Social determinants of contraceptive use among young women in Kenya

Master thesis in Public Health Sciences (30 ECTS)
Spring 2018
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Abstract

Contraceptive use has far-reaching social and health benefits for women in low and middle-income countries. While socioeconomic factors are known to be associated with contraceptive use, few studies on this topic have focused specifically on young women, whose reproductive health is a target of the Sustainable Development Goals and the Family Planning 2020 agenda. This study used the Kenya Demographic and Health Survey to examine the association between three social determinants (wealth, education, and residence) and two contraceptive outcomes (modern method use and long-acting reversible contraceptive [LARC] use) in women ages 15-24 in 2008-09 (n=3,211 women) and 2014 (n=4,982 women). Results showed increases in the prevalence of modern method use and of LARC use. Low wealth was associated with non-use of LARC methods, and the same wealth pattern emerged for all modern method use between the two timepoints. An education gradient was observed for both outcomes. This study provides some evidence that the urban-rural gap is closing for contraception; however, rural residence continues to be a strong predictor of non-use of LARC methods. Results indicate that continued work is needed to ensure equitable progress in contraceptive use and method choice to contribute to improved reproductive health for young Kenyan women.

Key words

Family planning, youth, Kenya, social determinants of health, long-acting reversible contraceptives, reproductive health
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Introduction

Many studies have sought to understand the drivers and determinants of contraceptive use among young women. Contraceptive use is a complex individual choice that is influenced by numerous factors including cultural norms, method availability and affordability, and personal knowledge (Bongaarts, Odile, & Lesthaeghe, 1984; Gage, 1998). This study uses the Demographic and Health Surveys (DHS) to examine the importance of wealth, education, and urban/rural residence as social determinants of contraceptive use among young women in Kenya. Kenya is a frequently studied nation in the literature on sexual and reproductive health and family planning in sub-Saharan Africa, and this study’s focus on young women aligns with the Sustainable Development Goals’ reproductive health targets and the Family Planning 2020 agenda (Family Planning 2020, 2020a; United Nations, 2015).

Kenya is located in East Africa and has a population of 50 million people (World Population Review, 2018). Kenya was one of the first countries in Africa to adopt a population policy to reduce the population growth rate, just four years after gaining independence in 1963 (Chimbwete, 2003; Commonwealth, 2018). Kenya’s family planning programming has since received much international attention and support (Chimbwete, 2003). As of 2014, Kenya’s fertility rate was estimated at 3.7 births per woman which is still notably higher than replacement-level (the birth rate at which the population replaces itself), defined as 2.1 births per woman (Craig, 1994; Kenya National Bureau of Statistics, Ministry of Health/Kenya, National AIDS Control Council/Kenya, Kenya Medical Research Institute, & National Council for Population and Development/Kenya, 2015). The contraceptive prevalence rate in 2014 was relatively high with 39.1% of all women reporting use of a modern contraceptive method (Kenya National Bureau of Statistics et al., 2015). Of the women who reported modern method use, most (59.9%) obtained their contraception from the public sector (including government dispensaries, government hospitals, and government health centers) and one in three (33.7%) obtained contraception from the private sector (mainly private hospitals, private clinics, and pharmacies). A review from 2010 reported that 47.3% of married women in Kenya were using any form of contraception, compared with 30.9% in Africa and 63.3% globally (Alkema, Kantorova, Menozzi, & Biddlecom, 2013). Although these statistics represent a certain level of success in reproductive autonomy for Kenyan women, unmet need (women who are fertile and are not using contraception but wish to delay or prevent pregnancy) remained high (17.5%) and contraceptive use was not found to be equal across all socioeconomic groups in 2014 (Kenya National Bureau of Statistics et al., 2015). Trends of fertility decline and contraceptive
use have also undergone unexpected reversals in recent Kenyan history. During the 1990s, Kenya experienced a stall in the process of fertility decline, the cause of which remains undetermined, followed by a period of marginal decline in contraceptive use between 1998 and 2003 (Bongaarts, 2006; Creanga, Gillespie, Karklins, & Tsui, 2011).

Modern contraceptive use in Kenya today remains particularly low among women under the age of 25. In 2014, 39.1% of all Kenyan women reported using a modern contraceptive method. Among women ages 20-24, 38.5% were modern method users; among women ages 15-19, only 9.3% were using one (Kenya National Bureau of Statistics et al., 2015). For comparison, 51.0% of women ages 25-29 reported using a modern method. These figures must be understood within the context of Kenya’s population distribution; 61.5% of Kenyans are under 25 (41.3% of whom are under 15 and 21.1% are 15-24) (United Nations Department of Economic and Social Affairs Population Division, 2011). Therefore, the low contraceptive use among young women represents a large proportion of the population which is being underserved by reproductive health services. Some of the differences in contraceptive use may be attributed to differences in sexual activity. Women under 25 report lower sexual activity than women over 25, and women ages 15-19 report the lowest activity, but there remains high unmet need for family planning in these groups indicating a need for further research to understand contraceptive use patterns among youth and increase access (Kenya National Bureau of Statistics et al., 2015).

Studies on adolescents and youth sometimes use these terms interchangeably. This thesis defines adolescents as people ages 10-19 years and youth as those between 15-24 years per the guidelines of the United Nations (United Nations Department of Economic and Social Affairs Population Division, 2011). Further, as this work only describes women, the term young women will be used hereafter to identify women ages 15-24 years.

Family planning in Kenya

Contraceptive use and method mix (the distribution of contraceptive methods across a population) have long been targets of policymakers and non-governmental organizations in Kenya (MEASURE Evaluation, 2018). Following its early adoption of a population policy, Kenya has continued to be a leader in African family planning policy.

Kenya was a founding participant of the Family Planning 2020 (FP2020) initiative, launched in 2012 at the London Summit on Family Planning where participating countries each
submitted their commitments to contribute to the global goal of enabling 120 million more girls and women to use contraceptives by 2020 (Family Planning 2020, 2018a). Kenya’s current commitment, updated in 2017, vows to “increase [the] modern contraceptive prevalence rate (mCPR) from 61% to 66% by the year 2030, increase CPR for any contraceptive method among adolescent women from 40% to 50% by 2020 and 55% by 2025, and reduce teenage pregnancy among adolescent women from 18% to 12% by 2020 and 10% by 2025.” (Family Planning 2020, 2018b). However, the contraceptive prevalence proportions presented in this commitment exclude unmarried women, which is a limitation of the Kenyan agenda for two reasons. First, it overestimates the current contraceptive prevalence rate, which is actually lower for all sexually active women; second, it disproportionally overestimates the rate for young women, who are less likely to be married (Kenya National Bureau of Statistics et al., 2015).

Another example of family planning progress in Kenya is the Tupange Project which was launched in 2011 in five cities and towns (Kakamega, Kisumu, Machakos, Mombasa, and Nairobi) as part of the Gates Foundation’s Urban Reproductive Health Initiative (URHI) (Benson et al., 2017). The five-year project used supply-side and demand-side components to promote the use of long-acting reversible contraceptives (hereafter LARCs), which include intrauterine devices (IUDs) and implants, in urban areas. The supply-side strategies included physician training and supply chain improvement, while demand-side strategies aimed to increase awareness and dispel misconceptions through educational materials (Benson et al., 2017). The program was successful in increasing use of contraceptives in general (from 45% to 52%) and of LARCs specifically (from 6% to 19%) in the intervention cities (Benson et al., 2017).

The promotion of LARC methods has gained in popularity following research on their unique benefits compared to other contraceptive methods. They can last for 3-10 years depending on the exact type and can be safely removed earlier if the patient decides they want to get pregnant (Benson et al., 2017). LARCs are more effective than many common contraceptive methods, including oral contraceptive pills, and injectables, and have almost no risk of use error (Winner et al., 2012). They also more cost-effective than oral contraceptive pills or condoms (Blumenthal, Voedisch, & Gemzell-Danielsson, 2011). However, there are disadvantages to LARC methods; namely, they require a trained health provider for insertion and removal. It may be difficult for women, especially those in rural areas, to access LARC methods because
misconceptions and negative perceptions are very common among providers and patients alike (Blumenthal et al., 2013). The most common misconceptions around LARCs are that they pose high risk of infection and of permanent infertility (Blumenthal et al., 2013). The Tupange Project appears to have had success in reducing these misconceptions to some degree in urban areas, but the logistical challenges remain and LARCs are not yet commonly used in Kenya. However, there is evidence of shifting method mix (Bearerger, Sieving, Ferguson, & Sharma, 2007; Cleland, Ali, & Shah, 2006; Obare et al., 2011). Research on contraceptive method mix and method choice in Kenya has largely focused on barrier methods, such as condoms, in the context of the HIV epidemic, which has a prevalence of 6% in Kenya (Bearerger et al., 2007; Cleland et al., 2006; Kenya National Bureau of Statistics et al., 2015). Obare et al. (2011) studied trends of contraceptive method mix among adolescent girls in Kenya between 1998 and 2008, reporting that use appeared to be shifting away from pills to use of injectables and condoms.

