FAMILY PLANNING IN URBAN KENYA:
AN EXAMINATION OF THE FACTORS AFFECTING CONTRACEPTIVE USE

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Abstract

LAILI IRANI: Family Planning in Urban Kenya: An Examination of
the Factors Affecting Contraceptive Use
(Under the guidance of Dr. Ilene S. Speizer)

Background

While Kenya's national fertility rate has declined, the urban poor still have high
fertility rates and a great family planning (FP) need. This dissertation aims to study the
impacts of married/cohabiting couples' characteristics and environmental factors on
contraceptive use patterns among urban Kenyans.

Methods

Data came from baseline population-based surveys from the Measurement, Learning
and Evaluation Project in three Kenyan cities: Nairobi, Mombasa and Kisumu.

For the first paper, women aged 15-49 were surveyed. The outcomes of interest were
contraceptive use patterns (current/former/never user), and current user patterns (first
method/switched from less to more effective/switched from more to less effective method).
Multinomial logistic regression methods were used.

For the second paper, a total of 840 couples (unweighted=883) were identified. The
outcomes of interest were current contraceptive use (currently using/not using) and intention
to use contraception in the near future (wants to/doesn't want to use), among non-users.
Logistic regression was used.

Results

The first paper shows that current contraceptive use and switching patterns, among current users, did not vary by neighborhood type (formal/informal). However, across household wealth, 62% of poor women were current users compared to 67% of the rich. Among current users, poor women were more likely to be using their first method than to have switched methods, suggesting reduced demand/limited access to contraception. Additional analyses to test a new slum variable (slum/intermediate/non-slum), based on a household's availability of electricity, water and toilet, showed similar results to household wealth.

The second paper shows that couples had greater odds of using contraceptives if the wife desired fewer children, or both partners admitted to discussing desired number of children/FP recently. Among non-users, intention to use contraception in the near future showed similar associations.

Conclusion

Since household wealth impacts contraceptive use, FP programs need to identify the urban poor across all urban neighborhoods. Local outreach workers can locate the urban poor and assist them in fulfilling their contraceptive needs. Furthermore, ideal family size and couple communication impact couples' contraceptive use. New strategies and interventions can increase men's engagement in FP and ensure that couples' fertility desires are met.

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Table of Contents

List of Tables

List of Figures

List of Abbreviations

APHRC   African Population and Health Research Center

CBS   Central Bureau of Statistics

CPR   Contraceptive Prevalence Rate

DHS   Demographic and Health Survey

FP   Family Planning

ICPD   UN International Conference on Population and Development

IIA   Irrelevant Alternatives

IUD   Intrauterine device

KEMRI   Kenya Medical Research Institute

LAM   Lactational Amenorrhea Method

MDG   Millennium Development Goal

MLE   Measurement, Learning & Evaluation

PoA   Program of Action

PSU   Primary Sampling Unit

TFR   Total Fertility Rate

URHI   Urban Reproductive Health Initiative

Chapter 1: Introduction

1.1 Statement of the problem

In the developing world, there are approximately 222 million women with an unmet need for family planning (FP), that is, these women are sexually active, want to delay or avoid childbearing but are not using contraception (Singh *et al.* 2009, Moreland *et al.* 2010, Carr *et al.* 2012). Unmet need for FP leads to unplanned and poorly timed pregnancies, which in turn end up as higher risk pregnancies resulting in increased maternal and child morbidity and mortality (Singh *et al.* 2009, USAID 2009). An increase in FP access and use will result in lower unmet need, thus helping achieve some of the Millennium Development Goals (MDG) to which nations have committed themselves, including improving maternal health overall (MDG 5), reducing child mortality (MDG 4), promoting better gender equality (MDG 3), reducing the spread of HIV/AIDS (MDG 6), achieving universal primary education (MDG 2), ensuring environmental stability (MDG 7), and reducing extreme poverty and hunger (MDG 1) (Allen 2007, Potts and Fotso 2007, USAID 2009, Canning and Schultz 2012, Cleland *et al.* 2012).

From the late 1970s to the early 1990s, fertility rates declined rapidly in sub-Saharan Africa (SSA) (Kirk and Pillet 1998, Ezeh *et al.* 2009). In particular, the decline was dramatic in rural areas across Eastern and Southern African countries. This decline in fertility rates has largely been attributed to increased availability of contraception (Kirk and Pillet 1998, Ezeh *et al.* 2009). However, this rapid decline slowed down in the 2000s for many reasons.

Countries and funding agencies shifted their commitment to other pressing health problems like HIV/AIDS. As a result of limited resources, the focus on FP programs was reduced (Kirk and Pillet 1998, Ezeh *et al.* 2009). Healthcare facilities also lacked the necessary resources to continue to provide much-needed FP services (Ezeh *et al.* 2009). As a result, 70 million women in this region have unintended pregnancies yearly, of which 45 million end in abortion that is often illegal (Glasier *et al.* 2006, Van Braeckel *et al.* 2012). Compared to other major regions of the world, fertility rates have remained among the highest in Sub-Saharan Africa. Admittedly, this is partly the result of a regional preference for more childbearing, but it is also a clear indication of a high unmet need (Westoff 2010). Recent estimates show that in several sub-Saharan African countries, the majority of contraceptive demand is unmet (Horton and Peterson 2012). Cleland suggests that maternal mortality would drop by 30%, if all the unmet need of the women in developing countries was met (Cleland *et al.* 2012). Therefore much more needs to be done, since among other problems, maternal morbidity and mortality remain high (Glasier *et al.* 2006, Friberg *et al.* 2010, Kinney *et al.* 2010). Healthcare services must be expanded if the Millennium Development Goals (MDGs) are to be reached in Sub-Saharan Africa (Friberg *et al.* 2010, Kinney *et al.* 2010).

