of contraception. This finding is in agreement with an observation by Ali and Cleland (1999) – consistent use of contraception among women older than 35 years compared to those younger than 35 years.

The duration of use of traditional methods, or non-use of contraception was statistically significant ($p < 0.001$) at predicting switching to a modern method in all countries other than Uganda – although women who use traditional methods, or those who do not use contraception for a longer time, are less motivated to switch to modern methods. In Kenya, urban women were positively associated ($OR = 1.1$; $p < 0.05$) with switching from a traditional method, or non-use of contraception to a modern method compared to their rural counterparts while Ethiopian women with secondary or higher education were less likely to switch ($OR = 0.8$; $p < 0.05$) from a traditional method, or non-use of contraception to a modern method. Switching among urban Kenyan women is likely to be motivated by close proximity to family planning facilities, or availability of family planning services. However, the results in Table 7.1 suggest three possibilities as to why Ethiopian women with secondary or higher education are less likely to switch compared to their counterparts with primary education: First, the most educated are not switching to a modern method because they are already using one. Second, some women with secondary or higher education may be abstaining from having sexual relations, and therefore may be less motivated to switch to an effective modern method of contraception. Third, most uneducated women who are not using a modern method may be more inclined to switch to a modern method than their

⁴⁰ In this thesis, the “duration of use” of a contraceptive method before switching and the “time to switch” are phrases used interchangeably to mean the same thing.

counterparts with secondary or higher education who may already be using a modern method of contraception.

Table 7.1 Odds ratios from multilevel discrete-time survival hazards models predicting contraceptive method switching from a traditional method, or non-use of contraception to a modern method, five countries, 2011-2015/2016 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Time to switch (months)	0.9841****	0.9583****	0.9536****	0.9886****	1.0012
Age at switching (RC= 20-29)					
10-19	0.9143	0.9024*	1.2253**	0.9626	0.8619*
30-39	1.0849	1.1122**	1.2185****	1.1497***	1.0931
40-49	1.5965****	1.6195****	1.7439****	1.3212***	1.1758
Residence (RC= Rural)					
Urban	0.8925*	1.0796**	0.9939	0.9690	0.9781
Education (RC= Primary)					
No education	0.9495	0.8967	0.9540	1.0260	0.9172
Secondary or more	0.8426**	1.0679*	1.0919	0.9828	0.9927
Household wealth (RC= Rich)					
Poor	1.0198	1.1397***	1.0845*	1.1058	1.0796
Middle	0.9839	1.1152**	0.9846	1.1344**	1.0489
Motivation to use (RC= Space)					
Limit	0.8260****	0.7741****	0.6710****	0.7503****	0.8257***
Number of children (RC= 1-3)					
0	0.8176	2.0255**	1.3687	1.0163	1.9226**
4 or more	0.8339***	0.8621***	0.6883****	0.7448****	0.8062***
Media exposure (RC= Yes)					
No	0.9038**	1.0290	0.9614	1.0054	0.9995
Access to family planning services (RC= Yes)					
No (RC)	1.0583	1.0443	1.1538*	1.0266	0.8918
Currently working (RC= Yes)					
No	0.9996	1.0288	1.0003	1.0087	1.1409**
Ideal family size (RC= 4)					
3 or fewer	0.9856	1.1324***	1.2047****	1.0138	1.1017
5+	0.8740**	0.9608	0.9602	0.8900***	0.9889
Non-numeric	0.8529**	0.8287	0.8235	0.8227*	0.9852
Wanted last child (RC= Wanted then)					
Wanted later	0.9911	1.0610	0.9991	1.1192***	1.1655***
Wanted no more	1.0159	0.8909**	0.9080	1.1387	1.0492
Constant	0.0658****	0.0549****	0.0773****	0.0496****	0.0406****
Person months	87342	158630	117618	117596	67299

Note: Reference categories in parentheses; period of observation is 60 months. *= $p < 0.10$; **= $p < 0.05$ ***= $p < 0.01$; ****= $p < 0.001$

Limiters in all countries were less likely ($p < 0.01$) to predict switching from a traditional method, or non-use of contraception to modern methods compared to spacers, and this pattern is similar to all women with four or more children who were also less likely ($p < 0.01$) to predict switching from a traditional method, or non-use of contraception to a modern method compared to women with 1-3 surviving children. A plausible reason for limiters being less likely to switch from a traditional method, or non-use of contraception to a modern method is because they may be already using an effective modern method of contraception. The same explanation would hold for women with four or more living children – because they have either stopped child bearing, or they want to space births, and they are already using a modern method of contraception.

Women with no media exposure in Ethiopia were less likely (OR=0.9; $p < 0.05$) to influence switching from a traditional method, or non-use of contraception to a modern method compared

to those with media exposure. However, this is expected especially if women cannot access family planning messages shared on information sources such as radio, or television. In Kenya (OR=1.1; $p<0.01$) and Rwanda (OR=1.2; $p<0.001$), women with an ideal family size of three or fewer children were more likely to switch from a traditional method, or non-use of contraception to a modern method than their counterparts with an ideal family size of four children. However, women with an ideal family size of more than five children in Ethiopia and Tanzania were less likely ($p<0.05$) to switch from a traditional method, or non-use of contraception to a modern method than women with an ideal family size of four children. These findings suggest that the motivation to use effective modern methods of contraception is higher among women who want to have fewer children (less than four) than among women who want to have high numbers of children (more than four). In Tanzania (OR=1.1; $p<0.01$) and Uganda (OR=1.2; $p<0.01$), women who wanted their last child later were more likely to switch from a traditional method, or non-use of contraception to a modern method than their counterparts who wanted their last child then. This is expected as women who want to space births are motivated to adopt effective modern methods of contraception than women who want to have a child soon.

However, the results presented in Table 7.1 suggest confounding by age among women with four or more living children, which makes interpretation of the results not straight forward. In order to understand better the effects of age and number of living children on switching, an interaction term was included in the model, and the results are presented in Table 7.2.⁴¹ An interaction term helps to understand how the effect of an explanatory variable on the outcome variable can be influenced by the effect of another explanatory variable in the model (Ai and Norton 2003). When an interaction between age and number of living children was introduced in the model, the results presented in Table 7.2 indicate that whereas the direction and statistical significance of women with four or more living children was maintained (as in the results presented in Table 7.1), this was not the case with age in all countries other than in Kenya. In Kenya, the odds of switching are observed to increase with age ($p<0.05$). However, in the other countries, there is no statistical significance attained among women in the age group 40-49 years, although Rwandan women aged 10-19 years and 30-39 years (at the time of switching) were more likely (OR=1.2; $p<0.05$) to determine switching from a traditional method, or non-use of contraception to a modern method than their counterparts aged 20-29 years.

⁴¹ The results presented in Table 7.2 exclude childless women because of wide confidence intervals, but the results from a model with childless women are presented in Table A.7, Table A.8, and Figure A.2. However, despite this consideration, the results from the two different models were in most cases the same in terms of magnitude and direction.

Table 7.2 Odds ratios from multilevel discrete-time survival hazards models predicting contraceptive method switching from a traditional method, or non-use of contraception to a modern method, five countries, 2011-2015/2016 DHSs (childless women excluded)

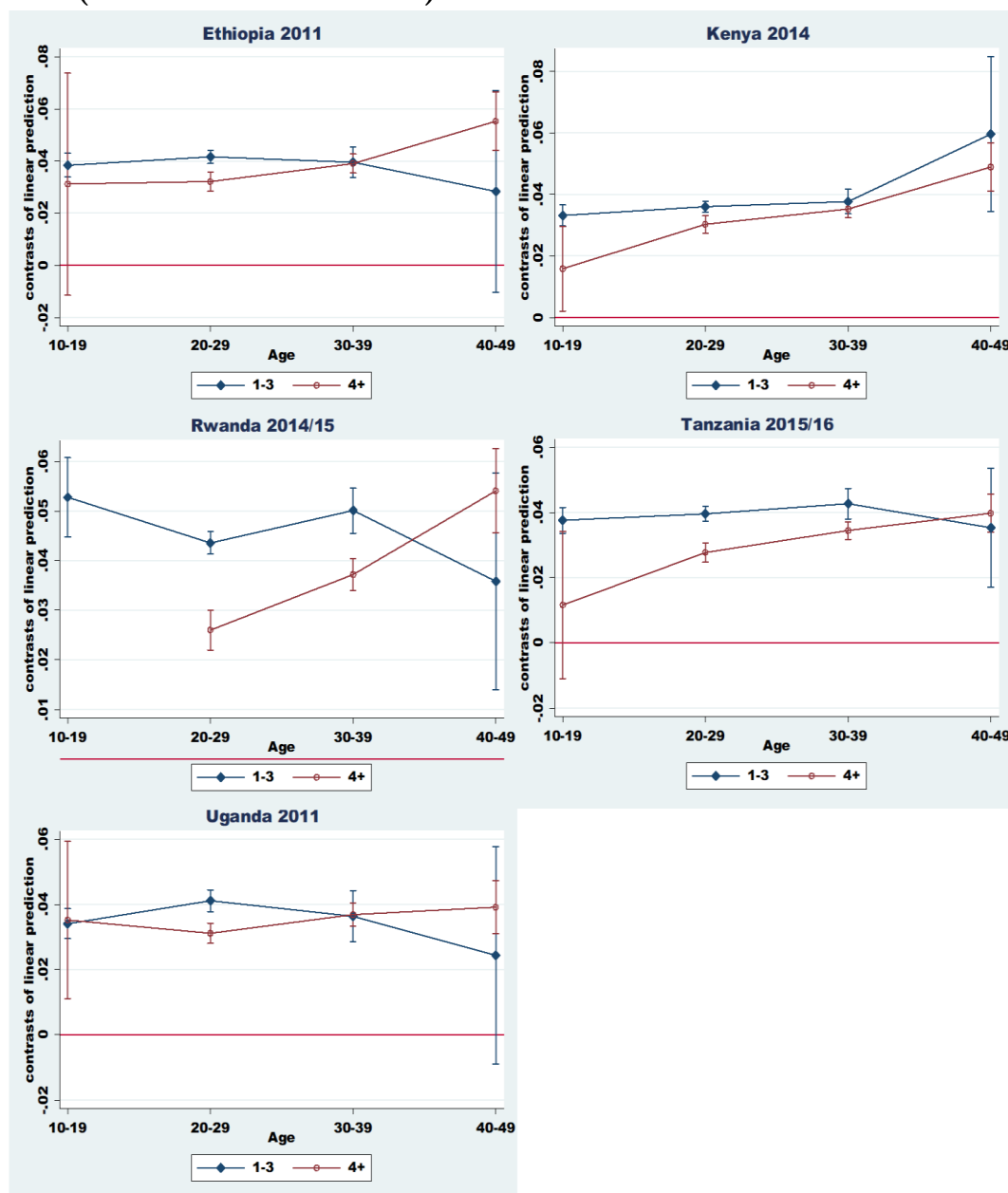
	<i>Ethiopia</i> 2011	<i>Kenya</i> 2014	<i>Rwanda</i> 2014/15	<i>Tanzania</i> 2015/16	<i>Uganda</i> 2011
<i>Background characteristics</i>					
Time to switch (months)	0.9843****	0.9581****	0.9537****	0.9886****	1.0013
Age at switching (RC= 20-29)					
10-19	0.9199	0.9186	1.2258**	0.9485	0.8222**
30-39	0.9482	1.0506	1.1594***	1.0816	0.8796
40-49	0.6721	1.7046**	0.8146	0.8883	0.5813
Residence (RC= Rural)					
Urban	0.9090	1.0828**	0.9935	0.9701	0.9929
Education (RC= Primary)					
No education	0.9563	0.9029	0.9588	1.0283	0.9200
Secondary or more	0.8564**	1.0689*	1.0936	0.9835	0.9882
Household wealth (RC= Rich)					
Poor	1.0220	1.1364***	1.0822	1.0455	1.0781
Middle	0.9901	1.1117**	0.9764	1.1330**	1.0430
Motivation to use (RC= Space)					
Limit	0.8246****	0.7773****	0.6769****	0.7458****	0.8227***
Number of children (RC= 1-3)					
4 or more	0.7632****	0.8349***	0.5834****	0.6902****	0.7487****
Media exposure (RC= Yes)					
No	0.9041**	1.0263	0.9617	1.0008	1.0011
Access to family planning services (RC= Yes)					
No (RC)	1.0569	1.0465	1.1522*	1.0267	0.8920
Currently working (RC= Yes)					
No	1.0022	1.0264	1.0007	1.0041	1.1349**
Ideal family size (RC= 4)					
3 or fewer	0.9728	1.1330***	1.1992****	1.0143	1.0909
5+	0.8696**	0.9598	0.9608	0.8927**	0.9795
Non-numeric	0.8461**	0.8300	0.8129	0.8164**	0.9754
Wanted last child (RC= Wanted then)					
Wanted later	0.9854	1.0612	0.9912	1.1153***	1.1634***
Wanted no more	1.0035	0.8876**	0.8901*	1.1275	1.0334
Interaction term					
10-19 * 4+	1.0561	0.5590	-	0.4339	1.3822
30-39 * 4+	1.2931**	1.1177	1.2524**	1.1589	1.3541**
40-49 * 4+	2.6314	0.9703	2.6472***	1.6397*	2.1812
Constant	0.0663****	0.0552****	0.0787****	0.0505****	0.0419****
Person months	87342	158630	117618	117596	67299