Benefits of contraceptive use

Health benefits. Promoting modern contraceptive method use among young women is important because of the many benefits of contraceptive use, both health-related and social, for women in general. The health benefits include reduced maternal mortality, reduced unsafe abortion, and several health benefits that are not related to fertility, including reduced risk of some types of cancers (Cleland, Conde-Agudelo, Peterson, Ross, & Tsui, 2012). Most of the benefit in relation to maternal mortality has been attributed to contraception’s role in prevention of high-risk and unwanted pregnancies, including reducing the frequency of unsafe abortion, said to cause 68,000 maternal deaths globally per year (Grimes et al., 2006; Marston & Cleland, 2003). One in four (25%) unsafe abortions in Africa are performed on adolescents and women under 25 make up nearly 60% of those having unsafe abortions (Grimes et al., 2006). The proportion of women have unsafe abortions who are young aligns with the population distributions of many countries in sub-Saharan Africa, Kenya included (United Nations Department of Economic and Social Affairs Population Division, 2011). Abortion is illegal in Kenya (except when deemed necessary to save the mother’s life), which further limits safe abortion access and makes abortion frequencies difficult to estimate (Gebreselassie, Gallo, Monyo, & Johnson, 2005; Mohamed et al., 2015). Despite the anti-abortion law, there is evidence that the abortion rate in Kenya is highest among young women, which provides another argument for the need for contraceptive availability in this group (Mohamed et al., 2015).
Another frequently discussed reason for promoting contraceptive use among young women is their potential heightened risk of maternal morbidities and mortality (Conde-Agudelo, Belizán, & Lammers, 2005; Ujah et al., 2005). This pattern has been especially prominent for adolescents; Conde-Agudelo et al. (2005) found increased risk of mortality in mothers under 15 and increased risk of varied morbidities in mothers under 20. Though the elevated risk of young motherhood has been shown to be less strong in recent years, investing resources into adolescent maternal health remains an effective health promotion strategy which can potentially yield long-term health benefits for women (Blanc, Winfrey, & Ross, 2013).

Social benefits. In addition to health benefits, access to contraception is important for its extensive social benefits. Using contraceptives allows women to plan whether and when they want to have a child, and this control over timing of childbearing is a critical component in the pursuit of educational and professional achievements (Benagiano, Bastianelli, & Farris, 2007; Sonfield, Hasstedt, Kavanaugh, & Anderson, 2013). Control over fertility during school years can allow women to finish compulsory school and decide whether they want to pursue secondary or higher education, making contraceptive use particularly beneficial for young women. Furthermore, increased educational achievement is associated with better employment opportunities and higher income. Use of contraception may then help reduce gender inequalities by improving women’s chances for education and professional achievement – particularly for young women (Benagiano et al., 2007; Sonfield et al., 2013).

Gender inequality in secondary and higher education is a persistent problem in Kenya (Sifuna, 2006). Despite a national gender and education policy having been introduced in 2008, education has remained male-dominated (Odhiambo, 2016). At the secondary school level, girls are under-represented and the availability and quality of girls’ schools is lower than boys’ (Sifuna, 2006). Women constitute approximately 30% of enrolment in Kenyan universities, a remnant of both the colonial economic structure which devalued women and traditional cultural norms emphasizing the reproductive role of women (Sifuna, 2006). Sifuna (2006) attributes some of this inequality in representation to early pregnancy and childbearing. Increased contraceptive use among sexually active young women could reduce school dropout due to childbearing, increasing gender equality in education and subsequently in the workforce.

The health and social benefits of contraceptive use are presented separately here for clarity of argument, but they are deeply intertwined. Increased socioeconomic status, measured by indicators such as education and wealth, is known to be associated with better health outcomes
and health problems can limit an individual’s access to education and wealth (Marmot, 2009). Therefore, improving contraceptive access is a powerful tool for improving women’s lives, especially young women whose lives are just beginning.

**Social determinants of contraceptive use**

As Kenya’s FP2020 goals are focused largely on adolescents, it is important to understand the drivers of contraceptive use in that group. Much of the research on the topic has sought to understand social determinants of contraceptive use among married women of all ages (Bakibinga et al., 2016; Creanga et al., 2011; Dodoo & Tempenis, 2002; Kimani & K’Oyugi, 2004; Ojakaa, 2008). However, it is important to examine whether determinants of use differ between young women and women of all ages to better inform interventions targeting young women. The following section summarizes what is known about social determinants of contraceptive use in Kenya, mainly using the more developed literature on women of all ages to inform hypotheses about young women.

**Wealth.** Wealth is widely considered to be an important social determinant of health (Marmot & Wilkinson, 2005). Access to material resources tends to have a positive effect on health behaviour and health outcomes. Inversely, poverty is strongly associated with poor health due to material deprivation. This pattern has been observed among youth and adolescents (Viner et al., 2012; von Rueden, Gosch, Rajmil, Bisegger, & Ravens-Sieberer, 2006). The link between poverty and poor health is commonly attributed in part to health behaviours, which predicts that wealth may be correlated with reproductive health behaviour including contraceptive use (Marmot & Wilkinson, 2005). The literature supports this hypothesis. Wealth has been shown to be positively associated with contraceptive use and negatively associated with unmet need (Creanga et al., 2011; Obare et al., 2011; Ojakaa, 2008). There is some inconsistency in the literature about whether there is a wealth gradient to contraceptive use; Obare et al. (2011) compared use rates among Kenyan women aged 15-19 and found the highest rate among richer women (4th wealth quintile measured by the DHS), followed by middle, then richest and poorer, and finally poorest. Ojakaa (2008) and Creanga et al. (2011) reported a gradient effect, with the poorest group having lowest contraceptive use and the richest group having the highest.

**Education.** Like wealth, education is also a frequently discussed determinant of health (Marmot & Wilkinson, 2005). Education can influence health through increased wealth and material resource access, but it is also directly related to health through *health literacy* (individual’s capacity to access and understand health information needed to make health decisions)
(Nutbeam, 2008; Ratzan & Parker, 2000). In the case of contraceptive use, increased health literacy may enable the individual to correctly assess the risk of becoming pregnant and increase their contraceptive knowledge. Education also improves an individual’s health through increased agency, which may enable women to gain control over their reproductive health in a patriarchal society (Dodoo & Tempenis, 2002; Gable, 2009; Ruger, 2004). There is strong evidence in the literature of the existence of an education gradient in contraceptive use, both in studies including all ages and in studies of young women (Bakibinga et al., 2016; Kimani & K'Oyugi, 2004; Magadi & Curtis, 2003; Njogu, 1991; Ojakaa, 2008). The role of education carries particular significance for young women, who are more likely to have the opportunity to obtain more education prior to marriage or pregnancy, compared to older women (Obare et al., 2011).

Residence. Research on reproductive health in Kenya has commonly found differences between urban and rural residents, independently of wealth and education status (Dodoo & Tempenis, 2002; Dodoo, Zulu, & Ezeh, 2007; Magadi & Curtis, 2003; Njogu, 1991; Ojakaa, 2008). The most common explanation for lower contraceptive use among women in rural areas is reduced healthcare access, which can be limited in remote areas and is especially affected by Kenya’s diverse geography (Njogu, 1991; Toda et al., 2012; Yao, Murray, & Agadjanian, 2013). In addition to access issues, there are vast cultural differences between urban and rural Kenya that likely contribute to the observed association between residence and contraceptive use (Dodoo & Tempenis, 2002; Dodoo et al., 2007; Njogu, 1991). Rural Kenyan society is centred around the farming economy and patriarchal extended family structure, which lead to low decision-making power for women over their own fertility (Dodoo & Tempenis, 2002; Njogu, 1991). In urban Kenya, the economic and social landscape allow women more control over their reproductive health; women in cities have more sexual partners on average and, when coupled, have higher decision-making power within the couple, both of which lead to higher contraceptive use (Dodoo & Tempenis, 2002; Dodoo et al., 2007).