1.1.1 Contraceptive use patterns among women

A large proportion of unwanted pregnancies are known to occur due to contraceptive discontinuation (Bradley *et al.* 2009b). Discontinuation of family planning has been linked to method choice (Steele *et al.* 1996, Williamson *et al.* 2009). Discontinuation rates from abandonment and switching are higher for easily discontinued methods such as traditional methods, condoms, oral contraceptives and injectables while discontinuation rates for

intervention-requiring methods such as IUDs and implants are lower (Curtis and Blanc 1997, Ali and Cleland 1999, Steele and Curtis 2003, UN Department of Economic and Social Affairs 2006, Bradley *et al.* 2009a, Ali and Cleland 2010). Some of the individual characteristics of women known to be associated with contraceptive discontinuation include being under 25 years old, lower parity and poor personal health (Rosenberg *et al.* 1995, Bradley *et al.* 2009a). Studies of the effects of environmental factors, such as the quality of FP services, on contraceptive discontinuation are inconclusive; some studies have shown that improved quality of FP services increases contraceptive uptake while other studies have not shown any significant improvement in contraceptive use associated with improved quality (Koenig *et al.* 1997, Steele *et al.* 1999, Leon 2003, RamaRao *et al.* 2003, Halpern *et al.* 2006, Do and Koenig 2007). On the other hand, the impacts of environmental factors, such as neighborhood types (formal/informal housing depending on whether the home is built on land allocated/not allocated for housing by the government) and household wealth, on contraceptive discontinuation have not been investigated.

Analysis of national-level data from various countries on discontinuation have shown that a fair proportion of women who discontinue contraceptive use eventually switch methods and resume use again (Ali and Cleland 2010). Some of the individual characteristics of the women who switch contraceptive methods rather than discontinue completely include higher education status and recent adoption of the last method they discontinued (Curtis and Blanc 1997, Barden-O'Fallon and Speizer 2011). An analysis of environmental factors on contraceptive switching patterns has produced mixed results; environmental factors, such as the existence of better family planning and counseling services, have not been conclusively associated with contraceptive switching patterns, possibly because high switching rates may

simply indicate the availability of multiple contraceptive methods in that particular setting (Jain 1989, Ping and Smith 1995, Steele and Diamond 1999, Blanc *et al.* 2002, Barden-O'Fallon and Speizer 2011). Furthermore, when comparing place of residence, a community-level characteristic, studies have shown that urban women were more likely to switch methods than stop completely as compared to rural women (Curtis and Blanc 1997, UN Department of Economic and Social Affairs 2006, Barden-O'Fallon and Speizer 2011). However, the impact of multiple environmental factors, such as neighborhood types and household wealth, on contraceptive switching patterns remain unknown. Hence, more information is needed on the impact of environmental factors on contraceptive discontinuation and switching among women. With the help of a carefully defined study, we have investigated the impact of environmental factors on women's contraceptive use patterns, *i.e.*, discontinuation and switching to a different method. Appendix 1.I displays the conceptual framework of the impact of environmental factors, *i.e.*, neighborhood types and household wealth, on women's contraceptive use patterns. Several individual characteristics identified in the literature are included in this framework as control variables. Our hypothesis is that after controlling for individual characteristics and city of residence, women living in poor households or in informal settlements are less likely to be current contraceptive users or switch contraceptive methods than rich women or those living in formal housing.

1.1.2 Contraceptive use among couples

Over the past two decades, there has been a growing trend towards recognizing that men have an important role to play in FP decision-making within a household. As a result, there is a growing body of research that has investigated the influence of men in family planning use within societies. A large body of literature from studies conducted worldwide

has generally compared the discordance of partners' reported current contraceptive use, *i.e.*, partners report different use. For instance, in a study of 23 countries using DHS couples' data, husbands reported higher contraceptive use than their wives, ranging from 2% more in Brazil to 150% more in Mali (Becker and Costenbader 2001). Another more recent study of data from six Sub-Saharan African (SSA) countries found agreement on contraceptive use to be only between 47 and 82% of couples, with husbands generally reporting higher levels of condom use, abstinence and pills and lower levels of IUD, injection and female sterilization (Becker et al. 2006). Lastly, in a couple study using Bangladesh DHS data, discordance in reporting condom use was 46%, of which about 32% could be explained by husbands reporting condom use when wives did not and 14% by wives reporting condom use when husbands did not (Islam et al. 2010). Notably, in the sub-Saharan African context, one explanation for inconsistent reporting could be the existence of multiple sexual partners such that individuals are potentially using different contraceptive methods with each partner (Becker and Costenbader 2001, Islam *et al.* 2010).

In an attempt to better understand factors affecting contraceptive use, few studies have tried to identify the impact of the couple's individual characteristics on contraceptive use. The educational level of both partners is one of the individual characteristics of couples that have been investigated; the findings of which have been mixed. For example, a study conducted in Nepal showed that a couple was more likely to use contraception if the husband was more educated; the wife's education did not have any effect on contraceptive use (Gubhaju 2009). On the other hand, another study including DHS data from fourteen countries showed that contraceptive use increased with a wife's educational level while the husband's education had less of an effect (Uchudi 2001). Furthermore, couples' religions and

ages have been shown to have an effect on FP use. Two Ghanaian studies showed that contraceptive use was higher among couples where there was a smaller age difference between spouses and the partners adhered to different religions (such as, Christian and Muslim) (Oheneba-Sakyi and Takyi 1997, Gyimah *et al.* 2008).

Besides individual-level characteristics, investigations of relationship-level characteristics have also been contradictory. In a large proportion of these studies, only data collected from the women are included; the opinions, views and characteristics of male partners are determined as perceived and reported by the women interviewed (Ezeh 1996, Kamau *et al.* 1996, Speizer 1999, Barden-O'Fallon and Speizer 2010). For example, studies conducted in several countries reported that the women often believe that their husbands generally disapprove of contraception (Ezeh 1996, Kamau *et al.* 1996, Speizer 1999), resulting in an environment of disagreement in which women lacked encouragement to use contraception and hence were unlikely to use FP to meet their own fertility desires (Kimuna and Adamchak 2001, Kraft *et al.* 2010). An Indonesian study found that women who reported that their husbands wanted more children than themselves were 58% less likely to use contraceptives than those who reported that their partners had similar desires to them (Barden-O'Fallon and Speizer 2010). Another study, based in Bangladesh, found that when spouses felt differently about having more children, the husbands' perceived preferences for a child determined the likelihood of a birth in the subsequent five-year follow-up period (Razzaque 1999). And finally, analyses conducted using the Kenya DHS data have shown that contraceptive prevalence is higher among women whose partners were perceived to approve of FP (39.2%) compared to women who did not perceive that their partners approved (23.2%) (Lasee and Becker 1997, Dodoo 1998). Hence, women's perceptions of

their partners' contraceptive preferences have an impact on contraceptive decision-making and pregnancy postponement. In order to compare the actual responses of both partners, couple-level data is needed.