Note: Reference categories in parentheses; period of observation is 60 months. *= $p < 0.10$; **= $p < 0.05$ ***= $p < 0.01$; ****= $p < 0.001$

Graphical representations have been suggested as a way of more usefully reflecting the effects of interaction terms (Karaca-Mandic *et al.* 2012). The marginal effects – which show changes in a dependent variable as a result of changes in explanatory variables (Brambor *et al.* 2006; Williams 2012) – of age and the number of living children on switching are shown in Figure 7.1.

In Ethiopia, switching from a traditional method, or non-use of contraception to a modern method of contraception among women with 1-3 living children is higher than among women with four or more living children for women aged 10-19 years and 20-29 years, but such a pattern changes among women aged 40-49 years (at the time of switching). Switching is more likely among women with four or more living children in the age group 40-49 years compared to women with 1-3 living children. Further, the switching pattern among women with 1-3, or four or more children appears the same among women aged 30-39 years.

Figure 7.1 Marginal effects of age and number of living children on switching from a traditional, or non-use of contraception to a modern method of contraception (childless women excluded)



In Kenya, the switching pattern is observed to increase with age irrespective of the number of living children a woman has. The odds of switching among Kenyan women with 1-3 children are higher than among Kenyan women with four or more children across all age groups. As earlier argued, the motivation to adopt modern methods of contraception is likely to be higher among women with fewer children (1-3 children) than among those with four or more children.

In Rwanda, an increasing trend to switch is observed among women aged 20-29 years and 40-49 years with four or more living children. This is likely to be motivated by the desire to either limit, or space births by adopting an effective method of contraception. However, a decreasing trend is observed between ages 30-39 years and 40-49 years among women with 1-3 children. This

may imply that the majority of Rwandan women with 1-3 children are already using a modern method of contraception before they turn 40-49 years.

Figure 7.1 shows that switching is observed to increase at all ages among Tanzanian women with four or more living children, but a slight increase is observed among women with 1-3 living children between age groups 30-39 years and 40-49 years. The slight decline in the curve observed between 20-29 years and 40-49 years among Ugandan women with 1-3 children may indicate that women with 1-3 surviving children are already using a modern method of contraception by the time they turn 40-49 years, while the increase in switching among women with four or more children between 20-29 years and 40-49 years may suggest the need to either space, or limit births by adopting an effective modern method of contraception.

The hypothesis that urban women are more likely to switch from a traditional method, or non-use of contraception to a modern method is only confirmed in Kenya – implying that the type of place of residence does not affect switching other than in Kenya.

7.1.2 Contraceptive method switching from the injectable to a less effective method of contraception

The results presented in Table 7.3 are from a multilevel model with two levels to control for unobserved heterogeneity among women with repeated observations in a cluster. Based on the classification of contraceptive effectiveness presented in Chapter 3, any switch from the injectable to either a traditional method (abstinence, withdrawal, or lactational amenorrhoea), or one of these modern methods (pill, condom, diaphragm, foam and jelly, or standard days method) constituted a switch, otherwise not. Switchers were coded a value of “1” otherwise “0”. In this model, the duration of use before switching was included as a continuous variable. However, episodes of consistent non-use of contraception, traditional, or modern methods other than the injectable were excluded from the analysis because they were not followed-up. Further, episodes of pregnancy, termination, and births were also not part of the analysis because they were not at risk of switching. Finally, all episodes with missing time durations were also excluded from the model.

Unlike with switching from a traditional method, or non-use of contraception to a modern method, the results presented in Table 7.3 show no statistical significance by the duration of use of the injectable before switching to a less effective method of contraception in all countries. However, switching from using the injectable to a less effective method increases with duration of use of the injectable in Kenya and Rwanda but this direction is reversed in the other countries. Women aged 40-49 years (at the time of switching) in Kenya were more likely ($OR=3.5$; $p<0.01$) to switch from the injectable to a less effective method of contraception than women aged 20-29 years. This may be expected especially if older women are switching from the injectable to

methods such as abstinence because of reduced sexual activity, or decline in fecundity (Ali and Cleland 1999).

Table 7.3 Odds ratios from multilevel discrete-time survival hazards models predicting contraceptive method switching from the injectable to a less effective method of contraception, five countries, 2011-2015/2016 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Time to switch (months)	0.9815*	1.0059	1.0029	0.9968	0.9853
Age at switching (RC= 20-29)					
10-19	0.4244*	1.5126*	1.0113	0.6073	2.3926*
30-39	0.6355	1.4548*	1.2094	0.7740	1.4066
40-49	0.61197	3.4660***	1.2761	1.0432	0.3727
Residence (RC= Rural)					
Urban	1.8852**	0.9272	1.1097	1.2919	1.5832
Education (RC= Primary)					
No education	1.0616	0.3559	0.6980	0.9974	2.8453**
Secondary or more	1.6483	1.5760***	1.3297	1.3898	1.3319
Household wealth (RC= Rich)					
Poor	1.0404	0.6992*	0.7625	0.7012	0.9885
Middle	0.9595	0.9919	1.1681	1.1498	1.6731
Motivation to use (RC= Space)					
Limit	0.8722	0.9196	0.8468	1.3225	1.2187
Number of children (RC= 1-3)					
0	-	-	-	-	-
4 or more	1.0311	0.5036***	1.1417	0.6368	1.0861
Media exposure (RC= Yes)					
No	1.5917	0.8128	1.2660	1.0898	1.0611
Access to family planning services (RC= Yes)					
No (RC)	0.7158	1.3923	0.6195	0.5728	1.3260
Currently working (RC= Yes)					
No	0.9715	1.2012	0.6983	1.1360	0.8646
Ideal family size (RC= 4)					
3 or fewer	0.8314	0.7855	0.8344	0.4095**	1.0333
5+	1.3824	0.9005	1.0234	0.3632****	0.9224
Non-numeric	1.3915	2.4625*	1.8006	0.5569	1.6647
Wanted last child (RC= Wanted then)					
Wanted later	0.9895	1.0991	1.2826	1.4533	0.8643
Wanted no more	1.1290	1.2167	1.2696	1.7805	1.8713
Constant	0.0021****	0.0039****	0.0034****	0.0040****	0.0013****
Person months	53507	60452	57291	34425	23244

Note: Reference categories in parentheses; period of observation is 60 months. *= $p < 0.10$; **= $p < 0.05$ ***= $p < 0.01$; ****= $p < 0.001$

Urban Ethiopian women were about 1.9 times ($p < 0.05$) more likely as their rural counterparts to switch from the injectable to a less effective method of contraception. This is likely to be the case in situations where women switch to non-clinical methods, or methods that can be obtained over-the counter such as the pill, or condom. A similar pattern of switching is observed among women with secondary or higher education in all countries, although a statistical significance is only attained in Kenya ($p < 0.01$). Two reasons may account for this pattern. First, the desire to use the easily accessible, or non-clinical contraceptive methods such as the pill, or the condom, or methods with fewer side effects may be behind the switches among such classes of women. Second, women with secondary or higher education may already be using more effective methods of contraception.

However, the results in Table 7.3 show what is expected among non-educated Ugandan women, who are more likely ($OR=2.8$; $p<0.05$) to switch from the injectable to a less effective method of contraception. This finding suggests weaknesses in the provision of family planning services, where non-educated users of the injectable may not be counselled on how to manage side effects from using the injectable and the availability of other modern contraceptive methods, and hence, they may be less motivated to practice immediate switching to more effective modern methods of contraception, or consistent use. However, accessibility challenges related to obtaining the injectable on follow-up visits, costs, or health concerns may be responsible for switching from the injectable to a less effective method. Other factors that may be responsible for a switch from the injectable to a less effective method relate to autonomy, or partner consent.