Social determinants of LARC use
While the literature on social determinants of contraceptive use in Kenya is extensive, research examining the social determinants of specific method selection is much more limited. Furthermore, studies exploring the social determinants of LARC use are nearly non-existent. Much of the literature on determinants of contraceptive method choice in sub-Saharan Africa has focused on the increased use of condoms and other barrier methods within the context of
reducing transmission of HIV (Bearinger et al., 2007; Cleland et al., 2006). One study on contraceptive method choice (Obare et al., 2011) described social patterning of method mix among Kenyan girl ages 15-19. As method mix was shifting from pills towards injectables and condoms, injectable use was found to be more common among girl in urban areas, while condom use was more frequently reported by girls in rural areas. Recent research shows that method mix in Kenya continues to change, and one such change is the increase in LARC use following the success of the Tupange Project (Benson et al., 2017). Despite increased use and LARC methods’ unique characteristics, prevalence remains low and research has not yet been published describing the social determinants of LARC use.

**Conceptual framework**

*Socioeconomic determinants of health framework.* Several theoretical frameworks have been proposed to describe how social determinants influence health outcomes. Turrell ’s framework of socioeconomic determinants of health (Figure 1) categorizes health-influencing factors into three groups: upstream/macro-level factors, midstream/intermediate-level factors, and downstream/microlevel factors (Turrell, Oldenburg, Mcguffog, & Dent, 1999). The macro-level factors (government, global forces, policies, and determinants of health) influence the intermediate (psychosocial factors, healthcare system, and health behaviours) which in turn affect micro-level factors (physiological systems, biological reactions, and health). The Turrell framework is useful for contextualizing contraceptive use in relation to socioeconomic factors and health outcomes. While contraceptive use is not a health outcome per se, it is relevant for multiple health outcomes including maternal morbidity and mortality. Understanding contraception as a link between social determinants and maternal health outcomes allows us to conceptualize it as a health behaviour. According to this model, it is therefore influenced directly by the social, physical, economic, and environmental determinants of health. This study focuses on three of these social determinants: household wealth, education, and urban/rural residence. This study uses household wealth instead of employment, occupation, and income in order adapt the framework for the youth study population who are less likely to be employed.
Determinants of fertility framework. Bongaarts (1978) provides a more specific framework outlining determinants of fertility. This framework was designed for calculating fertility levels, but it is frequently cited in the literature on contraceptive use and has been adapted by several researchers to model social determinants of contraception (Gichanga, 2011; Kimani & K'Oyugi, 2004). Bongaarts’ model for understanding and predicting fertility levels features multiple tiers of determinants. The first tier is comprised of socioeconomic, cultural, and environmental factors, termed indirect determinants by Bongaarts (1978). The second tier, direct determinants, is divided into exposure factors, deliberate marital fertility control factors, and natural marital fertility factors. Contraceptive use fits into this model as one of Bongaarts’ core direct determinants of fertility (Bongaarts, 1978).

Bongaarts’ (1978) framework can be understood within the context of the Turrell et al. (1999) framework, as they contain many of the same components, including the three determinants identified in this study. While the Turrell et al. (1999) framework provides a broad depiction of the relationship between socioeconomic factors and health behaviours, the inclusion of Bongaarts’ theory contributes a specific focus on contraception and connects this study with
prior works which have used this framework to study social determinants of contraceptive use (Gichanga, 2011; Kimani & K'Oyugi, 2004).

Health decision making process. The models presented above outline a relationship between social determinants and contraceptive use, but they do not explain the mechanism by which the determinants may affect the outcome. Use of contraception is a complex personal decision that is affected by factors on many tiers (Bongaarts et al., 1984). Gage (1998) proposed a framework for conceptualizing adolescents’ decision-making process for sexual activity and contraceptive use (Figure 2). The Gage framework, influenced by the health belief model (Becker, 1974; Janz & Becker, 1984) and the Ajzen-Fishbein model (Ajzen & Fishbein, 1980), points to the individual-level process of weighing cost and benefits of reproductive health behaviours. This conceptualization can help clarify the relationship between social determinants and contraceptive use.

Figure 2. Factors involved in adolescents’ decisions to engage in sexual activity or use contraceptives or condoms (Gage, 1998).

1. Consideration of the costs and benefits of engaging or not engaging in a particular behaviour
2. Assessment of the risks of becoming pregnant or contracting a sexually transmitted disease
3. Norms perceived to be held by significant others including peer groups, family members, and partners
4. Willingness of the adolescent to conform to the wishes of significant others
5. Self-efficacy in making decisions such as whether to have sexual intercourse, purchase and use a condom, obtain contraceptives, or convince a partner to use a condom

Gage’s (1998) framework, which draws from the literature on sub-Saharan Africa, outlines five key factors that influence how adolescents makes complicated sexual health decisions within their context – including socioeconomic characteristics and culture. Therefore, it is useful for relating the Kenyan socioeconomic and sociocultural context with young women’s decisions whether to use contraception. The five decision-making factors described by Gage are cost-benefit weighing, risk assessment, perception of norms held by significant others, willingness to conform, and self-efficacy (1998). The three social determinants in this study (wealth, education, and residence) are each connected with the components of the contraceptive decision-making process as defined by Gage (1998).
The effect of wealth on contraceptive use among young women in sub-Saharan Africa can be understood in Gage’s terminology when discussing possible mechanisms (1998). There is agreement across the literature that the poorest women are the least likely to use modern methods (Creanga et al., 2011; Obare et al., 2011; Ojakaa, 2008). This may be related to a lack of self-efficacy (Figure 2, point 5) in the decision to use contraceptives, if women are unable to obtain contraception due to a lack of resources (Gage, 1998).

Education is likely related to contraceptive use through multiple pathways of the decision-making process for use or non-use (Gage, 1998). Girls and women with higher education are likely to have more knowledge about contraceptive methods and reproductive health, both of which are prerequisites to informed decision making, which includes the weighing of costs and benefits (Figure 2, point 1) and assessment of risks (Figure 2, point 2) (Gage, 1998). This relates to the concept of health literacy, because more education may lead to increased ability to obtain and process health information to make informed reproductive health decisions (Ratzan & Parker, 2000). It is feasible that increased education may improve health literacy on reproductive health by demystifying common misconceptions (e.g. misunderstanding of how pregnancy occurs and false risks of contraception) and improving accuracy of risk assessments (Figure 2, point 2). Education may also increase agency, which can affect the adolescent’s willingness to conform to the wishes of others (Figure 2, point 4) (Gage, 1998; Ruger, 2004).

The relationship between urban/rural residence and contraceptive decision-making is likely linked with both culture and geography. Rural areas, which may be isolated, are likely to have specific cultural norms (Figure 2, point 3) around childbearing which may include childbearing as a symbol of social status (Gage, 1998). There is also evidence that the patriarchal structure in rural Kenya leads to reduced contraceptive decision-making power for women, which factors both into cultural norms (Figure 2, point 3) and self-efficacy (Figure 2, point 5) (Dodoo & Tempenis, 2002; Gage, 1998). Further, rural communities located in remote or geographically hard to reach areas are likely to have reduced access to contraceptives, decreasing a young woman’s self-efficacy in obtaining the method of her choice (Gage, 1998; Toda et al., 2012; Yao et al., 2013).

The factors described above are all components of young women’s contraceptive choices. Thus, individual-level processes exist within a socioeconomic and sociocultural context which is related to behaviour. The frameworks from Bongaarts (1978) and Turrell et al. (1999) illustrate how wealth, education, and residence are each linked with health behaviours,
including contraception use decisions. The Gage (1998) framework shows the key elements of an individual’s contraception use decision-making process, each of which may themselves by impacted by wealth, education, and residence.

Aim and research questions

Many of the aforementioned studies of social determinant of contraceptive use do not focus specifically on youth or adolescents, nor do they address the possible differences in determinants for youth or mechanisms behind those differences. However, there is some youth-specific evidence; Obare et al. (2011), for example, report a wealth and education gradient in contraceptive use in adolescent girls, which suggests similar patterns to those found in studies of older women (Creanga et al., 2011; Magadi & Curtis, 2003; Njogu, 1991; Ojakaa, 2008).

Still, there remains a need for more research on this topic in order to understand social determinants of contraceptive use among young women specifically. Furthermore, in the wake of the Tupange Project in Kenya, which promoted LARC use among women of all ages in urban Kenya, it is important to observe whether LARC use continues to increase and whether any observed increases are equitable across different socioeconomic groups. While the effectiveness, safety, low-cost, and low maintenance of LARCs may make them an appealing contraceptive option for both young women and rural women, little is known about the determinants of LARC use in these groups.

This thesis aims to address some of these knowledge gaps. More specifically, the aims are to:

1. Describe the prevalence of the use of modern contraceptives and long-acting reversible contraceptives among young women in Kenya; and
2. Examine the associations between three social determinants (wealth, education, and residence) and use of modern contraceptives and long-acting reversible contraceptives in young women in Kenya; and
3. Determine whether these associations have changed between the 2008-09 and 2014 Kenya Demographic and Health Surveys, in the context of the implementation of nationwide youth-focused family planning programs during that time.