The few studies that have asked men directly why they disapprove of contraception found that it is because of their preference for more children, particularly boys, with the hope that they can rely on them in old age (Isiugo-Abanihe 1994, Kamau *et al.* 1996, Bankole and Singh 1998, Odu *et al.* 2006, Okwor and Olaseha 2009, Wambui *et al.* 2009). Men who disapprove of contraception also desire shorter birth intervals than their wives, as exemplified by a review of studies from 28 countries and a recent analysis of DHS data using matched cohabiting couples from 10 countries in SSA (Bankole and Singh 1998, Wambui *et al.* 2009, Gebreselassie and Mishra 2011). These studies based primarily in Nigeria and in some rural communities of western Kenya found that men often disapprove of contraceptive use because of a fear of side-effects, a conflict with their religious beliefs and a perception that contraceptive use may hide infidelity.

Findings from various couple studies produced mixed results when determining the impact of fertility desires and better communication on contraceptive use. For example, national-level data from Kenya showed that women were more likely to use contraception if their husbands did not desire any more children (Dodoo 1998). On the other hand, analysis of national-level data from other countries showed that husbands' fertility preferences did not sway women's decisions to use contraception (Bankole and Singh 1998). Other evidence has shown that communication between spouses about fertility and contraception encourages contraceptive use resulting in smaller family sizes (Hardee-Cleveland 1992, Isiugo-Abanihe 1994, Lasee and Becker 1997, Bawah 2002, Azimi and Atiya 2003, Klomegah 2006,

Ogunjuyigbe *et al.* 2009, Yue *et al.* 2010, Link 2011). In light of the above contradictory findings, more research is needed to identify the effect of various relationship-level characteristics on couples' decisions to use contraception.

When determining the impact of environmental factors on contraceptive use, our review of the literature shows that among studies using national-level data of women, household wealth has an impact on contraceptive use, *i.e.*, women living in poor households are less likely to use contraception compared to women living in rich households (Creanga et al. 2011). The influence of environmental factors on couples' use remains unknown. Furthermore, the effect of other environmental factors, such as neighborhood type, has yet to be investigated. Hence, this study looks at the potential effect of relationship-level characteristics on couples' contraceptive use after controlling for individual partner's characteristics and environmental factors, as shown in Appendix 1.II. Our hypothesis is that after controlling for individual and environmental factors, couples living in poor households or in informal settlements are less likely to be using contraception than couples living in rich homes or formal housing.

1.2 The need for urban data in Africa

Previous studies of contraceptive use in Africa have primarily focused either on country-level data or on rural areas resulting in an incomplete understanding of the situation in urban areas, especially city slums. Africa is urbanizing faster than other regions of the world; it has progressed to such an extent that in 2008 more than 40% of the population resided in urban areas, and it is estimated that between the years 2000 and 2030, the African urban population will double again (UNFPA 2007, Montgomery 2008). This urbanization is

occurring during a period of relative economic stagnation; the World Bank and others have stated that poverty and income inequality in Africa are increasing with almost half of Africans living on a dollar a day or less (Firebaugh and Gosling 2004, CPRC 2008). This economic deprivation has resulted in the rapid growth of impoverished slum settlements (Fay and Opal 2000, Montgomery and Hewett 2004, United Nations 2005). These slums are often referred to as "informal settlements" to reflect governmental non-recognition and neglect, and reflect the limited access of their residents to health and educational services as well as basic amenities such as water, electricity, adequate sanitation, garbage and sewage disposal (Matrix Development Consultants 1993). Unlike other parts of the world, some of these "informal settlements" are more dire than rural areas when measured by percentage unemployment, cost of living, poverty, school outcomes, access to health and related facilities (Brockerhoff and Brennan 1998, Montgomery 2008). Slums typically possess the most meager of healthcare services; poor women, especially those in slums, have the least amount of access to healthcare services, often less than women living in rural areas (Gould 1998, APHRC and World Bank 2006, Fotso 2007, Fotso et al. 2008). Thus there is a need to understand the FP situation in urban settings to determine if the urban poor are having their FP needs met.

1.3 Country setting

Kenya has had a robust family planning program since the 1950s. Between the late 1970s and late 1990s, the fertility rate in Kenya declined from 8.1 to 4.7 (Bongaarts 2006, Speizer 2006, Kenya National Bureau of Statistics (KNBS) and ICF Macro 2010). Part of this decline was due to an increased use of modern contraception arising from improved education of girls, economic development, and the government's active promotion of FP through health services (Blacker *et al.* 2005, Omariba 2006). The

Map of Kenya
Source: www.worldtraderef.com

fertility rate was expected to continue to decline in the 21st century, but it failed to do so, primarily due to a reduced political commitment at the national and international levels, resulting in reduced spending on media campaigns and FP programs (Kirk and Pillet 1998, Ikamari 2000, Cleland *et al.* 2006, Speizer 2006, Crichton 2008). Consequently, FP programs failed to meet the contraceptive needs of Kenyan couples and the 2003 Kenya Demographic and Health Survey (DHS) showed deteriorating indicators (Ikamari 2000, Crichton 2008). In response to strong FP advocacy, the Kenyan government has again prioritized family planning, and the environment is now optimal for renewed FP programs (Crichton 2008). As a result, after over a decade of stagnant indicators, the rate of overall contraceptive prevalence rate rose from 39% in 2003 to 46% in 2008-2009 (Kenya National

Bureau of Statistics (KNBS) and ICF Macro 2010). The hope is that with increased funding support from international donors as well as greater political commitment to address the population's FP needs, contraceptive uptake will increase to address the unmet need of the population (Bill & Melinda Gates Foundation 2012).

In Kenya, 51.1% of all sexually active women aged 15-49 are using contraceptives; while 44.6% are using modern contraceptive methods (Kenya National Bureau of Statistics (KNBS) and ICF Macro 2010). The most commonly used methods are injectables (24.0%) and pills (8.3%). This is followed by any traditional method (6.5%) and female sterilization (4.8%). Male condom use only accounts for 3.4%. The distribution of contraceptive use and method mix varies greatly between regions. Despite this prevalence of use, 25.7% of married women have an unmet need for contraception; 12.9% for spacing purposes and 12.8% for limiting. Further, of urban women aged 15-49, one-fifth (20.2%) have an unmet need for contraception; about half for spacing (10.7%) childbearing and the other half for limiting (9.5%) (Kenya National Bureau of Statistics (KNBS) and ICF Macro 2010). Discontinuation of contraceptive methods is one of the factors contributing to unwanted pregnancies (Bradley et al. 2009b). Recent data from Kenya suggest that 36% of all women who begin using a contraceptive method discontinue within twelve months (Kenya National Bureau of Statistics (KNBS) and ICF Macro 2010). A good proportion of these women resume contraceptive use by switching to a different method; the methods they switch to and the reasons for switching remain unclear.