The results presented in Table 7.3 indicate that Kenyan women with four or more surviving children are less likely ($OR=0.5$; $p<0.01$) to switch from the injectable to a less effective method of contraception, probably because they are comfortable to continue using the injectable, or they prefer to switch to more effective methods of contraception. The same explanation would also hold for Tanzanian women with an ideal family size of three or fewer children, or five or more children, who are also less likely ($OR=0.4$; $p<0.05$) to switch from the injectable to a less effective method of contraception than their counterparts with an ideal family size of four children.

7.1.3 Contraceptive method switching from the injectable to a more effective method of contraception

Similar to the previous models in Table 7.1, Table 7.2, and Table 7.3, the results presented in Table 7.4 are also from a multilevel model with two levels to control for unobserved heterogeneity among women with repeated observations in a cluster. Again, based on the classification of method effectiveness presented in Chapter 3, any switch from the injectable to an IUD, Norplant, or permanent method constituted a switch, otherwise not. Switchers were coded a value of “1” otherwise “0”. In this model (Table 7.4), the duration of use of the injectable before switching was included as a continuous variable. However, episodes of consistent non-use of contraception, traditional, or modern methods other than the injectable up to the time of the survey were excluded from the analysis because they were not followed-up. Further, episodes of pregnancy, termination, and births were also not part of the analysis because they were not at risk of switching. Finally, all episodes with missing time durations were also excluded from the model.

Table 7.4 Odds ratios from multilevel discrete-time survival hazards models predicting contraceptive method switching from the injectable to a more effective method of contraception, five countries, 2011-2015/2016 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Time to switch (months)	1.0262**	0.9903	1.0076	0.9957	1.0598*
Age at switching (RC= 20-29)					
10-19	0.3214	0.3955**	1.5201	1.8676	-
30-39	1.5030	1.1173	1.1067	1.6618	1.8353
40-49	2.0218	1.0333	1.3831	2.4022	0.9872
Residence (RC= Rural)					
Urban	0.8753	1.0224	1.1451	1.0461	0.6005
Education (RC= Primary)					
No education	1.3946	0.2569	1.3045	0.6666	4.0200
Secondary or more	1.2656	0.9095	2.3087***	1.2522	2.2986
Household wealth (RC= Rich)					
Poor	1.7926	0.5197***	0.9122	1.7090	2.6169
Middle	1.6008	0.7419	1.0954	1.4329	4.2695
Motivation to use (RC= Space)					
Limit	1.0857	0.9063	0.9566	0.8885	0.7425
Number of children (RC= 1-3)					
0	4.3450	-	-	-	-
4 or more	1.0535	0.5671**	0.8808	1.3955	2.6688
Media exposure (RC= Yes)					
No	0.6173	0.3172**	0.6341	0.7653	2.7492
Access to family planning services (RC= Yes)					
No (RC)	0.7024	1.4828	0.4322	0.8369	-
Currently working (RC= Yes)					
No	0.8390	0.7355	0.4822*	1.2396	1.1664
Ideal family size (RC= 4)					
3 or fewer	1.1979	1.3655	1.5629*	2.5442***	0.5124
5+	1.0315	1.4275	1.6431	0.6548	1.4634
Non-numeric	1.4530	2.8238	5.9083**	0.3533	-
Wanted last child (RC= Wanted then)					
Wanted later	1.7634*	1.3828	1.4560	0.8590	0.1461*
Wanted no more	0.8209	2.3985***	1.0415	0.5225	1.2867
Constant	0.0005****	0.0035****	0.0009****	0.0011****	0.0000****
Person months	54285	61237	57700	34497	23338

Note: Reference categories in parentheses; period of observation is 60 months. *= $p < 0.10$; **= $p < 0.05$; ***= $p < 0.01$; ****= $p < 0.001$

Switching from the injectable to a more effective method of contraception attained a statistical significance of five percent only in Ethiopia by the duration of use, although the likelihood to switch increases with the duration of use of the injectable in Ethiopia. A change in method mix as a result of introducing new products on market such as the Norplant by family planning institutions, or government agencies, reductions in cost may account for women wanting to switch from the injectable to a more effective method (Jacobstein 2018). Further, switching from the injectable to a more effective method as women age could also imply that women use the injectable for some time as a transition before they switch to more effective methods of contraception such as the Norplant, or the IUD, or permanent methods. This is likely so especially if they have attained the number of children they so wish to have, or if they want to have longer child spacing intervals. However, only Kenyan women aged 10-19 years (at the time of switching) were less likely (OR=0.4; $p < 0.05$) to switch from the injectable to a more effective method of contraception. This could imply lower motivation to use more effective methods of contraception among younger women than older women.

In Rwanda, women with secondary or higher education were about twice ($p<0.01$) as likely as their counterparts with primary education to switch from the injectable to a more effective method of contraception. Being knowledgeable about the available more effective methods of contraception, and where to get them among women with secondary or higher education as argued by Ali and Cleland (1999), could account for such a behaviour. Poor Kenyan women were about 48 percent ($p<0.01$) less likely to predict switching from the injectable to a more effective method of contraception than their rich counterparts. However, this result is expected as women from poor households may have challenges related to the cost of obtaining clinical methods compared to their counterparts from rich households.

Further, Kenyan women with four or more surviving children ($OR=0.6$; $p<0.05$) and those with no media exposure ($OR=0.3$; $p<0.05$) were all less likely to switch from the injectable to a more effective method of contraception. The plausible explanation for limited switching among women with no media exposure is likely to be related to limited access to family planning information regarding the use of clinical methods. Results in Table 7.4 also confirm what is expected, as Kenyan women who did not want their last child were more likely ($OR=2.4$; $p<0.01$) to switch from the injectable to more effective methods of contraception. However, the hypothesis that women with secondary or higher education are more likely to switch to more effective methods than their counterparts with primary education is only confirmed in Rwanda ($p<0.01$).

7.2 Conclusion

This chapter set out to identify the key determinants of contraceptive method switching in East Africa. The three possible switching scenarios (a switch from a traditional method, or non-use of contraception to a modern method; a switch from the injectable to a less effective method; and a switch from the injectable to a more effective method) that are considered provide breadth of the key indicators of immediate contraceptive switching in East Africa. The main reason for paying attention to the injectable stems from the results shown in previous chapters that point to a significant proportion of East African women who use the injectable – where the majority of non-users of contraception adopted the injectable when they started using contraception, or a significant proportion of women who had stopped using contraception at some point in time switched to the injectable. Thus, with this evidence, the switching behaviour of users of the injectable deserves investigation.

Although the countries considered in the study may be different by the way they implement family planning programmes, this thesis aimed at finding out if the key indicators that determine switching are similar in all five countries. Three reasons are offered to back up such an expectation of having similar indicators of switching in all countries: First, all countries under study are

characterised by a slow fertility transition, which is typically slower in rural areas than in urban areas. Second, the results presented in Chapter 4 indicate improvements in quality in the provision and use of modern contraception in all countries, and last, the results presented in Chapter 5 and Chapter 6 speak to the same pattern in terms of adoption and consistent use of contraception. Therefore, because the countries under study share these characteristics, it was anticipated that they might share the key indicators that determine immediate switching of contraception.

However, to a large extent, the results suggest that the key indicators of switching are country-specific – the conclusions drawn from the analyses do not necessarily speak to the same story in all countries. Regarding a switch from using a traditional method, or non-use of contraception to a modern method, the duration of use, age, motivation for use of contraception, level of education, number of living children, media exposure, and ideal family size were key predictors in Ethiopia. In Kenya, the duration of use, age, type of place of residence, household wealth, motivation for use of contraception, number of living children, ideal family size, and wantedness of last child were important predictors of switching. In Rwanda, the duration of use, age, motivation for use of contraception, number of living children, and ideal family size emerged important predictors of switching. In Tanzania, the duration of use, age, household wealth, motivation for use of contraception, number of living children, ideal family size, and wantedness of last child were key determinants, while motivation for use of contraception, number of living children, employment status, and wantedness of last child were important factors in Uganda.

As regards a switch from the injectable to a less effective method, the type of place of residence emerged an important factor in Ethiopia. Age, level of education, and number of living children were significant factors in Kenya while only ideal family size was important in Tanzania. The level of education emerged the only significant factor in Uganda. Regarding a switch from the injectable to a more effective method of contraception, the duration of use emerged significant in Ethiopia while age, household wealth, number of living children, media exposure, and wantedness of the last child were important predictors of switching in Kenya. In Rwanda, the level of education and ideal family size were important determinants of switching while ideal family size was important in Tanzania. These results resonate with those of Bradley *et al.* (2009) that found age, duration of use of a contraceptive method, and number of living children to be important indicators of switching to either a more, or a less effective method of contraception in nine developing countries. Moreover, the significance of education in these findings concur with findings elsewhere that observed the level of education to be an important factor that influences switching (Ali and Cleland 2010a; 2010b).

The implications for the results obtained from the models suggest that specific important predictors of switching have to be integrated in family planning programmes designed for specific programme intervention. This is because predictor factors differed by the type of switching, with the exception of age and number of living children that emerged important predictors for all three types of switching in Kenya. Further, no factor emerged as important at predicting switching from using the injectable to a more effective method in Uganda, while no factor was important at predicting a switch from the injectable to a less effective method in Rwanda. Moreover, the results indicate that only a few factors were important at predicting switching from the injectable to either a less, or more effective method in Ethiopia and Tanzania. The results suggest that switching between methods may be less important, or may have received less attention from family planning programmes. On the other hand, adopting a modern method, or switching from a traditional method, or non-use of contraception to a modern method may have received a lot of attention among non-users of family planning services.

From the analyses, it is important to note that media exposure and access to family planning services emerged to be inconsistent factors at predicting switching in East Africa – implying that access to family planning services, or media exposure do not necessarily lead to switching of contraception. For example, media exposure emerged significant in only Ethiopia for switching from a traditional method, or non-use of contraception to a modern method while it emerged an important factor in Kenya for switching from the injectable to a more effective method of contraception. The results suggest that women answering in affirmative that they had media exposure may not necessarily imply getting the right family planning messages, or got messages at all. Therefore, using media exposure as a proxy measure of receiving family planning messages may not always be correct. Moreover, having access to family planning services may not translate into use, or even switching, should women not be motivated to use contraception consistently. Further, women with access to family planning services also need to be educated on method availability, new products on market, possible side effects and how to manage them, and consistent use of contraception – calling for better family planning information exchange.