These aims will be investigated by answering the following specific research questions:

1. Has the prevalence of modern contraceptive use increased in women under 25 from 2008-09 to 2014?
2. Has the prevalence of LARC use increased in women under 25 from 2008-09 to 2014?
3. Are wealth, education, and urban/rural residence associated with modern contraceptive use and LARC use in women under 25?
4. Have the associations between wealth, education, and urban/rural residence and use of modern contraceptives and LARCs changed over time?

**Methods**

*Data material*

The data used are from the Demographic & Health Survey (DHS). The DHS survey is a cross-sectional survey administered with technical support of the United States Agency for International Development (USAID) in Africa, Asia, Latin America, and the Caribbean approximately every 5 years (Kenya National Bureau of Statistics et al., 2015; The DHS Program, 2018). The DHS creates a nationally representative sample of women age 15-49 and uses a two-stage cluster sampling procedure. In the first stage enumeration areas are created from census files and in the second stage households are selected from an updated list within each enumeration area. The survey is administered to different households on each iteration, but the large-scale repeated cross-sectional design allows for trend observation over time. The survey consists of a Household Questionnaire, a Women’s Questionnaire, and a Men’s Questionnaire, and is administered to women and men in the form of interviews. The data used in this study come from the Women’s Questionnaire (full version) which contains questions about socioeconomic characteristics, reproductive health, maternal and child health, and nutrition for women and their children under 5. The interviewers (who are mostly women) are required to complete thorough training sessions and are supervised by field coordinators who monitor data collection quality. The target population of the survey is all women ages 15-49 and men ages 15-54 living in a residential household. In extreme cases, certain regions are excluded due to violence or instability (Kenya National Bureau of Statistics et al., 2015).

The data used in this study are from the Kenya Demographic & Health Survey (KDHS) 2008-09 (n=9,057 households) and KDHS 2014 (full questionnaire; n=17,409 households) administered by the Kenya National Bureau of Statistics (Kenya National Bureau of Statistics et al., 2015; Kenya National Bureau of Statistics, National AIDS Control Council/Kenya, National AIDS/STD Control Programme/Kenya, Ministry of Public Health and Sanitation/Kenya, & Kenya Medical Research Institute, 2010). The KDHS 2008-09 had a
household response rate of 97.7% and the KDHS 2014 had a household response rate of 98.8% (Kenya National Bureau of Statistics et al., 2010). The study population is non-pregnant women (married and unmarried) in Kenya ages 15-24 who participated in the KDHS 2008-2009 (n=3,211 women) and KDHS 2014 (full questionnaire; n=4,982 women). The data are cross-sectional and include two timepoints with different samples.

Ethical considerations. The data were obtained by submitting a study proposal to the DHS Program, which provides unrestricted datasets at no cost for academic research (The DHS Program, 2018). The DHS ethical procedures are detailed in the final report of each survey (Kenya National Bureau of Statistics et al., 2015; Kenya National Bureau of Statistics et al., 2010). All study participants were read an informed consent statement before the start of the interview. For adolescents, a parent or guardian was required to provide consent. The consent statement included the interview purpose, risks/benefits of participation, and contact information for more information on the research. The participant was also told that participation was voluntary and that they could terminate the interview at any time without any consequence.

Variables
The main dependent variables were modern contraceptive use and long-acting reversible contraceptive (LARC) use. The main independent variables were wealth, education, and urban/rural residence. Control variables were age, region, religion, fertility desire, having living children, child death, recent sexual activity, and marriage/cohabitation. All variables were recoded from the Standard DHS survey.

1. Dependent Variables
   - Modern contraceptive use- Respondents were asked their current contraceptive method. Responses were categorized by the DHS into either modern method (defined by the DHS as pill, IUD, injections, diaphragm, condom, female sterilization, male sterilization, implants, female condom, foam/jelly, and lactational amenorrhea), traditional method (defined as period abstinence/rhythm, withdrawal, abstinence), or folkloric method (other) (Kenya National Bureau of Statistics et al., 2015; Kenya National Bureau of Statistics et al., 2010). The DHS categorizations were further collapsed for this study into a dichotomous variable with current modern method usage coded as 1 and not currently using, traditional method, and folkloric method coded as
0. This classification was previously used by Ngome and Odimegwu (2014) and Stephenson, Baschieri, Clements, Hennink, and Madise (2007).

- LARC use- Current contraceptive method was recoded into a dichotomous variable with IUD (intrauterine device) and implant coded as 1 and all other modern, traditional, and folkloric methods and no method coded as 0.

2. Independent Variables

- Wealth- In order to measure wealth, this study used the composite wealth index measure generated by the DHS. The index is a score calculated by observed data including a household’s assets (e.g. televisions and bicycles), housing construction materials, and access to water and sanitation facilities (Filmer & Pritchett, 2001). The wealth index scores were arranged into five wealth quintiles by the DHS.

- Education- Respondents were asked their highest level of education out of four categories: no education, primary, secondary, and higher. These four levels were used in the present analysis.

- Residence- This dichotomous variable was created based on whether the cluster where the interview took place was classified as urban or rural by the DHS.

3. Control Variables

Eight control variables were selected for inclusion in the analysis, including three demographic variables and five family planning variables. The demographic variables (region, religion, and age group) were each found to be independently associated with the study exposures and outcomes with chi-square tests (results not shown), associations which are supported in the literature (Kimani, Njeru, & Ndirangu, 2013; Njogu, 1991; Ojakaa, 2008).

- Age- Respondents were asked their current age, which was then categorized into 5-year age groups. This study included young women (ages 15-24), so the 5-year age group variable was recoded into a dichotomous variable with 15-19 coded as 0 and 20-24 coded as 1. A sensitivity analysis was conducted to compare different age classifications and to determine whether use of a continuous age variable improved model fit. No difference was found in the results.

- Region- This variable was based on the region where the interview took place. There were 8 possible regions: Coast, North-eastern, Eastern, Central, Rift Valley, Western, Nyanza, and Nairobi (capital city).
- Religion- Respondents were asked their religion and were given four options: Roman Catholic, Protestant/other Christian, Muslim, no religion, or other (respondents in this category were asked to specify). The categories for ‘no religion’ and ‘other’ were combined into a single category for analysis.

The family planning variables (fertility desire, has children, child death, recent sex, and marriage/cohabitation) have also been used in prior studies on contraceptive use in Kenya (Kimani & K'Oyugi, 2004; Kimani et al., 2013) and represent the direct determinants of fertility from the Bongaarts (1978) framework. All variables were found to be independently associated with the outcomes with chi-square tests (results not shown).

- Fertility desire- Respondents were asked whether they want to have a child. Those who reported wanting a child were then asked their preferred waiting time. Their responses were then used to construct a variable that groups respondents by whether they wanted a child within the next two years, after more than two years, not at all, unsure, or had been declared infertile. Groups were then recoded into 1 for ‘wants child within the next two years’, and 0 for all other responses.

- Living children- Respondents were asked about their total number of children ever born, then they were asked number of living sons and daughter. These responses combined to create a variable indicating total number of living children. This variable was recoded into a dichotomous variable with 0 indicating no living children and 1 indicating one or more living children.

- Child death- Respondents were asked about the total number of children ever born, then they were asked their number of sons and daughters who had died. Those values were combined to create a variable indicating total number of children who had died, which was then recoded into a dichotomous variable with 0 indicating no child death experience and 1 indicating at least one child death.

- Recent sexual activity- Respondents were asked the time since last intercourse and their responses were coded into four categories: never had intercourse, active in last 4 weeks, not active in last 4 weeks (postpartum abstinence), and not active in last 4 weeks (not postpartum abstinence). These responses were recoded into a dichotomous variable with ‘active in last 4 weeks’ coded as 1 and all other responses coded as 0.

- Marriage/cohabitation- Respondents were asked if they were currently, formerly, or never married or living with a partner. Responses were recoded into a dichotomous
variable with ‘formerly’ and ‘never married’ coded as 0 and ‘currently married or cohabitating’ coded as 1.

One additional variable, survey wave, was included in the analysis. The 2008-09 survey was conducted across two calendar years, so the year variable was recoded into a dichotomous variable with 2008-09 coded as 0. The 2014 survey was coded as 1.

Statistical analysis

The analytical sample included 8,193 women under 25 who were not pregnant at the time of interview and provided valid responses to all study variables. In the KDHS 2008-09, the response rate for eligible women (all ages) was 96.3%. In the KDHS 2014, the response rate for eligible women was 96.2%.