By 2030, the UN estimates that the majority of Africans will live in urban areas (United Nations (UN) 2006). This would be manageable if it was not for the fact that basic infrastructure and employment are not keeping up with this growing urban population.

Hence, informal settlements and urban slums have sprung up all across African cities (Cohen 2004). According to the 2009 census, Kenya had a population of 38.6 million people, growing at 2.5% per year (Kenya National Bureau of Statistics (KNBS) 2010, Central Intelligence Agency (CIA) 2011). The total urban population is 32.2%, with an annual rate of urbanization of 4.2%. A startling phenomenon however is that the urban poor population is growing exponentially, doubling for instance in Nairobi, Kenya in just five years, from 1992-1997 (Central Bureau of Statistics (CBS) Ministry of Planning and National Development 2000). As a result, a large proportion of the city's population lives in slums covering only 5% of the land area (Matrix Development Consultants 1993).

According to the latest Kenya Demographic and Health Survey (DHS), the total fertility rate (TFR) in urban areas is 2.9 children per woman (Kenya National Bureau of Statistics (KNBS) and ICF Macro 2010). The fertility rate and the CPR have not changed much since the late 1990s. Despite residing in urban areas where basic health facilities exist, the urban poor typically live in slums and have the least access to healthcare services, which is surprisingly often worse than for those living in rural areas (Gould 1998, APHRC and World Bank 2006, Fotso 2007, Fotso *et al.* 2008). Generational poverty is cyclical and self-feeding in nature; the cycle is difficult to break but must be broken (Fotso et al. 2009). It is therefore clear that in order to break the cycle of poverty and decrease fertility rates in this most vulnerable population of the urban poor, programs need to identify this group's needs and target interventions to improve their quality of life (Fotso et al. 2009). Although modern contraceptive use has increased slightly over the past five years, the level of use amongst the poor is still abysmally low (Gakidou and Vayena 2007, Gillespie 2007). Hence, there is a need to identify the factors preventing contraceptive uptake among the urban poor. This will

further help FP programs address these challenges in a culturally appropriate manner and bring services to the populations most in need (Robey *et al.* 1996, Foreit and Futures Group 2011).

1.4 Specific aims and hypotheses

This dissertation uses baseline population-level data collected for the Measurement, Learning & Evaluation Project across three cities of Kenya, namely, Nairobi, Mombasa and Kisumu. It applies bivariate and multivariate analyses to determine the impacts of neighborhood types (informal/formal) and household wealth (poor/intermediate/rich) on contraceptive use patterns among Kenya's urban women. Furthermore, it outlines the effect of couple characteristics, such as fertility desires and communication, on contraceptive use and intention to use among urban couples in Kenya. This dissertation conducts two studies to test the specific aims and hypotheses.

The specific aims of the first study are as follows:

Overall Aim 1. To estimate the association of neighborhood type and household wealth on contraceptive use patterns among women in urban Kenya

Aim 1.1. Among all women, to estimate the association of neighborhood type and household wealth on women's contraceptive use patterns, *i.e.*, current, former, and never users.

Hypothesis 1.1.1. Women living in informal housing are more likely to be never users than current/former users as compared to women living in formal housing.

Hypothesis 1.1.2. Women from poor and intermediate wealth households are more likely to be never users than current/former users as compared to rich women.

Aim 1.2. Among current users, to estimate the association of neighborhood type and household wealth on women's use patterns, *i.e.*, using first method, switched from a less effective to a more effective method, and switched from a more effective to a less effective method.

Hypothesis 1.2.1. Women living in informal housing are more likely to be using their first method than to have switched methods as compared to women living in formal housing.

Hypothesis 1.2.2. Women from poor and intermediate wealth households are more likely to be using their first method than to have switched methods as compared to rich women.

Aim 1.3. To examine the reasons women give for switching methods, by neighborhood type and household wealth.

Hypothesis 1.3.1. Women living in informal housing or poor and intermediate neighborhood are more likely to state cost- and access-related reasons as well as opposition to use as reasons for switching.

Hypothesis 1.3.2. Women living in informal housing or poor and intermediate neighborhood are less likely to state method-related reasons and recommendations from others as reasons for switching.

Overall Aim 2. To estimate the association of couple/relationship-level characteristics on current contraceptive use among women and their married/cohabiting male partners in urban Kenya.

Aim 2.1. To determine the association of couple characteristics on current contraceptive use among couples.

Hypothesis 2.1.1. Couples who have a desire for a smaller ideal family size are more likely to use contraceptives than couples with a desire for a larger family size.

Hypothesis. 2.1.2. Couples where both partners report communicating with each other about the desired number of children are more likely to use contraceptives than couples who do not communicate with each other.

Hypothesis. 2.1.3. Couples where both partners report communicating with each other about family planning use are more likely to use contraceptives than couples who do not report communicating with each other.

Aim 2.2. To determine the association of couple characteristics with intention to use contraception among couples currently not using family planning.

Hypothesis 2.2.1. Among non-users, couples who have a desire for a smaller ideal family size are more likely to intend to use contraceptives than couples with a desire for a larger family size.

Hypothesis. 2.2.2. Among non-users, couples where both partners report communicating with each other about the desired number of children are more likely to intend to use contraceptives than couples who do not report communicating with each other.

Hypothesis. 2.2.3. Among non-users, couples where both partners report communicating with each other about family planning use are more likely to intend to use contraceptives than couples who do not report communicating with each other.