The results presented in this chapter offer an opportunity to tailor family planning programmes that encourage immediate contraceptive switching among groups of women at risk of unintended pregnancy within respective countries. Using the key determinants of switching, family planning programmes are able to know if clients are satisfied with the family planning services offered to them (Khan *et al.* 2007). Switching is more likely to be practiced if clients have access to a wide range of family planning products (Steele and Curtis 2003). This implies that failure to immediately switch after stopping might speak to a limited choice of family planning products, or

less satisfaction. However, a broadened method mix with evidence shown in Chapter 4 points to an increase in method choice, although switching in this case might be limited because of accessibility challenges, and lack of information exchange. Further, immediate switching may also be unlikely if partners, peers, or in-laws do not support continuous use of contraception. However, although availability of a range of contraceptive methods in public and private facilities may be a possible determinant of switching, we note from the review (in Section 2.4.1) that there is no monopoly of who provides which contraceptive method (whether from public or private facilities) in the countries under study – implying that the source of contraceptive methods in the countries under study may not be a major determinant of immediate switching.

Having said this, the results from the analyses suggest that countries are making progress in terms of encouraging women to switch from traditional methods, or from a state of non-use of contraception to using a modern method of contraception. However, the results suggest that switching of contraception among users of modern methods, that is, from one modern method to another modern method of contraception, seems to be a neglected dimension by family planning programmes – calling for complementary programmes that promote immediate contraceptive switching among already existing users of contraception, in addition to those that encourage adoption of modern contraception among non-users of contraception. We emphasise that family planning programmes that only promote contraceptive uptake among new users but without encouraging immediate switching among existing users are less likely to reduce, or prevent unwanted pregnancy resulting from failure to immediately switch contraception. This is because discontinuation of contraception coupled with inconsistent use has been observed to lead to mistimed and unintended pregnancies (Barden-O’Fallon *et al.* 2008). Incorporating campaigns that promote and encourage immediate switching of contraception, implies that fertility transition that is mediated by contraceptive use is likely to be faster than if family planning programmes only concentrated on non-users of contraception.

8 CONCLUSIONS

8.1 Thesis summary

This thesis set out to answer the research question, “Why has contraceptive use remained low in the five East African countries?” To answer this research question, three main investigations in relation to the five main objectives as laid out in Chapter 1 have been performed: (i) quality in provision and use of contraception; (ii) contraceptive adoption and duration of use; and (iii) consistent use and women’s immediate switching behaviour.

Although cross-sectional estimates indicate rising proportions of women adopting modern contraception over time, current estimates point to a slow pace of contraceptive adoption in the countries under study (Ethiopia, Kenya, Rwanda, Tanzania, and Uganda). This raises concern, and suggests that a different way of how we examine the use of modern contraception among women in need could shed light on why contraceptive use has remained at low levels in the region. A review of the literature (in Chapter 2) provides a justification for this. Balán *et al.* (1969) emphasise the value of incorporating life histories in the study of changes in people’s behaviour over time, as this provides better causality results and conclusions than if only cross-sectional estimates were considered. For this reason, in addition to current-status data, this thesis adopted a longitudinal approach – that makes use of contraceptive histories, collected retrospectively, to unpack the dynamics surrounding transitions in contraceptive use and immediate switching of contraception – a neglected reproductive health concern – and argues that immediate switching of contraception should be an added priority to family planning programmes, so women can avoid unintended pregnancies, but also accelerate fertility transition. Thus, this chapter draws on the thesis findings to explain women’s reproductive behaviour. The policy recommendations that are geared towards increasing consistent use of modern contraception, and directions for future research are also discussed.

Using current-status data, Chapter 4 investigated the utility of method skew, method information index, and method composition index as proxy measures of quality in provision, and adoption of contraception – key indicators used to monitor progress in contraceptive uptake. In Chapter 5, reproductive calendar data were used to study contraceptive method adoption and duration of use. Chapter 6 examined consistent use and transitions in use of contraception, stratified by background factors – as this information provides an indication of the groups at a greater risk of unwanted pregnancy. In Chapter 7, the key determinants of immediate contraceptive method switching among East African women were identified, when three types of switching are

considered: switches from a traditional method, or non-use of contraception to modern methods; from the injectable to a less effective contraceptive method; and from the injectable to a more effective contraceptive method.

The main findings presented in Chapter 4 indicate an improvement in the quality in the provision of contraceptive methods in all countries, both in terms of method availability and choice – suggesting a well-developed family planning programme capable of providing a wide range of family planning products. As Ross *et al.* (2002) observe, a balanced method mix is likely to lead to an increase in consumer satisfaction, thereby leading to an increase in contraceptive uptake.

However, the method information exchange, as one of the key indicators that can be used to monitor progress in contraceptive uptake, suggests that information exchange is unbalanced by type of contraceptive method used – with users of LARCs (who constitute the minority) getting more information than users of short-term methods. The results in this thesis indicate weaknesses on the side of family planning providers to share correct family planning information to all users of contraception, which raises a concern in the provision of contraception, especially when the cardinal objective of family planning programmes is to increase adoption of modern contraception. As argued in Chapter 4, two reasons are likely to account for such a difference: First, increased promotion of LARCs, that is borne from a desire to encourage most users of short-term methods to shift to LARCs, could lead to more information being given to users of LARCs than users of short-term methods. Second, because LARCs are clinical methods, it is likely that the clinical environment under which users of LARCs obtain these methods facilitates more information sharing than among users of short-term methods, that can be obtained from even non-clinical settings.

However, this thesis argues that differences in the way women experience information exchange by the contraceptive methods used may reflect weaknesses in the family planning programmes. Although the key indicators that influence information exchange provide an indication of the most important categories of women to focus on, this thesis observes that the type of a contraceptive method used emerged significant at predicting information exchange in all countries. The results presented in this thesis emphasise the need to make sure that family planning programmes embrace, and emphasise the idea of providing reliable and accurate information to every user of modern contraception.

Whereas adoption of modern contraception is observed to increase with time (in Chapter 5), use of modern contraception in East Africa tends to be skewed to one method of contraception. That is, most users adopt short-term methods of contraception – with the injectable being the most

adopted, while adoption of LARCs remains minimal. Despite this finding, this thesis has shown that the minority users of long-acting reversible contraceptives (LARCs) use them for longer durations than most women who adopt short-term reversible modern methods of contraception. The results in this thesis concur with an argument advanced in a recent paper by Jain (2016), that the use of LARCs facilitate contraceptive continuation than short-term methods. Against this backdrop, family planning programmes in respective countries should intensify promotion campaigns for the use of LARCs. The increase in the use of LARCs can be achieved through providing better information, train more personnel to administer clinical services, reduce costs, embark on promotion campaigns, but most importantly, make such services readily available at most health facilities. Evidence from a recent paper by Zerfu *et al.* (2018) points to an increase in use of LARCs in rural areas of Ethiopia when family planning programmes train community health workers to counsel and administer such methods.

The results in this thesis confirm that the injectable is the most used modern reversible method of contraception in East Africa. However, although a significant proportion of non-users of contraception switched to the injectable in all countries, this thesis has shown that immediate switching remains less practiced among discontinuers of the injectable, leading to increased risk of unwanted pregnancy.

Although adoption of LARCs remains minimal (as observed in Chapter 5), the results in Chapter 6 suggest that the use of LARCs is increasingly becoming popular especially in Ethiopia, Kenya, and Tanzania. The practice of switching from using the injectable to a long-reversible contraceptive method may suggest that use of the injectable can be a transition to the use of LARCs, although increased adoption of LARCs is likely to be as a result of rolling out LARCs in health facilities. A recent paper by Jacobstein (2018) observes that increased use of the Norplant in East Africa can be attributed to a change, or an increase in method mix, government intervention, and reductions in costs – thereby increasing its popularity even for users of other contraceptive methods such as the pill and the injectable to try it out.

Although in reality, the countries under study are different, one of the goals underlying the analysis of the key indicators of switching was to perhaps establish a common set of factors since all countries exhibit a slower fertility transition, but also share the same pattern of adopting and use of modern contraception (as observed in Chapter 5). However, this thesis has shown that the predictor factors responsible for switching of contraception are largely country-specific – depending on the type of switching despite to a few common factors that apply to all countries. For example, regarding a switch from a traditional method, or non-use of contraception to a

modern method, two contraceptive goals (the motivation for using contraception, and number of living children) were important predictors of switching in all countries. Duration of use, age, and ideal family size were important in all countries other than Uganda, while the level of education emerged important in only Ethiopia. Household wealth was important in Kenya and Tanzania, while employment status was an important predictor in only Uganda. The type of place of residence was significant in only Kenya while wantedness of last child was significant in Tanzania and Uganda. However, no factor emerged important in Rwanda with regards to a switch from the injectable to a less effective method while only ideal family size was important in Tanzania. In Ethiopia, the type of place of residence emerged significant while the level of education was significant in Uganda. Age, the level of education, and number of living children were important factors of switching in Kenya. However, no factor emerged important in Uganda for a switch from the injectable to a more effective method while duration of use in Ethiopia, ideal family size in Tanzania were significant factors at predicting switching. In Kenya, age, household wealth, number of living children, media exposure, and wantedness of the last child were important determinants while the level of education, and ideal family size emerged important in Rwanda for switching from the injectable to a more effective method of contraception.

Despite the differences in key determinants of switching, the hypothesis that women with secondary or higher education are more likely to switch to more effective methods than their counterparts is only confirmed in Rwanda. However, the hypothesis that urban women are more likely to switch from the use of a traditional method, or non-use of contraception to a modern method is only confirmed in Kenya. Based on the results from the multilevel models, this thesis suggests that different approaches within respective countries need to be developed and implemented depending on the needs of women. Further, the results also suggest that immediate switching between methods may not be important compared to adopting modern contraception. The results in this thesis may confirm the notion that whereas the use of modern contraception is observed to increase in the countries over time, emphasis is placed on encouraging non-users to adopt modern methods, or users of traditional methods to switch to modern methods.

There are three aspects that make up the East African story of how women use and immediately switch contraception: First, a balanced method mix indicates that there is an improvement in the provision of contraception in East Africa. However, the results show that method information exchange was significant at predicting contraceptive use, despite differences in the provision of family planning information by the contraceptive method used. The results presented in this thesis underscore the importance of promoting family planning information exchange if developing countries are to realise increased uptake of modern contraception.

However, although there is evidence that a significant proportion of women are now adopting modern contraception in the countries under study, the main motivation for using modern contraception could be to delay the start of childbearing (Caldwell *et al.* 1992), and postponement (Timæus and Moultrie 2008) – and not necessarily to limit childbearing (Johnson-Hanks 2007). Thus, women with such practices are less likely to consider consistent use, or immediate switching of contraception important.