The data were analysed using IBM SPSS Statistics Version 24 (IBM Corp., 2016). Descriptive statistics were generated for all study variables, stratified by survey wave. Sample weights were applied for any calculation of percentages, so all reported percentages are weighted. Sample weights in the DHS are applied to counterbalance the effect of the two-stage cluster sampling procedure. The sample is weighted at the regional level to correct the unweighted sample’s overrepresentation of sparsely populated regions and underrepresentation of densely populated regions (Kenya National Bureau of Statistics et al., 2015). Descriptive statistics were used to determine prevalence of the outcomes, and the distribution of the predictor and control variables.

Associations between the main independent variables (wealth, education, and urban/rural residence) and the dependent variables (modern contraceptive use and LARC use) were tested using binary logistic regression. Separate binary logistic regressions were conducted for each dependent variable.

Two of the predictor variables, wealth and education, were categorical and required a selection of reference group for analysis. Education contained the following four categories: none, primary, secondary, and higher. Primary education was chosen as the reference because 49.7% of the sample had primary as their highest level of education, and primary education is free and compulsory in Kenya (Education Policy and Data Center, 2012). The richest wealth quintile was selected as the reference category for wealth to highlight the potential effects of wealth inequality among individuals in lower income quintiles.
First, the regression analyses were run on a combined sample including both survey waves. This analysis entailed four regression models. Model 1 produced unadjusted odds ratios (ORs) showing the crude effect of each predictor (wealth, education, and urban/rural residence) separately on the outcome. Model 2 produced mutually adjusted ORs showing the effects of each predictor when adjusting for the other two predictors. Model 3 produced adjusted ORs including all three predictors and all eight control variables (region, religion, age group, fertility desire, has children, child death, recent sex, and marriage/cohabitation). Model 4 produced fully adjusted ORs including all predictor variables, all control variables, and adjusted for survey wave.

Secondly, an interaction analysis was conducted to determine if survey wave functioned as a moderator between the predictors and the outcomes. Product terms were created for wealth and survey wave, education and survey wave, and urban/rural residence and survey wave. Each product term was added into the regression to test if the model including the product term described the data better than the fully adjusted model. Fit was determined from the statistical significance of the likelihood ratio test (LRT) comparing the model that includes the interaction term with the fully adjusted model. The interaction was considered significant if the LRT was statistically significant, i.e. if the more complex model significantly improved the less complex model.

In the final iteration of the analysis, the sample was stratified by survey wave. The survey wave-stratified analyses contained three models, which were identical to Models 1-3 in the survey wave-combined analysis. The results of the stratified analysis are presented below.

**Results**

*Descriptive statistics and trends*

Table 1 shows the distribution of all study variables, across the entire sample and stratified by survey wave. Sample weights were applied for any calculation of percentages, so all reported quantities are unweighted and percentages are weighted. Between the two survey waves, the
Table 1. Frequencies of all analytical variables for women under 25* by survey wave (n=8,193).

<table>
<thead>
<tr>
<th>Wave of survey</th>
<th>2008-09 (n=3,211)</th>
<th>2014 (n=4,982)</th>
<th>Total (n=8,193)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-19</td>
<td>1674</td>
<td>52.4</td>
<td>2731</td>
</tr>
<tr>
<td>20-24</td>
<td>1537</td>
<td>47.6</td>
<td>2251</td>
</tr>
<tr>
<td><strong>Wealth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poorest</td>
<td>633</td>
<td>16.1</td>
<td>1101</td>
</tr>
<tr>
<td>Poorer</td>
<td>476</td>
<td>18.0</td>
<td>1078</td>
</tr>
<tr>
<td>Middle</td>
<td>561</td>
<td>19.5</td>
<td>992</td>
</tr>
<tr>
<td>Richer</td>
<td>639</td>
<td>21.4</td>
<td>913</td>
</tr>
<tr>
<td>Richest</td>
<td>902</td>
<td>24.9</td>
<td>898</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>314</td>
<td>5.3</td>
<td>391</td>
</tr>
<tr>
<td>Primary</td>
<td>1744</td>
<td>58.5</td>
<td>2337</td>
</tr>
<tr>
<td>Secondary</td>
<td>957</td>
<td>30.7</td>
<td>1947</td>
</tr>
<tr>
<td>Higher</td>
<td>196</td>
<td>6.6</td>
<td>307</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>1011</td>
<td>24.9</td>
<td>1805</td>
</tr>
<tr>
<td>Rural</td>
<td>2200</td>
<td>75.1</td>
<td>3177</td>
</tr>
<tr>
<td><strong>Region</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coast</td>
<td>439</td>
<td>8.3</td>
<td>643</td>
</tr>
<tr>
<td>North-eastern</td>
<td>230</td>
<td>2.1</td>
<td>259</td>
</tr>
<tr>
<td>Eastern</td>
<td>393</td>
<td>14.8</td>
<td>827</td>
</tr>
<tr>
<td>Central</td>
<td>332</td>
<td>9.6</td>
<td>403</td>
</tr>
<tr>
<td>Rift Valley</td>
<td>501</td>
<td>16.9</td>
<td>1455</td>
</tr>
<tr>
<td>Western</td>
<td>426</td>
<td>12.0</td>
<td>533</td>
</tr>
<tr>
<td>Nyanza</td>
<td>538</td>
<td>17.8</td>
<td>721</td>
</tr>
<tr>
<td>Nairobi</td>
<td>352</td>
<td>8.4</td>
<td>141</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None/other</td>
<td>68</td>
<td>1.7</td>
<td>81</td>
</tr>
<tr>
<td>Roman Catholic</td>
<td>659</td>
<td>23.3</td>
<td>986</td>
</tr>
<tr>
<td>Protestant/other Christian</td>
<td>1969</td>
<td>67.7</td>
<td>3218</td>
</tr>
<tr>
<td>Muslim</td>
<td>515</td>
<td>7.4</td>
<td>679</td>
</tr>
<tr>
<td><strong>Fertility desire</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does not want baby within 2 years</td>
<td>2903</td>
<td>91.2</td>
<td>4597</td>
</tr>
<tr>
<td>Wants baby within 2 years</td>
<td>308</td>
<td>8.8</td>
<td>385</td>
</tr>
<tr>
<td><strong>Children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has no children</td>
<td>1962</td>
<td>62.1</td>
<td>3095</td>
</tr>
<tr>
<td>Has at least 1 child</td>
<td>1249</td>
<td>37.9</td>
<td>1887</td>
</tr>
<tr>
<td><strong>Child death</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No child death</td>
<td>3083</td>
<td>96.2</td>
<td>4857</td>
</tr>
<tr>
<td>At least 1 child death</td>
<td>128</td>
<td>3.8</td>
<td>125</td>
</tr>
<tr>
<td><strong>Recent sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sex in last 4 weeks</td>
<td>2284</td>
<td>74.0</td>
<td>3667</td>
</tr>
<tr>
<td>Sex in last 4 weeks</td>
<td>927</td>
<td>26.0</td>
<td>1315</td>
</tr>
<tr>
<td><strong>Cohabitating</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not married/in union/cohabitation</td>
<td>2194</td>
<td>70.7</td>
<td>3496</td>
</tr>
<tr>
<td>Married/in union/cohabitation</td>
<td>1017</td>
<td>29.3</td>
<td>1486</td>
</tr>
<tr>
<td><strong>Modern method use</strong>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not currently using modern method</td>
<td>2711</td>
<td>84.6</td>
<td>3890</td>
</tr>
<tr>
<td>Currently using modern method</td>
<td>500</td>
<td>15.4</td>
<td>1092</td>
</tr>
<tr>
<td><strong>LARC method use</strong>**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not currently using LARC</td>
<td>3197</td>
<td>99.7</td>
<td>4780</td>
</tr>
<tr>
<td>Currently using LARC</td>
<td>14</td>
<td>0.3</td>
<td>202</td>
</tr>
</tbody>
</table>

* Pregnant women are excluded
** Numbers are unweighted; percentages are weighted.
*** Modern methods are Pill, IUD, Injections, Diaphragm, Condom, Female Sterilization, Male Sterilization, Implants, Female Condom, Foam/Jelly and Lactational Amenorrhea.
**** Long-acting reversible contraceptives (LARC) are IUD and Implants.
prevalence of modern method use in the samples increased from 15.4% to 25.2% and LARC use increased from 0.3% to 4.4%. The sample contained approximately equal proportions of women 15-19 years old (52.1%) and 20-24 years old (47.9%), with no change in the age distribution across the two time points. Between the surveys the percentage of women with primary education as their highest education dropped from 58.5% to 44.1% while the secondary education group grew from 30.7% to 43.7%. There was also a change in the urban-rural distribution; the urban group increased from 24.9% to 39.1%. The other study variables remained stable across the two time points. Regional representation varied, from the smallest North-eastern (2.0%) to the largest Rift Valley (26.8%). About two-thirds (70.4%) of the sample identified themselves as Protestant or other Christian. The second most common religion was Roman Catholic, including about one-fifth (21.1%) of the sample. Almost all women (92.3%) reported that they did not want to have a child within the next two years and twenty-seven percent (27%) of women reported sexual activity within the past four weeks at the time of survey. Ninety-seven percent (97.0%) of women had not experienced the death of a child and 37.9% were mothers to at least one living child at the time of survey. Seventy-one percent (71.0%) of participants were not married, cohabitating, or in a union.