Chapter 2: Impacts of Neighborhood Type and Household Wealth on Contraceptive Use Patterns among Urban Women in Kenya

2.1 Background

At the present time, 220 million women in the developing world have an unmet need for contraception to stop or postpone childbearing, with over 40 million of them living in sub-Saharan Africa alone (Carr *et al.* 2012, Habumuremyi and Zenawi 2012, Horton and Peterson 2012). As a result, every year 70 million women living in sub-Saharan Africa end up having unintended pregnancies, of which 45 million end in abortion (Glasier *et al.* 2006, Van Braeckel *et al.* 2012). Hence, the need to increase contraceptive uptake and ensure its continued use remains of paramount importance today. It is not only the basic human right of every woman to have the number of children she desires and can take care of, but reducing unintended pregnancies will in turn reduce a nation's maternal and infant morbidity and mortality (Canning and Schultz 2012, Cleland *et al.* 2012, Cottingham *et al.* 2012). Analyses from 42 countries in sub-Saharan Africa (SSA) have shown that the majority of unintended pregnancies occur due to high contraceptive discontinuation rates and incorrect use of short-term hormonal methods such as pills and injectables (Blanc *et al.* 2002, Cleland and Ali 2004, Creanga *et al.* 2007, Hubacher *et al.* 2008, Bradley *et al.* 2009a). Other studies have found that one-third of ever users discontinue contraception even though they do not wish to get pregnant (Westoff 2006, Bitzer 2009). Hence, identifying ways to reduce discontinuation

and unintended pregnancies is essential to reducing the number of mistimed and unwanted pregnancies in SSA.

Notably, 7-20% of discontinuation occurs due to a reduced need for FP arising from a desire to become pregnant, infertility, or loss of a partner from divorce, separation, or death (Blanc et al. 2002). However, other reasons for discontinuation include side-effects and health concerns (Ali and Cleland 1995, Rosenberg *et al.* 1995, Khan 2003). Some of the sociodemographic factors associated with higher contraceptive discontinuation rates include lower parity and younger age (under 25) (Bradley et al. 2009a). Other factors include multiple sexual partners, poor personal health and histories of previous abortion (Rosenberg et al. 1995). In contrast, there have been mixed results on the relationships between some environmental/service delivery factors, such as FP services quality and contraceptive discontinuation; for example, some studies have shown that high quality services are associated with less discontinuation while others have shown no significant effect between the two (Do and Koenig 2007, Leite and Gupta 2007). Discontinuation has also been found to be associated with distance from health facilities, while contact with FP outreach workers in other settings has not yielded declines in discontinuation (Koenig *et al.* 1997, Steele *et al.* 1999, Leon 2003, RamaRao *et al.* 2003, Halpern *et al.* 2006, Do and Koenig 2007). The impacts of other environmental factors, such as neighborhood type or household wealth, on contraceptive discontinuation remain uninvestigated. The hypothesis is that women living in informal settlements or in poor households are more likely to be never users than current or former users. This may occur due to several reasons including a desire for more children, lack of knowledge on where to access methods, or limited access to family planning (Ali and Cleland 1995, Ping and Smith 1995, Steele and Diamond 1999, Blanc *et al.* 2002, Bradley *et*

al. 2009a). More research is therefore critical for assessing and reducing families' unmet needs, as well as determining the impact of environmental factors on contraceptive uptake in varying contexts.

The evidence suggests that switching to a different contraceptive method after discontinuation is not uncommon. For example, data from 19 countries showed that 35% of women who discontinued oral contraceptives switched to another method within 3 months (Ali and Cleland 2010). Notably, women with higher levels of education and socioeconomic statuses were more likely to switch than discontinue completely (Curtis and Blanc 1997, UN Department of Economic and Social Affairs 2006). Similarly, longitudinal data analysis from Honduras revealed that women were more likely to switch than completely stop a method if they had communicated with their partner about discontinuing, sought help for side-effects or had only recently adopted the last method they just discontinued (Barden-O'Fallon and Speizer 2011). Analyses that examine place of residence, a community-level characteristic, have shown that urban women were more likely to switch methods than stop completely as compared to rural women (Curtis and Blanc 1997, UN Department of Economic and Social Affairs 2006, Barden-O'Fallon and Speizer 2011). Greater clarity is still needed on the relative importance of environmental factors, such as neighborhood types and household wealth, in regard to contraceptive switching. Our hypothesis is that women living in informal settlements or in poor households are more likely to use the same method of contraception than switch to a different method. This may occur due to several reasons such as a lack of knowledge about other methods, comfort using the same method, lack of desire to seek a different method to better suit their needs, difficulty accessing other contraceptive methods or limited availability of a wide range of methods.

In light of the above findings, in this analysis, we sought to determine the impact of environmental factors, *i.e.*, neighborhood type (informal/formal settlements) and household wealth (possession of assets) on contraceptive use. Analysis of Demographic and Health Survey (DHS) data from three SSA countries showed that wealth is confounded by place of residence; hence, the report recommended that the effects of wealth and place of residence need to be investigated separately (Foreit and Group 2011). With the aid of a carefully designed survey, we thus compared contraceptive usage between urban residents living in informal settlements vs. those living in formal housing, and the poorest vs. richest urban populations, and have been able to provide new insights. Since discontinuation due to method failure is already well studied (Curtis and Blanc 1997), we focused on the impact of poverty on discontinuation due to abandonment or switching, taking into account individual and behavioral characteristics. Furthermore, we elucidate fertility and non-fertility-related reasons for switching to the most recent contraceptive method.

2.1.1 Country context

In Kenya, the location of this study, fertility rates have stalled for over a decade, at a national average of around 4.7 children per woman (Bongaarts 2006, Speizer 2006). Despite a growing desire for smaller families, Kenya's population has been growing at 2.5% per year (KNBS and Macro 2010, CIA 2011). In urban centers, despite the availability of family planning services, urban fertility rates are high and there remains a need for family planning (Fotso et al. 2008). According to the latest Kenya Demographic and Health Survey (DHS), the total fertility rate (TFR) in urban areas is 2.9 children per woman (KNBS and Macro 2010). In addition, the contraceptive prevalence rate (CPR) among urban women is 53.1% and that of modern methods is 46.6%, with much regional variation (KNBS and Macro

2010). Approximately 20.2% of currently married urban Kenyan women aged 15-49 have an unmet need for contraception, with just over half desiring spacing and the remainder desiring limiting (KNBS and Macro 2010). Recent data suggest that 36% of all Kenyan women initiating a contraceptive method discontinue within twelve months (KNBS and Macro 2010). The proportion of women who switch to other methods, the new methods they adopt and the reasons for switching remain poorly studied.