Second, the adoption of short-term methods by the largest proportion of users concurs with findings observed elsewhere that indicate increased use of the injectable relative to other methods in Eastern Africa (Ross and Agwanda 2012; Ross *et al.* 2015). However, present patterns of contraceptive adoption can be linked to earlier family planning programmes in these countries, that placed more emphasis on the use of short-term methods compared to LARCs. Although LARCs were not in abundance (and a few users of contraception in the countries under study knew about their existence), a review of the history of family planning and population policy indicates that most family planning programmes at a time promoted only the use of short-term methods. However, shorter durations of contraceptive use remain a weakness in promoting continuous use. Therefore, this thesis adds voice to Jain (1989), who calls for making consistent, or continuous use of contraception among current users an added priority in addition to recruiting new users.

Finally, although the bigger picture points to limited immediate switching, the key factors that are likely to influence women to immediately switch contraception largely differ by country, despite all countries having a slow fertility transition, similar patterns in contraceptive adoption, and duration of use of modern contraception. That is, according to Bulatao's (1989) framework, the four main categories (contraceptive access, contraceptive competence, contraceptive evaluation, and contraceptive goals) that influence the choice of contraceptive methods are in most cases country specific. Immediate switching of contraception is likely to be influenced by more than one broad category in Bulatao's framework. However, the motivation for using contraception, and the number of living children were significant at predicting a switch from the use of a traditional method, or non-use of contraception to a modern method in all countries. The pattern is however, different for switching from the injectable to a less, or more effective method. Other than Kenya, significant factors that predict switching between modern methods were either limited, or non-existent in some countries. That is, no factor emerged significant in Rwanda for a switch from the injectable to a less effective method while no background factor was significant for a switch from the injectable to a more effective method in Uganda. Despite this, only the ideal family size influenced switching from the injectable to either a less, or more effective method in Tanzania. The literature on contraceptive use provides some of the plausible reasons that could

account for limited switching, and these are: failure to provide correct information to users of contraception (Jain 2016); weak political commitment (Caldwell 1994); limited funding provided to national family planning programmes (Cleland *et al.* 2006b); limited family planning products (Asnake *et al.* 2013); limited personnel to train and deliver clinical services (Ross *et al.* 2015); and approaches that focus on recruiting new users as opposed to encouraging continuous use among existing users (Jain 1999).

Thus, this thesis highlights the need to create awareness about the challenges associated with unintended pregnancies, that could result from inconsistent use of contraception. However, this thesis suggests that the best solution to avoiding unintended pregnancy, is to practice immediate switching of contraception following discontinuation, among women in need. We note that the women's behaviour by which they use contraception can be tied to the early days when family planning programmes had just been introduced in these countries – promotion of short-term methods as opposed to long-term methods. Further, as the literature highlights, the emergence of health hazards such as the HIV/AIDS epidemic, tuberculosis, and malaria, led to a divided attention between promoting family planning programmes and curbing high rates of morbidity and mortality. As a result, the motivation to promote family planning programmes waned especially in countries such as Tanzania and Uganda where the HIV/AIDS epidemic was higher than in other countries, since the focus was then turned on eliminating, or reducing the spread of these diseases (Bongaarts 2011; National Bureau of Statistics (Tanzania) and ICF Macro 2011; Judice and Snyder 2013).

The results presented in this thesis provide a rich understanding of the individual choices about switching of methods. According to Bulatao (1989), although examining the effectiveness of a particular method and increasing contraceptive method supplies lead to better contraceptive choice, incorporating the individual's characteristics, and the decisions taken in choosing a contraceptive method provides a much better option to understanding choices made by individuals. This is because users of modern contraception are compelled to approve or disapprove of the contraceptive methods available on the market. In order to achieve this, the four broad categories in Bulatao's (1989) framework: contraceptive goals that mainly look at reasons for using contraception; contraceptive competence which examines the ability to effectively use a contraceptive method; contraceptive evaluation which involves judgement on how to use a contraceptive method, and the effects that may result from use; and contraceptive access which look at method availability that may be influenced by media exposure, type of place of residence or household wealth, are essential in improving contraceptive method choice.

Switching of contraception may be largely influenced by contraceptive goals. That is, women switch to less effective methods because they want to either postpone or space births while switching to more effective methods may be mediated by the desire to limit childbearing. Using data from the Japan World Fertility Survey collected in 1974, Bulatao (1989) observes that the use of the condom was mostly used by couples who had just married because they either wanted to postpone or space births. On the other hand, women are more likely to switch methods if their contraceptive access is higher, although poorer women may struggle to practice switching of contraception.

The level of education has a bigger role in influencing contraceptive competence. Women who lack contraceptive knowledge especially on the availability of other methods may find it hard to switch to other methods. Moreover, Bulatao (1989) observes that women who have not yet become mothers often lack knowledge on contraceptive technology, since some women only initiate discussion on family planning use after they have become mothers. However, as Bulatao (1989) observes, the unreliability in the measurement of the level of education attainment may explain the differences in the effect of education on switching, observed in the results presented in this thesis. Contraceptive competence may also be influenced by previous use of a particular method. Users of contraception may choose to stick to the same contraceptive method used before because they have gained competence in using the same method. This however, may not necessarily imply that the method in question does not have any side effects, but it is possible that the user of the method is tolerant of the probable side effects. Switching to more effective methods such as LARCs or permanent methods may also be influenced by other factors (not measured in the thesis) such as stability of the relationship, or duration spent in a relationship. Also, adopters of more effective methods are likely to be influenced by failure to cope with the side effects of other contraceptive methods.

Contraceptive evaluation can be mediated by health concerns. For example, users of modern contraception may not switch to permanent methods because of fear, or the medical risks involved. On the other hand, users of contraception may switch to a particular method if they lack access to other methods of contraception while intensified promotion campaigns may lead to more switching of contraception.

Three important contributions emerge from this thesis:

- 1) this thesis has shown that the slow fertility transition in East Africa can be attributed to the way women use contraception. In particular, failure to immediately switch

contraception among discontinuers of short-term methods, is largely responsible for low contraceptive use as well as unwanted pregnancies.

- 2) this thesis also underscores the importance of information exchange as an indicator highlighted by FP2020, to monitor progress in the provision of family planning services in the 69 world's poorest countries. In East Africa, the results from the analyses confirm that family planning information exchange is an important indicator of modern contraceptive use.
- 3) this thesis has shed light on how East African women adopt, and how long they use modern contraception – the majority of users of contraception adopt short-term methods, although use of these methods is for shorter durations. In East Africa, the results obtained in this research, are in agreement with the history associated with the introduction of family planning programmes in the countries under study – programmes that promoted the use of short-term methods as opposed to long-acting reversible contraceptives.

8.1.1 Reproductive health implication for the use of the injectable

Having confirmed (from the results presented in this thesis) that the majority of users of contraception in the five East African countries adopt the injectable, it is important that this thesis examines the health implications that may arise from its use. Although the process of avoiding an unwanted pregnancy requires women, or couples, to use effective methods of modern contraception, the need to provide safe contraception remains a priority in the reproductive health sector, as this upholds women's reproductive rights and freedom (Hapgood *et al.* 2018). Despite the commitment by family planning programmes to provide healthy contraception, some epidemiological studies have reported that the use of some hormonal contraception – particularly the injectable, popularly known as Depo-Provera, or depot medroxyprogesterone acetate (DMPA) – is a risk factor for acquiring HIV and other sexually transmitted infections in women. This is of great concern especially in the developing countries of sub-Saharan Africa (SSA) particularly the Eastern and Southern Africa regions, where the majority of users of modern contraception use the injectable (United Nations Population Division 2015), and are at the same time the regions with the highest HIV incidence (Joint United Nations Programme on HIV/AIDS (UNAIDS) 2016a).

The evidence from some epidemiological studies indicate that the three-month injectable (DMPA) that is associated with the risk of acquiring HIV is reported to weaken the immune system, and damage the protective membrane in female genitals, thereby facilitating easier HIV acquisition (Hapgood *et al.* 2018). Additional evidence from a meta-review by Polis *et al.* (2016b) indicates that users of the injectable stand at about 30-40 percent risk of HIV than users of other

hormonal contraceptives. However, a concern over some of the cofounding factors which might be methodological, or behavioural, has been raised as a limitation to the findings in the literature (Jain 2012; Polis *et al.* 2016b). For example, the differences embedded in the way women use condoms might influence the direction of the conclusions. Whereas infections related to mother-to-child transmissions and deaths related to HIV/AIDS have declined greatly, the use of the condom in preventing HIV infections is reported to have declined in sub-Saharan Africa (Joint United Nations Programme on HIV/AIDS (UNAIDS) 2016b). As Polis *et al.* (2016b) observe, limited use of the condom is likely to be responsible for some new HIV infections – an observation that calls for emphasising dual protection.

The Joint United Nations Programme on HIV/AIDS (2016b) has made a commitment to end the spread of HIV by 2030, particularly among young women (aged 15-24 years), who are at the greatest risk of childbearing and HIV infection, but these efforts are likely to be hampered should use of the injectable be a risk factor to HIV infection. Ending the spread of HIV by 2030 would require that programmes target risky groups particularly young women in the age group 15-24 years who are at a high risk of new HIV infections, but with less knowledge on how to protect themselves from contracting the virus.

However, some studies observe that the benefits that arise from the use of the injectable might outweigh those associated with stopping use of the injectable, in a bid to minimise HIV infections. Using data from three different settings, depicting high HIV prevalence, high maternal mortality, and high fertility, represented by South Africa, Zimbabwe, and Kenya respectively, Jain (2012) observes that an immediate decision to withdraw the injectable from family planning programmes is likely to lead to more unwanted pregnancies and maternal deaths. Jain (2012) argues that with a relatively high number of women using the injectable (as the case is in East Africa), an increase in the number of unwanted births and maternal deaths because of a withdraw of the injectable from family planning programmes, is likely to outweigh the benefits of HIV prevention. This argument is in line with the recently updated guidelines by the World Health Organisation (WHO), for the use of hormonal contraception among women with a high risk of HIV infection. The World Health Organisation (2017) emphasises, that whereas all women need to be given correct information about the benefits and risks of using hormonal contraception, advantages that result from the use of hormonal contraception outweigh the probable risks of HIV infection (World Health Organisation 2017a). However, Jain (2012) suggests that should the need to switch from the injectable brought about by the desire to lower the risk of HIV infection arise, users of contraception should be encouraged to switch to LARCs, or permanent methods of contraception instead of short-term methods.