Logistic regression analyses

Modern contraceptive use. The results of the interaction analysis showed that survey wave acted as a moderator between the three predictor variables (wealth, education, and urban/rural residence) and modern contraceptive use. The likelihood ratio test (LRT) for the interaction between wealth and survey wave had a p-value of 0.032. For the interaction of education and survey wave, the p-value of the LRT was 0.004. The interaction between urban/rural residence and survey wave had an LRT p-value of 0.000. These results show a significant interaction between survey wave and each of the three predictor variables in predicting modern contraceptive use.
Table 2. The association between wealth, education, urban/rural residence, and modern contraceptive use among women under 25 in Kenya in 2008-09, based on logistic regression analysis \( (n=3,211) \)

<table>
<thead>
<tr>
<th>Modern contraceptive method use</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95 % CI)</td>
<td>OR (95 % CI)</td>
<td>OR (95 % CI)</td>
</tr>
<tr>
<td><strong>Wealth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poorest</td>
<td>0.36 (0.25, 0.50)</td>
<td>0.56 (0.35, 0.88)</td>
<td>0.67 (0.39, 1.14)</td>
</tr>
<tr>
<td>Poorer</td>
<td>0.48 (0.36, 0.65)</td>
<td>0.69 (0.46, 1.04)</td>
<td>1.11 (0.68, 1.81)</td>
</tr>
<tr>
<td>Middle</td>
<td><strong>0.54 (0.40, 0.72)</strong></td>
<td>0.79 (0.53, 1.17)</td>
<td>1.40 (0.88, 2.23)</td>
</tr>
<tr>
<td>Richer</td>
<td>0.78 (0.60, 1.01)</td>
<td>1.08 (0.78, 1.49)</td>
<td>1.32 (0.89, 1.96)</td>
</tr>
<tr>
<td>Richest (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0.39 (0.21, 0.72)</td>
<td>0.45 (0.24, 0.85)</td>
<td><strong>0.40 (0.19, 0.83)</strong></td>
</tr>
<tr>
<td>Primary (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Secondary</td>
<td>0.97 (0.79, 1.21)</td>
<td><strong>0.79 (0.63, 0.99)</strong></td>
<td>1.48 (1.12, 1.97)</td>
</tr>
<tr>
<td>Higher</td>
<td>1.40 (0.95, 2.05)</td>
<td>0.92 (0.61, 1.38)</td>
<td><strong>2.11 (1.27, 3.49)</strong></td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Rural</td>
<td><strong>0.48 (0.39, 0.59)</strong></td>
<td><strong>0.60 (0.44, 0.82)</strong></td>
<td><strong>0.47 (0.31, 0.71)</strong></td>
</tr>
</tbody>
</table>

Model 1: Unadjusted  
Model 2: Mutually adjusted  
Model 3: Adjusted for region, religion, age group, fertility desire, has children, child death, recent sex, and marriage/cohabitation

Table 3. The association between wealth, education, urban/rural residence, and modern contraceptive use among women under 25 in Kenya in 2014, based on logistic regression analysis \( (n=4,982) \)

<table>
<thead>
<tr>
<th>Modern contraceptive method use</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95 % CI)</td>
<td>OR (95 % CI)</td>
<td>OR (95 % CI)</td>
</tr>
<tr>
<td><strong>Wealth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poorest</td>
<td><strong>0.52 (0.41, 0.66)</strong></td>
<td>0.81 (0.61, 1.08)</td>
<td><strong>0.52 (0.36, 0.77)</strong></td>
</tr>
<tr>
<td>Poorer</td>
<td>0.99 (0.82, 1.19)</td>
<td><strong>1.44 (1.14, 1.83)</strong></td>
<td>0.73 (0.53, 1.02)</td>
</tr>
<tr>
<td>Middle</td>
<td>0.87 (0.72, 1.06)</td>
<td><strong>1.29 (1.03, 1.63)</strong></td>
<td>0.88 (0.64, 1.21)</td>
</tr>
<tr>
<td>Richer</td>
<td>1.15 (0.96, 1.38)</td>
<td><strong>1.43 (1.17, 1.75)</strong></td>
<td>0.78 (0.60, 1.03)</td>
</tr>
<tr>
<td>Richest (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td><strong>0.34 (0.22, 0.55)</strong></td>
<td>0.46 (0.28, 0.74)</td>
<td><strong>0.28 (0.16, 0.49)</strong></td>
</tr>
<tr>
<td>Primary (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Secondary</td>
<td><strong>0.84 (0.73, 0.96)</strong></td>
<td>0.75 (0.65, 0.86)</td>
<td>1.21 (0.99, 1.47)</td>
</tr>
<tr>
<td>Higher</td>
<td>0.98 (0.78, 1.24)</td>
<td>0.81 (0.63, 1.05)</td>
<td><strong>1.58 (1.14, 2.21)</strong></td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Rural</td>
<td><strong>0.60 (0.53, 0.68)</strong></td>
<td><strong>0.54 (0.46, 0.64)</strong></td>
<td>0.99 (0.78, 1.25)</td>
</tr>
</tbody>
</table>

Model 1: Unadjusted  
Model 2: Mutually adjusted  
Model 3: Adjusted for region, religion, age group, fertility desire, has children, child death, recent sex, and marriage/cohabitation
Because survey wave appeared to have a moderating effect on the associations between the wealth, education, and residence and modern contraceptive use, the logistic regression results are presented stratified by survey wave. Results in bold in Tables 2-4 are statistically significant (p<0.05). Table 2 shows the results from 2008-09. In the fully adjusted model (Model 3), no association was found between wealth and modern contraceptive use. Women with no education had significantly lower odds of modern contraceptive use than women with primary education (OR=0.40; 95% CI: 0.19-0.83), while women with secondary and higher education had higher odds of use (secondary education OR=1.48; 95% CI: 1.12-1.97; higher education OR=2.11; 95% CI: 1.27-3.49). Women in rural areas had significantly lower odds than urban women of using modern contraceptives (OR=0.47; 95% CI: 0.31-0.71). The results from 2014 (Table 3; Model 3) show that the poorest group developed lower odds of use compared to the richest group between 2008-09 and 2014 (OR=0.52; 95% CI: 0.36-0.77). In 2014 there was no difference in odds of use between primary and secondary education, but women with no education were less likely to use modern methods (OR=0.28; 95% CI: 0.16-0.49) and women with higher education remained more likely users (OR=1.58; 95% CI: 1.14-2.21). The association between urban/rural residence and modern contraceptive use disappeared between the two survey waves.

Table 4. The association between wealth, education, urban/rural residence, and LARC use among women under 25 in Kenya in 2014, based on logistic regression analysis (n=4,982)

<table>
<thead>
<tr>
<th>LARC use</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Wealth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poorest</td>
<td>0.58 (0.35, 0.98)</td>
<td>1.09 (0.60, 1.98)</td>
<td>0.64 (0.33, 1.25)</td>
</tr>
<tr>
<td>Poorer</td>
<td>1.14 (0.77, 1.69)</td>
<td>1.92 (1.20, 3.07)</td>
<td>0.91 (0.52, 1.57)</td>
</tr>
<tr>
<td>Middle</td>
<td>0.86 (0.57, 1.31)</td>
<td>1.49 (0.92, 2.40)</td>
<td>0.79 (0.46, 1.36)</td>
</tr>
<tr>
<td>Richer</td>
<td>1.26 (0.86, 1.85)</td>
<td>1.62 (1.09, 2.40)</td>
<td>0.84 (0.55, 1.28)</td>
</tr>
<tr>
<td>Richest (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0.12 (0.02, 0.70)</td>
<td>0.16 (0.03, 0.92)</td>
<td>0.15 (0.02, 0.91)</td>
</tr>
<tr>
<td>Primary (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Secondary</td>
<td>0.67 (0.51, 0.90)</td>
<td>0.60 (0.45, 0.81)</td>
<td>0.88 (0.64, 1.21)</td>
</tr>
<tr>
<td>Higher</td>
<td>0.57 (0.33, 1.00)</td>
<td>0.47 (0.26, 0.85)</td>
<td>1.27 (0.66, 2.43)</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban (ref.)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Rural</td>
<td>0.49 (0.37, 0.64)</td>
<td>0.36 (0.26, 0.51)</td>
<td>0.56 (0.39, 0.83)</td>
</tr>
</tbody>
</table>

Model 1: Unadjusted
Model 2: Mutually adjusted
Model 3: Adjusted for region, religion, age group, fertility desire, has children, child death, recent sex, and marriage/cohabitation
Long-acting reversible contraceptive use. Due to an extremely low prevalence of LARCs in 2008-09 (0.04%), there was insufficient power to analyse the relationship between the three social determinants and LARC use in the first survey wave. The likelihood ratio test (LRT) results for survey wave and the three predictor variables were all non-significant, indicating that there was no statistical interaction between survey wave and wealth, survey wave and education, or survey wave and residence in prediction of LARC use. The results from the second survey wave (2014) are presented in Table 4. Model 3, the fully adjusted model, shows no association between wealth and LARC use. The no-education group had lower odds of LARC use compared to women who had completed primary education (OR=0.15; 95% CI: 0.02-0.91), but there was no statistically significant relationship in the secondary and higher groups. Women in rural areas showed significantly lower odds of LARC use than urban woman (OR=0.56; 95% CI: 0.39-0.83).