Almost one-third of Kenyans live in urban areas with an annual rate of urbanization of 4.2% (KNBS and Macro 2010, CIA 2011). A growing number of urban dwellers live in informal settlements referred to as slums, where space is limited resulting in cramped housing and living quarters (Matrix Development Consultants 1993). In addition, slum dwellers have less access to healthcare services than residents of rural areas (Gould 1998, APHRC and Bank 2006, Fotso 2007, Fotso *et al.* 2008). As a result, a quarter to a third of the poorest women cannot access family planning and have an unmet need for family planning (Habumuremyi and Zenawi 2012). Providing adequate FP services to the urban poor would help address their unmet need and improve their overall quality of life (Fotso et al. 2009). Couples living in slums have greater need for FP than the urban average despite living in cities with available services (Fotso et al. 2008). Hence, with the aid of a carefully designed survey, we set out to determine the impact of poverty on contraceptive use and switching patterns in urban Kenya.

2.2 Methods

To study the impact of poverty on contraceptive use patterns among women in urban Kenya, we used quantitative population-based survey data from the Measurement, Learning

21

& Evaluation (MLE) Project. The MLE Project is designed to evaluate interventions that increase contraceptive prevalence among urban populations, particularly the urban poor, in Kenya, Nigeria, Senegal and Uttar Pradesh, India. The Urban Reproductive Health Initiative (URHI), funded by the Bill & Melinda Gates Foundation, is the intervention arm evaluated by the MLE project. Tupange, meaning "let's plan" in Kiswahili, is the 5-year URHI implementation project designed to assist the Kenyan government to reestablish urban FP programs.

The MLE Project uses a quasi-experimental design and multiple data collection approaches, such as population-based surveys of men and women along with facility-level data. In Kenya, baseline population-based surveys were conducted from September through November 2010 across the cities of Nairobi, Mombasa, Kisumu, Machakos and Kakamega. Data from the latter two cities were dropped from this analysis because their Primary Sampling Units (PSUs) had not been classified into formal and informal areas, a primary independent variable. Before conducting the surveys, the 2009 census sampling frames were collected from the Kenyan government. The census sampling frames for Nairobi, Mombasa and Kisumu were used to classify all PSUs as predominantly formal or informal; all households in a PSU were classified as informal if built on land unallocated for housing (unzoned) and formal if built on land allocated for housing. A two-stage sampling method was used to select and interview representative samples of women from each city. In the first stage, random samples of PSUs were selected; half from formal settlements and the other half from informal settlements. In the second stage, random samples of 30 households from each PSU were chosen for interviewing. All eligible women aged 15-49 within those selected households were invited to participate in pencil-and-paper interviewer-led surveys of

sociodemographic characteristics, reproductive health history, and FP use. Household questionnaires were also administered to a member of each household; these provided information on the household assets used to create the wealth index.

A total of 5,774 women were interviewed in the three study cities. From this sample, 596 were excluded as they had never been sexually active. Another 90 women were dropped as they lacked knowledge of any FP method and did not answer questions related to FP. Lastly, 2 women were dropped as they were missing data on household wealth, a key variable of interest. Ultimately, 5086 women were included. Population weights were applied to the sample which produced an adequate representation of 4968 women across the three included cities.

2.2.1 Variables

The primary outcome of interest, as reported by the woman, related to the use of any modern/traditional contraceptives, divided into three categories: current users of any modern or traditional method, former users of any modern or traditional method and never users. Current users were further categorized into first method users, those who had switched from the last/previous less effective method to a current more effective method and those who had switched from the last/previous more effective method to a current less effective method. These switching patterns are shown in Appendix 2.I. Switching from a less to a more effective method included switching from a traditional method (such as standard days method, withdrawal) to a modern method (such as spermicide, condom, pill, injectable, IUD, implant, sterilization); any method to sterilization; a barrier method or Lactational Amenorrhea Method (LAM) to a hormonal method; pills to injectables, IUD or implant; injectables to IUD or implant; and IUD to implant (Bradley et al. 2009a). On the other hand,

switching from a more to a less effective method included changing from a modern to a traditional method; hormonal to a barrier; implants to pills or injectables or IUD; IUD to pills or injectables; and injectables to pills (Bradley et al. 2009a).

In addition to the above categories, current and former contraceptive method users were categorized into users of traditional, short-term and long-term methods; traditional methods included natural methods (such as standard days, withdrawal) and LAM; short-term methods included female/male condoms, daily pills, emergency pills and injectables, and; the long-term methods comprised of the IUD, implant and female/male sterilization.

The primary independent variables of interest were neighborhood type and household wealth, with neighborhood type capturing place-based poverty and household wealth being an indicator of asset-based poverty (Rutstein and Johnson 2004). Based on census data from the Kenya National Bureau of Statistics, the neighborhood type was defined as informal or formal housing. All households in a PSU were classified as informal if built on land unallocated for housing (unzoned) and formal if built on land allocated for housing. Household wealth was created by constructing a linear index from asset ownership indicators using principal components analysis of data from the household questionnaire (Filmer and Pritchett 2001). We used 21 household assets[1] to generate the wealth index variable for the three cities combined. Using this index, the households were divided into tertiles with one-third of the population in each tertile to create three categories: poor (lowest wealth tertile), intermediate (middle wealth tertile) and rich (highest wealth tertile).

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[1] The 21 assets included owning a vehicle, computer, TV, bicycle, clock, refrigerator, electric stove, mosquito net, VCR, iron, sofa, torch; having domestic help; the number of rooms in the house; whether the house has a separate kitchen, electricity, toilet, home insurance, and the types of floors and walls.

A third indicator of poverty was generated based on three household amenities (electricity, water supply and toilets). This variable was previously developed to study the impact of slum residence on sexual behavior in urban African cities (Zulu *et al.* 2002, Dodoo *et al.* 2007, Greif *et al.* 2011). In Zulu and others' original analyses, a household was defined as a "slum" if it lacked electricity, water supply and toilets, "intermediate" if it had one/two of the amenities and a "non-slum" if it had all three. In our analysis, we modified Zulu's categories slightly because the slum populations have grown since the 1998 original analyses and most households lacked access to all three amenities. Hence in our analysis, we defined a household as being a slum residence if it lacked electricity, piped water supply and indoor toilets; intermediate if it had one of the amenities, and non-slum if it had two or three amenities (Zulu et al. 2002).

Other independent variables of interest were also included in the analysis as control variables. As described in Table 2.1, these included the city of residence, the woman's age (divided into 5-year categories), marital status, religion, education levels, the number of living children (0, 1, 2, or 3+), employment in the prior 12 months for cash, migration to the city and whether she had heard FP radio messages in the prior 12 months.