Using an effective method of contraception but with minimal risks to health problems cannot be emphasised enough. However, although the final decision to use a contraceptive method is largely made by the user, it is important that correct information regarding the benefits and costs of using modern contraception be given to users. This thesis observes that at present, the benefits that accrue from a high proportion of users of the injectable in East Africa, including prevention of unwanted pregnancy and maternal deaths, achievement of a desired family size, might outweigh the benefits of withdrawing it (injectable) from the existing method mix. This thesis echoes suggestions made by other authors (Polis and Curtis 2013; Polis *et al.* 2014), that in situations where women find themselves at risk of contracting HIV, dual protection that involves the use of condoms should be used. This thesis further suggests that if the popular injectable (Depo-Provera) is withdrawn from the existing method mix, it should be replaced immediately with another type of injectable but with less risks to HIV infection.

8.2 Limitations

As with any other study, this thesis has five principal limitations which are worth mentioning: First, the calendar used to collect contraceptive histories only allows a single contraceptive method (event) to be captured in each month. Therefore, in situations where use of more than one contraceptive method, or dual protection (hormonal and barrier methods) occurred in the same month, only one method can be recorded. Although, there is a suggested ranking order as to which event can be entered first in relation to others, this obscures our understanding and contribution of other events in the calendar. Moreover, even the order in which events occurred as told by the respondent cannot be guaranteed. Further, the authenticity of the data collected in the calendar cannot also be guaranteed in terms of the methods used, and the exact dates when respondents started and stopped using such methods, largely because of recall bias (Croft *et al.* 2017). In addition, there is a danger that some contraceptive events may go unreported either because of recall bias (Callahan and Becker 2012), or cultural sensitivities, especially in situations where still births, or terminated pregnancies occur – leading to underestimations of such events.

Second, the study of the relationships between distal factors and calendar data requires that the distal factors are linked to calendar data that is longitudinal. However, this thesis was unable to establish causality because information about the distal factors is collected once, at the time of the survey. Thus, this thesis assumed that the distal factors are time-invariant although we acknowledge the possibility of these factors changing with time. For example, it is very likely that there was a change in the type of place of residence during the period of observation, which may not reflect the information collected at the time of the survey. Despite these likely occurrences, this thesis assumed that the effect of distal determinants (measured at the time of the survey) on

contraceptive use, is likely to represent the changes that may have occurred during the period of observation (Polis *et al.* 2016a).

Third, the method information index estimated in this thesis considers only current users, and who received information at the start of their last episode of contraceptive use – leading to a selection bias in the study. Moreover, the calculated method information index is not representative of all current users of contraception, since it is limited to current users of a method for a duration that is not exceeding 60 months. Further, because no information was collected on non-users of contraception, this thesis could not study the relationship between information exchange and contraceptive use among non-users before they abandoned contraception. Further, this study only used the surveys considered for the analysis of calendar data, and so changes in the method information index in the countries under study between surveys, or over time were not studied. In addition, similar to calendar data that is collected retrospectively, information used to compute the method information index is also subject to recall bias, since respondents are tasked to report on the occurrence of events at the time they received contraception. For example, respondents may tell the interviewer only the information they can remember, which may not be exactly what they were told in the first place. Moreover, the occurrence of desirability bias, where respondents want to tell the interviewer only what they wish them to hear cannot be ruled out (Jain 2016). Further, there is also a risk that respondents report information gained from other sources (such as the media, or friends), and not the exact information given to them from where they obtained contraception.

Fourth, women's autonomy has been linked to have an influence on contraceptive use (Fotso *et al.* 2009; Acharya *et al.* 2010; Wado 2013), yet this study was unable to include a measure for autonomy on who decides to use contraception. Although the measurement of women's autonomy has been described to be multifaceted and multidimensional (Takyi and Broughton 2006), the Demographic and Health Survey (DHS) programme collects information which can be used as proxy measures for autonomy. These are: who decides to use contraception; partner's attitude on family planning matters; and whether a respondent asks the partner to use a condom. However, all these questions were either answered by only married women, or a small proportion of respondents.

Finally, whereas the DHS programme provides the best data source of demographic data, it may not be perfect with the way some variables are measured. For example, this thesis uses the distance to a health facility as a proxy measure of the physical access yet this may not measure realistic access. Access to family planning services may be affected by individualistic characteristics, provider bias and the welfare of households, which the DHS programme may not measure.

Further, the DHS programme does not capture adequately electronic media sources of information such as internet, yet this could be of great importance at disseminating family planning information. In addition, this thesis did not consider male involvement in contraceptive decision-making process – data limitation – which is likely to be a major factor in the way women use modern contraception in sub-Saharan Africa, because the question on who decides to use modern contraception was only asked of married women, yet this thesis considered both single and married women for analysis, to find out how the two groups of women vary by contraceptive use.

8.3 Recommendations

Based on this research, policy recommendations aimed at making sure that women increasingly and immediately switch contraception, to avoid unwanted pregnancies, and realise a faster fertility transition can be offered. The evidence emerging from this study that indicates differences in contraceptive use – highest in some countries compared to other countries – can be partly attributable to differences in family planning projects and initiatives. For example, higher contraceptive use in Kenya and Rwanda, relative to the rest of the countries under study is largely attributed to the “Tupange” project in Kenya, and Health Extension Workers in Rwanda. All these initiatives were started with an aim of increasing coverage and usage of modern contraception, particularly in rural areas. As a result, these countries have emerged to represent a family planning success story in sub-Saharan Africa, but largely supported by the political will to promote the effective use of modern contraception, with the main objective of achieving a smaller family size. Although community based distribution services (similar to health extension workers) were also introduced in Ethiopia, Tanzania, and Uganda, these programmes were not that successful as in Kenya and Rwanda. Therefore, this thesis suggests that initiating, promoting, or replicating these projects in countries such as Tanzania and Uganda, where the use of modern contraception remains lower is likely to reap benefits.

A second important policy recommendation is encouraging consistent and continuous use of contraception. Having registered tremendous progress in terms of adopting contraception, the results here call for family planning programmes to encourage users of contraception to immediately switch contraception to avoid unintended pregnancies. Fertility transition is likely to continue at a slower pace in these countries should women continue to have unintended pregnancies because of failure to immediately switch contraception. Encouraging immediate switching can be done through improving the exchange of family planning information to all women who use contraception. In practice, family planning programmes need to design policies aimed at sensitising providers of contraception to educate and provide users of contraception all the necessary and accurate information.

Third, in a bid to increase uptake and continuity in use, this thesis suggests that family planning programmes need to take advantage of contraceptives used by the majority, and considering the needs of specific age groups and socio-economic background. For example, the evidence from the results presented in this study indicate that the majority of never-married and young women use the condom – calling for programmes that aim to strengthen continuous use to avoid unwanted pregnancy especially among such categories of women. These programmes are likely to reap benefits by addressing past failures of family planning programmes that aimed to serve (only) married women at a time they had just been introduced in these countries. One way of promoting continuous use of the condom is by incorporating technological innovations in the provision of family planning programmes. For example, Chandra-Mouli *et al.* (2014) have suggested the use of cell phones, social media, and better communication programmes, that appeal particularly to young women. In addition, continuity in using contraception can be achieved through the use of long-acting reversible contraceptives (LARCs), a shift that women should make away from using short-term methods. Such a programme (of promoting the use of LARCs) should also focus on young people (Radovich *et al.* 2017). However, as Moultrie *et al.* (2008) argue, programmes that seek to promote only increased use of the condom – without considering other effective methods of contraception (dual protection) – risk unintended pregnancy that may result from method failure, leading to probable fertility stalling. Further, given the AIDS pandemic in sub-Saharan Africa, future studies should investigate the dynamics through which young people use the condom in the presence of HIV/AIDS. The results from such studies may help uncover why use of the condom is limited among women who stop using the injectable in East Africa.

The directions for future research largely hinge on methodological recommendations. Future research can make use of improved Demographic and Health Survey (DHS) data that collect responses used to estimate the Method Information Index (MII), by type of place (location) where women obtain contraception. With such data, we will be able to understand better the cause and effect relationships (causality) than just disaggregating women's responses by type of place of residence. The analyses from such data are likely to better inform policy makers and programme managers to tailor family planning programmes and needs of users according to the most deserving places of contraceptive acquisition, to promote contraceptive continuation. At present, the information that is collected cannot help much in terms of identifying and understanding challenges associated with service providers by location. In addition, future studies should take advantage of the trend analysis in information exchange to reach firm conclusions.

Further, since women are likely to report all types of information, including even information from other sources, which may not be necessarily the one given to them while

receiving contraception, the estimates derived may be a misrepresentation of what we claim to measure. This thesis joins Jain's (2016) suggestion, that questions designed to collect information exchange should include client's knowledge about method availability, side effects, and the source of that knowledge. Further, current questions that are designed to collect responses on method information exchange only target current users of contraception. This means that information on past users of contraception is never collected – limiting our understanding of the challenges they faced prior to abandoning use. It would be helpful to study the behaviour of past users of contraception and compare them to current users in terms of information exchange, if data on past users were available. For this reason, as Jain (2016) suggests, this thesis also finds merit in proposing data collection on method information exchange periodically, or in longitudinal surveys, because data from such surveys would offer better ways of studying relationships between contraceptive use and information exchange. In practice, data on information exchange among current users can be compared to that of past users, to ascertain if limited information exchange among past users can be attributed to discontinuation in use of contraception.

Finally, this thesis proposes that future research can adopt a qualitative approach to explore the challenges that may hinder women from immediately switching contraception. As Johnson-Hanks (2005) argues, women's opinions generated from qualitative studies help to uncover underlying stories to statistical numbers from quantitative surveys. These opinions add clarity to the statistical power, which inform policy, and devise useful ways of solving the problem accordingly. In addition, future studies looking at married women can consider data on male involvement in the use of family planning services in sub-Saharan Africa, as this may help to uncover the role of partner opposition in the use of modern contraception in sub-Saharan Africa.

This thesis provides an account of the challenges, progress, and current state of using modern contraception in sub-Saharan Africa (SSA). In so doing, the results presented in this thesis act as evidence, and add clarity to the existing body of literature in a number of ways. This thesis has provided a justification for the history of family planning programmes and policies being at the forefront for why and how East African women adopt modern methods of contraception. Further, the results presented in this thesis set out why it is necessary to consider family planning indicators set as the standard, in monitoring progress in the use of modern contraception. Finally, regarding the principal focus of the inquiry (research question), this thesis has provided the cause for family planning programmes to rethink the strategies employed at providing modern contraception, and incorporate ideas that aim to promote consistent use of contraception, either through encouraging immediate switching as a long-term strategy to avoiding unintended pregnancy, or by promoting long-acting reversible contraceptives to begin with (in the short-term).