Discussion
Summary of results
This study examined patterns of use of modern contraceptive methods and long-acting reversible contraceptive methods (LARCs) and their association with social determinants among women under 25 in Kenya. The results showed that there has been an increase from 2008-09 to 2014 in the prevalence of modern contraceptive use (from 15.4% to 25.2%) and in the prevalence of LARC use (from 0.3% to 4.4%). During the first study wave, in 2008-09, no association was found between wealth and modern method use, but in 2014 the women in the poorest quintile were found to have lower odds of using a modern method. Living in a rural area was associated in 2008-09 with lower odds of modern method use, but in 2014 no difference was found between urban and rural women. An education gradient was found, with no education and secondary or higher education associated with lower and higher odds of modern method use respectively. This remained stable across the two survey waves, though in 2014 the increased odds among the secondary educated group became statistically insignificant. There was no observed association between wealth and LARC use, but women with no education and women in rural areas were both significantly less likely to use LARCs relative to primary educated and urban women, respectively. Due to extremely low prevalence of LARC use in 2008-09, the results of this study cannot assess changes across the two time points in the relationship between the social determinants and LARC use. The results of this
study are largely in line with previous research on the topic, but also contribute some different findings to the discussion.

**Household wealth and modern method use.** The guiding theoretical frameworks for this study, Turrell et al.’s socioeconomic determinants of health framework (1999) and Bongaarts’ determinants of fertility framework (1978), identify wealth as an important determinant of health behaviours. This study tested the relationship between household wealth and modern contraceptive use and found that there is a relationship between the two, which contributes to the body of evidence supporting these frameworks and contributes additional knowledge on the importance of wealth as a determinant of contraceptive use. The Turrell et al. (1999) and Bongaarts (1978) frameworks were not designed explicitly for young women, so these results also contribute evidence that the frameworks can be used for this population.

Like previous research, this study found that poorest women have the lowest likelihood of modern contraceptive use (Creanga et al., 2011; Obare et al., 2011; Ojakaa, 2008). This has been a well-documented pattern in studies including women of all ages, but the body of research confirming this relationship among young women is smaller. We did not find any evidence of a wealth gradient in modern contraceptive use as reported in the studies by Ojakaa (2008) and Creanga et al. (2011), both of which included women of all ages. This finding raises the question of what role age plays in the relationship between wealth and reproductive health behaviours. It may be the case that wealth is not the strongest determinant of contraceptive use for young women but one which increases in importance over time as women finish their education and enter the workforce. There is also a possibility of reverse causality between wealth and contraceptive use in older women, i.e. that use of contraceptives permits women to gain more wealth. A bi-directional relationship could contribute to the existence of a wealth gradient among adults and the absence of gradient among young women. The results of this study suggest that access to resources is not so definitive of young women’s contraceptive access, except in the case of extreme lack of resources. While cost is not commonly cited by Kenyan women as a reason for non-use of contraception, it’s possible that in cases of extreme deprivation women may not have been able to access contraception for another reason, e.g. lack of financial means to travel to a healthcare facility to obtain contraception (Kenya National Bureau of Statistics et al., 2015). A concerning finding is that the association between being in the poorest wealth quintile and lower contraceptive use appears to be a new development, as the two variables were not significantly associated in 2008-09. This development suggests that
despite overall improvement in modern contraceptive use, the progress has perhaps not been equitable.

*Education and modern method use.* This study’s finding of an educational gradient in modern method use also supports the utility of Turrell’s (1999) and Bongaarts’ (1978) identification of education as a determinant of reproductive health behaviour. The results of this study support prior research which found an education gradient in contraceptive use (Bakibinga et al., 2016; Obare et al., 2011; Ojakaa, 2008). While education is widely accepted as a determinant of reproductive health behaviour, our finding of this relationship in youth suggests that this particular benefit of education can occur at a young age. This hypothesis would need to be tested to control for parents’ education (data for which was not available in this study) because based on our results we cannot rule out an intergenerational effect on the association between education and modern contraceptive use. It is possible that parents’ education is associated both with educational achievement and contraceptive use among young women. If so, it could confound the association between young women’s own education and contraceptive use.

The observed effect of education on contraceptive use can be understood within the decision-making framework from Gage (1998). An increase in education may correspond with increased health literacy and more correct assessment of pregnancy risk and contraceptive methods. It may also lead to increased agency which can increase a young woman’s self-efficacy in decision making regarding her sexual activity and contraceptive use (Gage, 1998; Ruger, 2004). The evidence from this and similar studies strongly positions education as a productive target for intervention aiming to improve reproductive health among young women. Education is a feasible entry point for intervention, whereas other determinants such as wealth and residence may be less accessible for policymakers to affect. Furthermore, education for young women is already a target of the Sustainable Development Goals, so the observed effect on reproductive health aligns with and adds to the existing agenda (United Nations, 2015).

*Residence and modern method use.* Prior research in Kenya has found urban residence to be a strong determinant of modern contraceptive use even when controlling for region (Dodoo et al., 2007; Magadi & Curtis, 2003; Ojakaa, 2008). This study similarly found young rural women to be less likely to use a modern method in 2008-09, but the association disappeared completely by 2014.
This result requires further investigation. There are several possible factors that may have contributed to this development. First, it is likely that geographic access to modern contraceptives has increased for young women in recent years. The Kenyan government is explicitly aiming to increase use among adolescents as a central focus of their FP2020 involvement (Family Planning 2020, 2018b). This increased political attention could encourage intervention in hard-to-reach areas, improving access and enabling women in rural areas to obtain modern contraceptive methods. A second possible contributing factor is the urban to rural shift in the sample distribution. Between the two surveys, the proportion of women living in urban areas increased from 24.9% to 39.1%, which constitutes a large change in the residential makeup of the sample. The DHS’ sampling procedure is representative at the national level so this shift should reflect a change in the population (Kenya National Bureau of Statistics et al., 2015). The results of this study do not allow us to interpret whether there was a selective effect with the change in distribution that may be reflected in the results, and further research is needed to address this possibility. A third proposed explanation draws from Gage’s (1998) framework, which identifies cultural norms as a major factor in the sexual and reproductive health decision-making process. Several studies have argued that cultural norms explain part of the effect of residence on contraceptive use (Dodoo & Tempenis, 2002; Dodoo et al., 2007; Njogu, 1991). For example, Njogu (1991) argued that the observed rural/urban difference in contraceptive use in Kenya was partly due to differences in ideal family size. Dodoo and Tempenis (2002) attributed lower contraceptive use to the more traditional patriarchal farming structure found in rural Kenya. If these cultural factors have contributed to differences in contraceptive behaviour across residence groups, then this study’s observed reduction of that difference could indicate that the gap in cultural norms has narrowed between the two groups. However, this topic requires further study.

Long-acting reversible contraceptive use. This study found that while prevalence of LARC use among young women remains low, it increased substantially between the two survey waves in 2008-09 and 2014. This may be attributable in part to the Tupange Project, which promoted LARC use among urban women in Kenya and was launched in between the two studied survey years (Benson et al., 2017).

LARC methods may provide an appealing contraceptive alternative for women who wish to delay childbearing, but there are clear logistical disadvantages and risk misconceptions which have limited its use to date. Although LARCs are effective and inexpensive, they require a
healthcare provider for insertion and removal (Winner et al., 2012). Blumenthal et al. (2013) identified the biggest barriers to LARC uptake as provider training and negative perception of LARC methods, based on results of an intervention from Population Services International (PSI). The most common negative perceptions which prevent women from seeking them out and providers from offering them are risk of infection and of long-term infertility (Blumenthal et al., 2013). The Tupange Project managed to address some of these issues with multifaceted strategies including method supply, education of physicians, and increase of patient awareness through educational materials.