2.2.2 Analysis plan

Bivariate and descriptive analyses were conducted to determine the effects of neighborhood type and household wealth on contraceptive use outcomes. The significance of each bivariate analysis was tested at a significance level of 0.05. The dependent variables of choice, *i.e.*, categories of contraceptive use among all women and current users, consisted of responses with more than 2 nominal categories. The categories are nominal as they could not be meaningfully ordered. Hence, multinomial logistic regression models were used to

25

determine the association between neighborhood type and household wealth and women's contraceptive use patterns (Cameron and Trivedi 2005, Hamilton 2009). An assumption specific to the multinomial logistic regression model is the independence of irrelevant alternatives (IIA). According to the IIA assumption, the odds of a participant selecting one outcome versus another to the dependent variable, *i.e.*, contraceptive use patterns, is independent of any other irrelevant factor. In other words, the IIA assumption implies that adding another category to the dependent variables of interest does not affect the relative odds between the two/more categories considered by each participant. We tested both our models using the Hausman test, the Likelihood Ratio (LR) test developed by Small and Hsiao, and the K Wald test in Stata (Hausman and McFadden 1984, Small and Hasiao 1985, Freese and Long 2000). Both our models held the IIA assumption for all three tests. In addition, bivariate analyses were performed to determine the differences in reasons for switching among women from different types of neighborhoods and household wealth. We then repeated the multivariate analyses to test the new indicator of poverty based on slum residence classified as slum, intermediate and non-slum

All analyses were conducted using Stata 12 software (Stata Corp 2011). Ethical clearance for the primary data collection was obtained from the University of North Carolina at Chapel Hill Institutional Review Board (UNC IRB) and the Kenya Medical Research Institute (KEMRI). Furthermore, the UNC IRB exempted the secondary data analysis done for this study.

2.3 Results

After city-level population weights were applied, 4968 women aged 15-49 represented the urban women from the three cities with a history of at least one sexual encounter and knowledge of at least one contraceptive method.

2.3.1 Characteristics of the women

As noted in Table 2.1, over three-quarters (79%) of the study sample lived in formal settlements while the rest lived in informal settlements. An overwhelming majority (90%) of rich people (highest wealth tertile) lived in formal settlements. On the other hand, 66% of poor people (lowest wealth tertile) lived in formal housing. Interestingly, of the informal city dwellers, 60% were poor, 21% lived in intermediate wealth housing and the remaining 19% were rich. Three-quarters of the population lived in Nairobi, 19% lived in Mombasa and the remaining 6% lived in Kisumu. Among informal housing dwellers, 75% were from Nairobi, 7% from Mombasa and 18% from Kisumu. Three-quarters of women living in formal housing were in Nairobi, 22% in Mombasa and only 2% in Kisumu.

Table 2.1 also shows the distribution of the women's other individual characteristics. Most (70%) of the women were between 20-34 years old, with 54% of all women 20-29 years of age. Two-thirds (64%) of the women were married; across neighborhood types, 69% of informal settlement dwellers and 62% of formal settlement dwellers were married or cohabiting in the same household with a male partner. A quarter (24%) of all the women had never been married; across neighborhood types, 19% of informal settlement dwellers and 26% of formal settlement dwellers had never married. The overwhelming majority (89%) of women were Christian, with over a quarter of them Catholic and the rest Protestant/other. More than a quarter (27%) of the women had completed primary education and another 38%

had completed secondary education. A quarter of the poor women had not completed primary school compared to only 9% of the rich. On the other hand, one-third (36%) of poor women had received at least some secondary education in contrast to almost three-quarters (75%) of rich women. Table 2.1 also shows the distribution of women's parity; one-fifth of women (22%) had no children, with more of the rich having none (29% of all rich women) compared to the poor (18% of all poor women). Almost one-third (31%) of the women had one child while another 23% had two children. Larger percentages (29%) of poor women had three or more children compared to the rich (21%). Two-thirds of the women were employed for cash in the last 12 months. A higher percentage of the rich women were employed for cash compared to the poor (72% vs. 59%). About 14% of the population had migrated from a rural area to the three cities within the last 10 years while 86% had lived in urban areas for over 10 years. Furthermore, 60% of the women had heard a FP message on the radio in the past 12 months, with a higher percentage (63%) of the rich women having done so than the poor women (55%). In summary, the poor urban women generally had more children, were less likely to be employed, and had heard fewer FP messages recently. These data, taken together, indicate that when distinctions were observed, they were more often by the wealth groups than by the neighborhood type.

Next we examined contraceptive method prevalence and switching (Table 2.2). Around half (52%) the women are current contraceptive users, 32% are former users and 16% are never users. The difference in contraceptive prevalence is statistically significant (p=0.002) across wealth categories with the poor less likely to have been current users (44% vs. 52%) and more likely to have been never users (21% vs. 15%) compared to the rich. No significant difference was found by neighborhood type. Of the 2582 current contraceptive

users, 54% were using their first method while the rest had switched at least one method in the past. More than a quarter (28%) of current users had switched from a previous less to a current more effective method while the remaining 18% had switched from a previous more to a current less effective method. Poor women were significantly more likely to be first-time users (p=0.025); no difference was found by neighborhood type group. Among the current users, 14% were using long-term/permanent methods, over one-third (38%) were using injectables, a quarter (24%) were using pills, 15% were using condoms and 10% were using traditional methods of contraception. The distribution of current contraceptive methods varied by neighborhood type and household wealth and this difference was statistically significant. Women living in formal housing or who were from rich households were more likely to be using long-term/permanent methods, pills and condoms. On the other hand, women from informal households or poor women were more likely to be using injectables than women living in formal housing or rich women, respectively. When asked about the previous method they were using, 7% of current users stated that they had used a long-term method, another one-third (30%) injectables, 38% had been using pills, 14% condoms and another 12% had switched from using a traditional method. As elucidated in Appendix 2.II, among the 12% of current users who had previously used a traditional method, 85% had switched to a short-term method and another 11% to long-term/permanent methods. Of the 82% of current users who were previously using a short-term modern contraceptive method, 11% were currently using a traditional method while 20% were currently using a long-term contraceptive method. Furthermore, 10% of the women previously using a long-term method switched to using traditional methods and 52% of them switched to a short-term method.