Despite the many different explanations to fertility transitions, and suggested motivating factors for the use of modern contraception in sub-Saharan Africa, this thesis has helped to fill a void in understanding better how women use and immediately switch modern contraception, in the quest to finding solutions to why contraceptive use has remained at low levels, but also why fertility transition is slower in East Africa. Consequently, this thesis provides a justification of the importance of considering immediate switching of contraception in avoiding unintended pregnancy and high fertility, but also as a major component to the provision of family planning services. Thus, this thesis, and the results presented therein, locate itself in this research gap, and suggest that consistent, or continuous use of modern contraception through immediate switching, is vital in increasing contraceptive use, reducing unintended pregnancy, but also in the realisation of a faster fertility decline.

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APPENDICES

Figure A.1 Country specific reported durations of contraceptive episodes, 2011-2015/16 DHSs

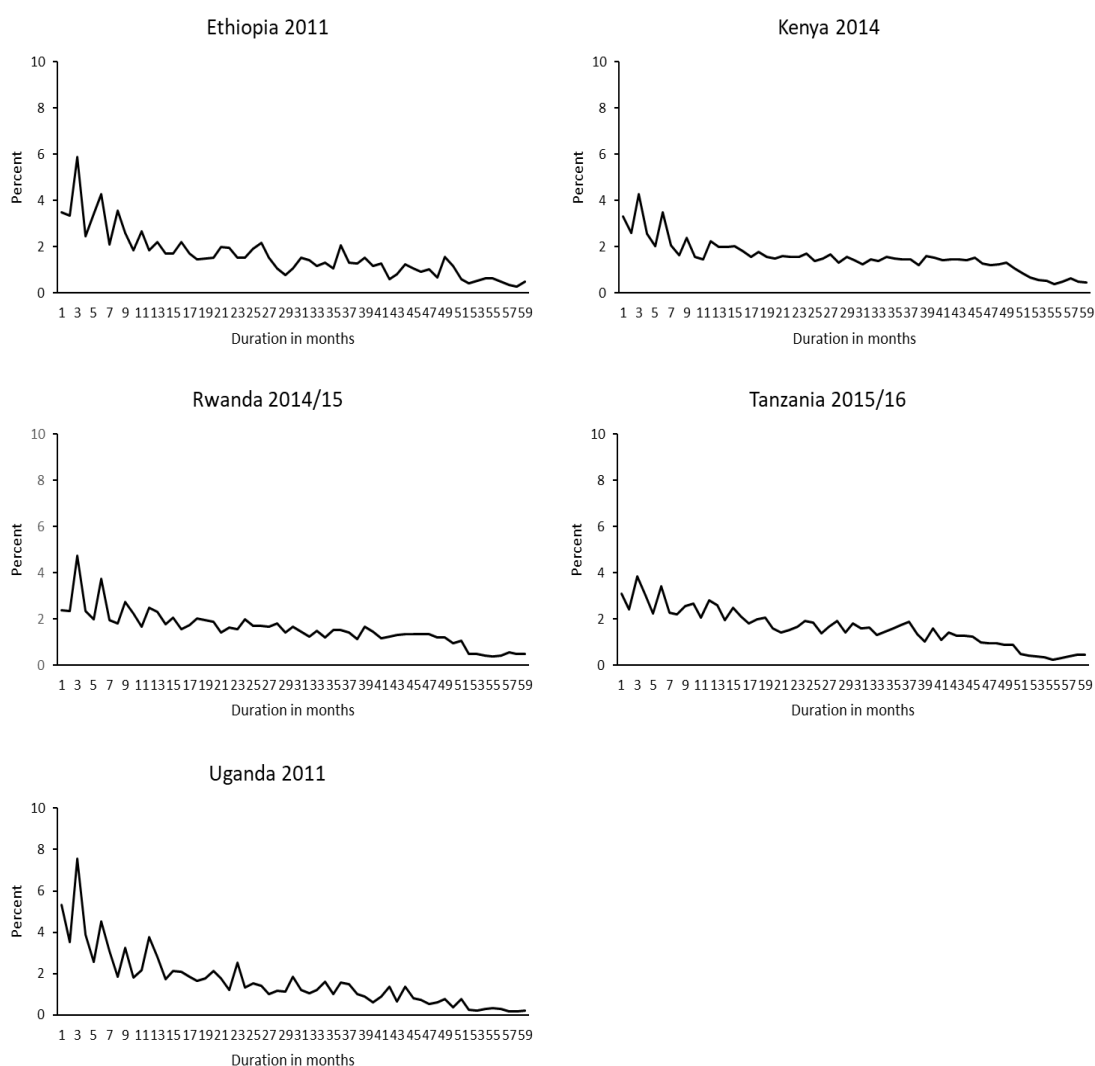


Table A.1 Method specific discontinuation rate (percent) within 60 months preceding the survey by reason for stopping, Kenya 2014 DHS

Reason	Method						
	Pill	IUD	Injectable	Condom	Norplant	Abstinence	Withdrawal
Method failure	14.1	4.7	6.2	6.2	1.3	38.5	35.7
Desire to get pregnant	23.5	24.2	29.0	16.5	24.5	21.8	29.2
Husband disapproval	0.7	24.2	0.9	5.6	1.1	0.7	1.6
Side effects	27.6	24.2	37.6	1.2	51.5	0.0	3.4
Access/ availability/ cost	1.4	24.2	2.6	0.3	0.3	0.0	0.0
Wanted more effective	12.8	24.2	4.9	9.6	2.5	19.4	12.4
Inconvenient to use	3.5	24.2	1.2	1.5	1.1	0.9	2.5
Infrequent sex/ husband away/ marital dissolution	7.2	24.2	7.6	38.5	8.3	6.0	2.0
Other	4.1	24.2	4.2	4.4	5.9	3.4	1.1
Not stated	5.2	24.2	5.7	16.2	3.7	9.3	12.2
Total	100	100	100	100	100	100	100

Table A.2 Method specific discontinuation rate (percent) within 60 months preceding the survey by reason for stopping, Rwanda 2014/15 DHS

Reason	Method						
	Pill	IUD	Injectable	Condom	Norplant	Abstinence	Withdrawal
Method failure	12.8	11.7	5.5	17.3	3.2	47.8	46.7
Desire to get pregnant	21.6	22.6	31.4	23.5	23.2	35.5	28.0
Husband disapproval	0.4	4.5	1.0	16.2	1.7	0.0	1.8
Side effects	34.7	46.5	39.6	1.1	44.7	0.0	0.0
Access/ availability/ cost	1.2	0.0	1.1	2.4	0.6	0.0	0.0
Wanted more effective	15.2	1.3	9.1	18.9	9.5	9.5	11.5
Inconvenient to use	2.6	0.0	0.9	5.1	0.0	2.2	3.9
Infrequent sex/ husband away/ marital dissolution	6.3	3.5	6.3	5.4	3.5	0.0	2.3
Other	2.2	7.5	2.9	4.7	10.8	2.0	2.3
Not stated	3.1	2.3	2.3	5.4	2.9	3.2	3.5
Total	100	100	100	100	100	100	100

Table A.3 Method specific discontinuation rate (percent) within 60 months preceding the survey by reason for stopping, Tanzania 2015/16 DHS

Reason	Method						
	Pill	IUD	Injectable	Condom	Norplant	Abstinence	Withdrawal
Method failure	9.2	8.8	3.2	8.9	2.6	40.9	36.8
Desire to get pregnant	39.0	28.5	40.0	32.3	43.2	35.9	19.1
Husband disapproval	2.0	2.4	2.5	8.9	2.2	0.7	3.6
Side effects	28.0	47.3	36.8	2.8	39.1	0.3	0.6
Access/ availability/ cost	2.1	0.0	4.9	2.0	2.7	0.0	0.0
Wanted more effective	7.6	4.9	4.7	22.0	2.7	11.2	32.9
Inconvenient to use	2.4	0.0	0.3	2.5	0.0	2.4	1.7
Infrequent sex/ husband away/ marital dissolution	6.7	4.7	3.8	18.2	1.5	4.0	4.1
Other	2.6	3.5	3.6	2.1	6.1	4.1	1.1
Not stated	0.5	0.0	0.3	0.5	0.0	0.6	0.3
Total	100	100	100	100	100	100	100

Table A.4 Method specific discontinuation rate (percent) within 60 months preceding the survey by reason for stopping, Uganda 2011 DHS

Reason	Method						
	Pill	IUD	Injectable	Condom	Norplant	Abstinence	Withdrawal
Method failure	14.5	4.6	7.3	13.6	6.4	32.5	41.0
Desire to get pregnant	20.5	25.9	25.4	17.3	34.5	42.1	30.3
Husband disapproval	3.2	0.0	3.3	10.3	0.4	4.3	7.5
Side effects	33.8	50.6	45.2	1.7	50.1	0.5	0.0
Access/ availability/ cost	3.5	0.0	2.8	5.0	2.2	0.0	0.0
Wanted more effective	3.5	9.1	1.8	3.8	0.0	9.0	12.3
Inconvenient to use	9.1	6.7	1.5	7.8	0.0	2.9	2.4
Infrequent sex/ husband away/ marital dissolution	8.2	0.0	7.2	34.8	2.1	5.5	4.5
Other	3.9	3.1	5.1	4.3	4.0	3.4	2.0
Not stated	0.0	0.0	0.3	1.5	0.4	0.0	0.0
Total	100	100	100	100	100	100	100

Table A.5 Testing for multicollinearity

<i>Variable/ Country</i>	<i>Tolerance values</i>				
	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Age at exposure	0.6002	0.6134	0.6004	0.5463	0.5422
Type of place of residence	0.5690	0.8372	0.8036	0.7272	0.7292
Level of education	0.6430	0.7931	0.8155	0.7904	0.7298
Household wealth	0.6659	0.7016	0.7456	0.6648	0.7188
Motivation to use	0.7640	0.6708	0.6773	0.6850	0.6602
Number of living children	0.5118	0.5601	0.5830	0.5209	0.5028
Media exposure	0.7828	0.9000	0.9185	0.9127	0.9458
Access to family planning	0.8942	0.9883	0.9836	0.9785	0.9661
Currently working	0.9617	0.9475	0.9665	0.9607	0.9506
Ideal family size	0.9544	0.9754	0.9907	0.9737	0.9818

Table A.6 Test parameter estimates of the Wald Chi-square test for covariates predicting consistent use of the injectable, five countries, 2011-2015/16 DHSs