Due to low prevalence in 2008-09, this study was unable to observe any change over time in the relationship between wealth, education, and residence and LARC use. However, the results from 2014 provide preliminary findings for the discussion of the relationship between social determinants and choice of LARC methods. The results show that in 2014 women with a rural residence and women with no education had lower odds of using LARCs relative to urban women and high educated women, respectively. The finding of lower LARC use among rural women can likely be explained in part by The Tupange Projects’ role in increasing use among urban women. However, several features of LARC methods make them a good match for the needs of women in rural areas. Because LARC methods require very little maintenance or user effort, compared to injectables or the pill, they provide a contraceptive alternative for women who live in remote areas and have less frequent access to a healthcare provider (Blumenthal et al., 2011; Winner et al., 2012). The decision-making process for contraceptive use as described by Gage (1998) includes knowledge, access to methods, and the influence of cultural norms, all of which are likely lower among rural women. In the case of LARCs, access to the method also requires access to a provider who can (and is willing to) perform the procedure, which can be a major barrier (Blumenthal et al., 2013). The association between having no education and lower LARC use likely functions through a similar mechanism, particularly a lack of knowledge. However, IUDs and implants may offer an appealing method choice for women with no education because they require little user adherence such as dosage or following of instructions (Blumenthal et al., 2013).

**Strengths and limitations**

This study contributed new knowledge to the topic of social determinants of contraceptive use for young women in Kenya, who are not often represented in the literature. Furthermore, in addition to married women this study included unmarried women, a group which is frequently
excluded from research on contraceptive behaviour. Seventy-one percent of the study sample were not married, cohabiting, or in a union. It is important to include unmarried women in this type of research, particularly when studying contraceptive behaviours of young women, who are less likely to be married.

DHS surveys provide a wealth of information on health status in low and middle-income countries which allows for both analysis of trends over time and of cross-country comparisons (Boerma & Sommerfelt, 1993). This scale of data collection greatly enhances the research on reproductive health in Kenya and other survey countries. The indicators measured in the survey cover a range of varied health topics. The surveys are continuously updated according to international standards and data quality is ensured through an elaborate feedback process (Boerma & Sommerfelt, 1993; Institute for Resource Development, 1991).

However, there were also several limitations of this research. First, the study used cross-sectional survey data so we are unable to interpret causality. Self-reported data, such as that included in surveys, are subject to reporting and recall bias, though DHS evaluation has shown that the reporting, including sensitive topics, is generally reliable (Boerma & Sommerfelt, 1993; Institute for Resource Development, 1991). Nevertheless, there is a risk of reporting bias on sensitive issues such as sexual health and activity. Despite the DHS’ random sampling procedure, there remains a risk of selection bias. In the 2008-09 KDHS, the household response rate was 97.7% and the eligible women response rate was 96.3% (Kenya National Bureau of Statistics et al., 2010). In the 2014 KDHS (full questionnaire), the household response rate was 98.8% and the eligible women response rate was 96.2% (Kenya National Bureau of Statistics et al., 2015). In both years, the reason for missing households was generally that the location was found vacant or destroyed, or that household members were absent for a long time during the survey period. Likewise, the reason for eligible women not being interviewed was usually that they were not found at home despite repeated attempts. In both years, rural households had higher response rates (Kenya National Bureau of Statistics et al., 2015; Kenya National Bureau of Statistics et al., 2010). There is a risk of selection bias if the missing households or women had something in common. For example, families or women who have the means to travel for an extended time may have been excluded.

There are also some limitations associated with implementing and conducting a large cross-national survey. The standardization of survey items can compromise some of the local
relevance of questions; however, this is addressed through an adaptation of the survey for the different country contexts (Boerma & Sommerfelt, 1993).

Conclusions and implications

This study has contributed new knowledge on the social determinants of contraceptive behaviors among young women in Kenya. There are five key conclusions that can be drawn from this study:

1. **Modern contraceptive use has increased among young women in Kenya, but a wealth inequality seems to have emerged in recent years.** While work on promoting contraceptive use among young women continues, it is essential that programs focus on promoting equity in use so that the wealth gap in modern method use does not continue to widen.

2. **Living in a rural area was not found to be a risk factor for low modern contraceptive use among young women in 2014.** This is an interesting finding in the context of Kenya where urban/rural residence is a known dimension of social inequality. The demographic shift towards residence in urban areas that occurred during the study time frame may help explain the observed change.

3. **Education is a key actionable determinant of contraceptive use among young women.** Education is known to be positively associated with contraceptive use among older women, but this finding suggests that education may provide a particularly effective intervention target for young women, who are more likely to continue their education than older women.

4. **LARC use has increased among young women; while it remains unpopular, the reproductive health implications of the increase are promising.** Despite pervasive misconceptions about the risks of LARC use, it provides an inexpensive, effective, safe, and user-friendly contraceptive solution for women who want to delay childbearing. Given that nearly all of the young women interviewed in this study stated that they wanted to delay childbearing for at least two years, this is a group that could particularly benefit from having increased contraceptive options.

5. **LARC use remains extremely low among uneducated women and women in the poorest quintile, but these groups may in fact benefit the most from LARC use.** Because LARCs are inserted and removed by a healthcare professional, they require no user adherence which makes them a viable option for women who have no education
or are illiterate. LARC’s also do not require recurring medical appointments, making them suitable for women who live in rural areas and have infrequent access to healthcare providers. Therefore, the two groups who are least likely to use LARC’s seemingly could benefit the most from them, and interventions targeting these groups could potentially have the largest public health effects.

Future research

Several of the study findings regarding social determinants of modern contraceptive use merit further research.

The apparent emergence of an association between being in the poorest wealth quintile and lower odds of modern contraceptive use requires further study because replication of these results could have policy implications. If reproductive health progress is shown to be inequitable it could mean that interventions need to be designed to be more inclusive of diverse wealth groups. Alternatively, interventions could be designed to specifically target the poorest young women.

This study found an education gradient in modern contraceptive use, which suggests that increasing education can have a beneficial effect on young women’s reproductive behaviour. However, this study did not have access to information about parental education, which is a potential confounder if increased parental education is associated with increased education of the adolescent and their modern contraceptive use. Replication of this study with the addition of parental education as a control variable would add valuable information about the relationship between education and contraceptive use.

The lack of a significant association found between urban residence and increased use of modern methods in 2014 also requires further investigation. Though this finding may represent the success of interventions aiming to reach women in rural areas, the results must be replicated. The relationship between region and urban/rural residence must also be considered. This study adjusted for region, but it would be interesting to test for an interaction between region and residence. Also, future studies should examine the shift towards higher urban population, to understand a possible selection effect in urban and rural populations.

While our results provide some preliminary information about social patterning of LARC use, this area requires further study. This will be an interesting area of study after the completion of the next KDHS (Kenya Demographic and Health Survey) in 2019 following the rapid increase
in LARC use observed between the 2008-09 and 2014 iterations of the survey. If LARC uptake becomes more common, changes in young women’s perception of the methods will alter the decision-making process for LARC use. Young women will have more knowledge of LARCs and more ability to obtain them. This increase in self-efficacy paired with the reduction of misconceptions will likely change the balance of cost-benefit weighing (Gage, 1998). As this change happens, it will be worthwhile to study whether the social determinants of LARC use mirror the determinants of modern method use and whether progress occurs in an equitable fashion.

Final remarks
This goal of this study was to contribute to the body of knowledge around social inequalities in young women’s reproductive health. Access to modern contraceptives and the knowledge to make informed reproductive health decisions are instrumental to improving life chances for young women. And while progress is occurring quickly in Kenya, this study (like many before it) found that the poorest young women and those with no education continue to use modern contraceptive methods less than other young women. It is crucial that they be given the same opportunities as their wealthier and more highly educated counterparts. Increases in method options, such as LARCs, may increase the health practitioners’ ability to reach underserved populations, but there is much work to be done on reducing stigma and misconceptions. In conclusion, the observed trends in modern contraceptive use in Kenya are encouraging, and more research identifying patterns of use may help promote reproductive health equity for all young women.

Acknowledgements
I extend my deepest thanks to Claudia Hanson, Andrea Dunlavy, and Mia Granvik Saminathen for your wealth of knowledge, honesty, and trust in my work. Thank you to Ylva Brännström Almquist for your open door, and to my classmates for sharing this process with me. Finally, thank you to the DHS Program, who provided the data for this study, for encouraging research in this field by making data available.
References