<i>Background characteristics</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
Age	0.0000****	0.0000****	0.0000****	0.0000****	0.0000****
Type of place of residence	0.0000***	0.5590	0.2522	0.0551*	0.1668
Level of education	0.1680	0.0003****	0.0212**	0.0001****	0.5163
Household wealth	0.0431**	0.0206**	0.0908*	0.6988	0.0194**
Motivation to use	0.7298	0.5864	0.0033***	0.1288	0.5064
Number of living children	0.0001****	0.0493**	0.0025***	0.0932*	0.1368
Media exposure	0.1983	0.6410	0.7539	0.7242	0.2732
Access to family planning	0.9344	0.7325	0.0347**	0.2871	0.1301
Currently working	0.1881	0.3990	0.4479	0.2086	0.9473
Ideal family size	0.0003****	0.1351	0.3623	0.8867	0.0747*

Note: Reference categories in parentheses; *= $p < 0.10$; **= $p < 0.05$; ***= $p < 0.01$; ****= $p < 0.001$

Table A.7 Odds ratios from multilevel discrete-time survival hazards models predicting contraceptive method switching from a traditional method, or non-use of contraception to a modern method, five countries, 2011-2015/2016 DHSs (childless women included)

	<i>Ethiopia</i> 2011	<i>Kenya</i> 2014	<i>Rwanda</i> 2014/15	<i>Tanzania</i> 2015/16	<i>Uganda</i> 2011
<i>Background characteristics</i>					
Time to switch (months)	0.9843****	0.9582****	0.9536****	0.9886****	1.0014
Age at switching (RC= 20-29)					
10-19	0.9192	0.9185	1.2242**	0.9481	0.8224**
30-39	0.9487	1.0506	1.1600***	1.0823	0.8791
40-49	0.6746	1.7048**	0.8161	0.8887	0.5818
Residence (RC= Rural)					
Urban	0.9010*	1.0821**	0.9948	0.9695	0.9929
Education (RC= Primary)					
No education	0.9529	0.9023	0.9596	1.0294	0.9203
Secondary or more	0.8584**	1.0694*	1.0916	0.9822	0.9911
Household wealth (RC= Rich)					
Poor	1.0181	1.1394***	1.0809	1.0422	1.0787
Middle	0.9860	1.1166**	0.9770	1.1329**	1.0434
Motivation to use (RC= Space)					
Limit	0.8241****	0.7773****	0.6770****	0.7450****	0.8239***
Number of children (RC= 1-3)					
0	1.2995	4.6903****	2.4533*	1.0141	1.3327
4 or more	0.7620****	0.8339***	0.5830****	0.6911****	0.7481****
Media exposure (RC= Yes)					
No	0.9042**	1.0289	0.9569	1.0030	1.0009
Access to family planning services (RC= Yes)					
No (RC)	1.0576	1.0474	1.1535*	1.0288	0.8919
Currently working (RC= Yes)					
No	1.0014	1.0238	1.0050	1.0062	1.1366**
Ideal family size (RC= 4)					
3 or fewer	0.9780	1.1335***	1.1995****	1.0158	1.0951
5+	0.8749**	0.9616	0.9603	0.8895***	0.9840
Non-numeric	0.8475**	0.8300	0.8134	0.8143**	0.9789
Wanted last child (RC= Wanted then)					
Wanted later	0.9837	1.0623	0.9966	1.1185***	1.1660***
Wanted no more	1.0111	0.8877**	0.8915*	1.1280	1.0344
Interaction term					
10-19 * childless	0.2248**	0.2557**	-	1.2040	3.4924*
10-19 * 4+	1.0583	0.5591	-	0.4345	1.3825
30-39 * childless	0.3951	-	0.2590	0.4195	-
30-39 * 4+	1.2913**	1.1176	1.2527**	1.1588	1.3544**
40-49 * childless	3.8863	-	-	-	-
40-49 * 4+	2.6148	0.9699	2.6452***	1.6418*	2.1783
Constant	0.0665****	0.0550****	0.0787****	0.0505****	0.0417****
Person months	87342	158630	117618	117596	67299

Note: Reference categories in parentheses; period of observation is 60 months. *= $p < 0.10$; **= $p < 0.05$ ***= $p < 0.01$; ****= $p < 0.001$

Table A.8 Marginal effects of age and number of living children on switching from a traditional method, or non-use of contraception to a modern method (childless women included)

<i>Age * Number of living children</i>	<i>Ethiopia</i> 2011	<i>Kenya</i> 2014	<i>Rwanda</i> 2014/15	<i>Tanzania</i> 2015/16	<i>Uganda</i> 2011
10-19 * childless	0.0116*	0.0394***	-	0.0456***	0.1410**
10-19 * 1-3	0.0384****	0.0332****	0.0528****	0.0376****	0.0342****
10-19 * 4+	0.0312	0.0158**	-	0.0116	0.0353***
20-29 * childless	0.0535****	0.1466***	0.0994**	0.0401***	0.0542**
20-29 * 1-3	0.0417****	0.0360****	0.0436****	0.0396****	0.0412****
20-29 * 4+	0.0321****	0.0302****	0.0260****	0.0277****	0.0312****
30-39 * childless	0.0208	-	0.0326	0.0186	-
30-39 * 1-3	0.0396****	0.0377****	0.0502****	0.0427****	0.0364****
30-39 * 4+	0.0390****	0.0353****	0.0372****	0.0345****	0.0369****
40-49 * childless	0.1286	-	-	-	-
40-49 * 1-3	0.0285	0.0596****	0.0359***	0.0354****	0.0244
40-49 * 4+	0.0552****	0.0489****	0.0541****	0.0399****	0.0392****

Note: Reference categories in parentheses; *= $p < 0.10$; **= $p < 0.05$ ***= $p < 0.01$; ****= $p < 0.001$

Figure A.2 Marginal effects of age and number of living children on switching from a traditional, or non-use of contraception to a modern method of contraception (childless women included)

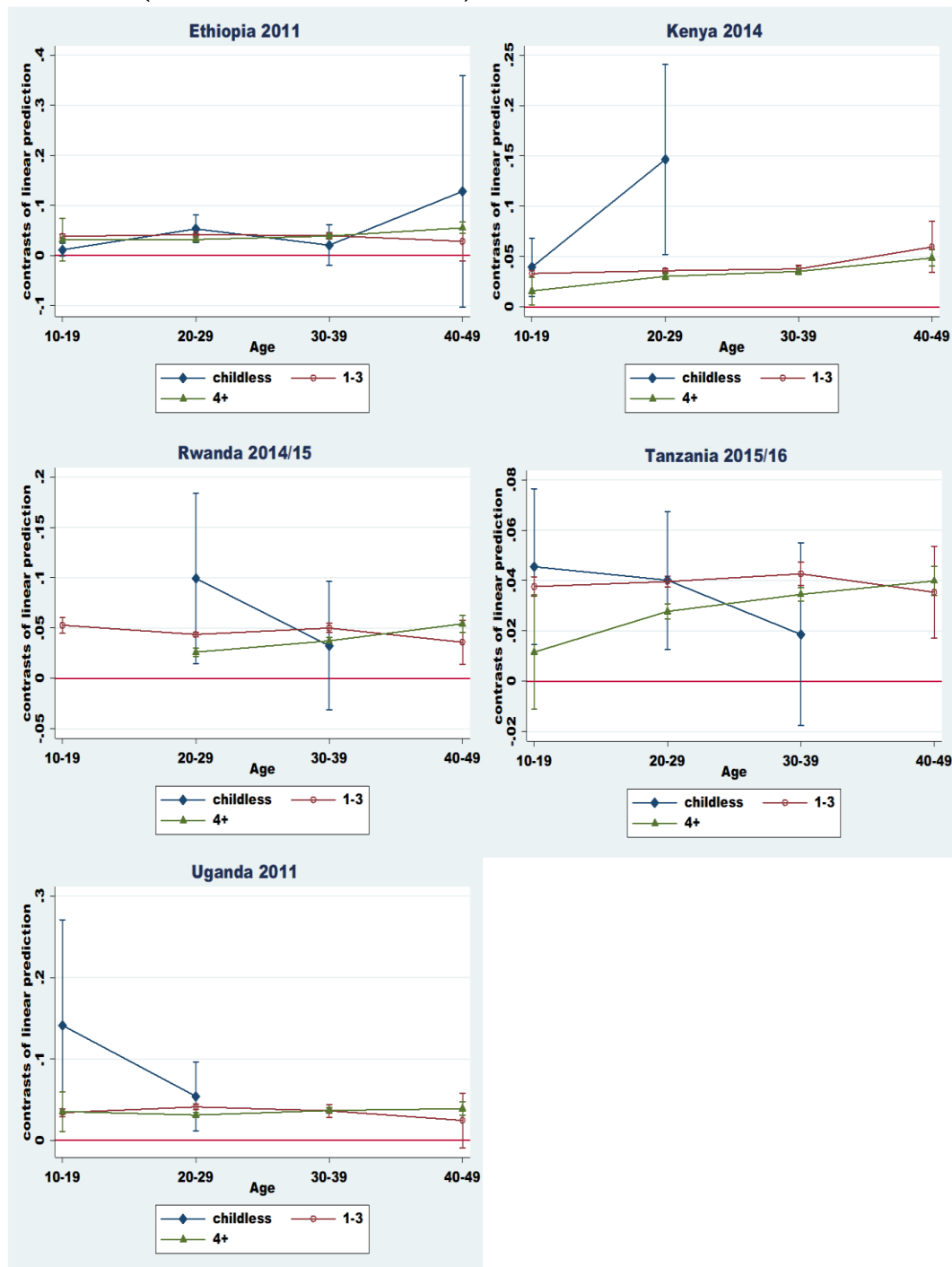


Table A.9 Marginal effects of age and number of living children on switching from a traditional method, or non-use of contraception to a modern method (childless women excluded)

<i>Age * Number of living children</i>	<i>Ethiopia 2011</i>	<i>Kenya 2014</i>	<i>Rwanda 2014/15</i>	<i>Tanzania 2015/16</i>	<i>Uganda 2011</i>
10-19 * 1-3	0.0384****	0.0331****	0.0528****	0.0377****	0.0341****
10-19 * 4+	0.0312	0.0158**	-	0.0116	0.0352***
20-29 * 1-3	0.0416****	0.0360****	0.0436****	0.0396****	0.0412****
20-29 * 4+	0.0321****	0.0302****	0.0260****	0.0277****	0.0312****
30-39 * 1-3	0.0395****	0.0377****	0.0501****	0.0427****	0.0364****
30-39 * 4+	0.0390****	0.0353****	0.0372****	0.0345****	0.0369****
40-49 * 1-3	0.0284	0.0596****	0.0359***	0.0354****	0.0244
40-49 * 4+	0.0553****	0.0489****	0.0541****	0.0398****	0.0392****