2.3.2 Multivariate analyses

We next used multinomial logistic regression to assess the association between neighborhood type (informal/formal) and household wealth (poor/intermediate/rich) on contraceptive use, adjusting for clustering at the PSU level. As presented in Table 2.3, we ran two multinomial logistic regression models to determine the impact of poverty on current contraceptive use: Model 1 includes neighborhood type and household wealth controlling for city of residence while Model 2 included additional controls for age, marital status, religion, education, number of living children, employment in the prior 12 months, rural-urban migration and hearing of FP messages on the radio in the prior 12 months. No significant association was found between neighborhood type and being a current, former or never user. Conversely, across both models, poor women were significantly less likely to be current users or former users than never users as compared to rich women. They were also less likely to be current users than former users. Hence, poor women were less likely to have ever used contraception than rich women. Based on these findings, we calculated the predicted probability of current contraceptive use for the woman with the most common characteristics within the population. We used the regression outputs from Model 2 to compare contraceptive use across neighborhood type and household wealth, as noted in Figure 2.1. Not surprisingly, keeping all other variables constant, we see that the probability of using contraceptives did not vary much by neighborhood type. However, the poor had a 62% probability of being current users while the rich had a 67% probability. On the other hand, the poor had a higher predicted probability of being former/never users than the rich. Hence, the probability of contraceptive use is impacted much more by household wealth than neighborhood type.

We next shifted our attention to the association between neighborhood type and household wealth on switching methods among current contraceptive users. Table 2.4 presents multinomial logistic regression outputs which show no significant difference between neighborhood type and being a first method user or method-switcher. Among current contraceptive users, the women from poor and intermediate wealth households were more likely to be first method users than to have switched from a more to a less effective or from a less to a more effective method compared to the rich. We further compared the predicted probability of switching methods among current contraceptive users in relation to neighborhood type and household wealth, using Model 2. As shown in Figure 2.2, keeping all other characteristics constant, the probability of using the first method or switching didn't vary much across neighborhood types; current contraceptive users in informal housing had a 43% chance of currently using their first method as compared to a slightly lower predicted probability of 41% among formal housing dwellers. Across wealth tertiles, 50% of the poor were using their first method, less so in intermediate (49%) and rich (41%) households. On the other hand, the predicted probability of switching methods was higher among wealthier women. For example, the probability of switching from a less to a more effective method among the poor women was 34% while it was 39% among the rich. Here, again, we see bigger differences when comparing wealth categories than formal vs. informal housing.

We repeated multivariate analyses for the new housing variable defining urban slum, intermediate and non-slum residence based on availability of electricity, water and a toilet within the household. Approximately 27% of homes are termed slum dwellings lacking the household amenities of electricity, piped water and an indoor toilet; one-third (33%) are categorized as intermediate as they have one amenity; and the remaining 39% have at least

31

two household amenities and are defined as non-slum housing (as shown in Appendix 2.III).

Table 2.5 presents the multinomial logistic regression coefficients for the analysis of housing type on women's current contraceptive use. Across both models, slum dwellers were less likely to be current or former users than never users as compared to women from non-slum housing. They were also less likely to be former users than never users as compared to women living in non-slum housing. Based on these findings, we calculated the predicted probability of current contraceptive use across slum residences. Women living in slum households have a lower (62%) probability of being current users than non-slum dwellers (67%). On the other hand, slum dwellers have a higher probability of being former/never users compared to rich women.

Next, we tested the effect of housing type on current contraceptive use patterns among current users. As shown in Table 2.6, both models show that slum dwellers are more likely to be using their first method than to have switched methods, *i.e.*, from a less to a more effective or from a more to a less effective method. Based on predicted probabilities, as shown in Figure 2.4, we see that slum and intermediate slum dwellers are more likely to be using their first method than non-slum dwellers.

2.3.3 Reasons for switching

Current contraceptive users who had used a different method prior to the current method were asked the reasons they had switched, characterized as fertility-, method-, cost- and access-related, partner opposition, recommendations by others and other reasons. Fertility-related reasons were: method failed/got pregnant, lack of sexual urge, infrequent/no sex (such as, due to loss of partner/divorce/separation), more frequent sex, stopped breastfeeding, menopause/hysterectomy. Method-related reasons were: created menstrual

problem, created health problem, inconvenient to use, gained weight, lost weight, disliked

method, wanted a more effective method, wanted to try the method, or experienced a lack of

privacy. Women were assigned to the category "other reasons" if they did not give an

explanation or stated other reasons such as hearing on the radio about the new method. Some

women gave multiple reasons. As shown in Table 2.7, of the 733 current users who had

switched from a less to a more effective method, 15% cited fertility-related reasons for

switching and 85% gave method-related reasons; 3% cited cost- and access-related issues,

6% said that their partners opposed the previously used method, another 5% were advised to

switch to the current method by others and 18% cited other reasons. When comparing

neighborhood types, women living in formal settlements who had switched from a previous

less effective to a current more effective method were more likely to cite fertility-related

reasons for switching compared to women from informal housing (8% versus 17%). Across

household wealth, method-related reasons and partner opposition were more often cited by

women living in poor and intermediate housing than rich women. Furthermore, they were

less likely to cite recommendations from others than rich women. Among the other group of

466 women who switched from a more to a less effective method, 13% cited fertility-related

reasons, 87% gave method-related reasons, and 4% cited partner opposition. Across

neighborhood types, 1% of informal dwellers cited partner opposition as a reason for

switching compared to 4% of formal housing dwellers. When comparing reasons for

switching by household wealth, women from poor and intermediate wealth homes were more

likely to cite method-related reasons than rich women. We further compared the reasons for

switching by the categories of methods women had switched from, *i.e.*, traditional, short-

term and long-term methods. As seen in Appendix 2.IV, current users were more likely to

have switched from a less effective traditional method to a more effective short-term method due to fertility-related reasons, such as the presence of a partner. On the other hand, current users were more likely to switch from a short-term to a long-term method if recommended by others, as compared to other switching patterns. When comparing the switching patterns of women who had switched from a more to a less effective method, we see that current users were more likely to switch from a short-term to a traditional method due to fertility-related reasons, such as the partner's absence. They also switched from a long-term to a short-term method if recommended by others, such as from their family members and friends. Hence, we note that current users switched contraceptive methods for many reasons.

2.4 Discussion

In this study, we focused on determining the impact of poverty on contraceptive use among the under-studied population of urban women in three Kenyan cities. We used two separate indicators of poverty, place-based poverty denoted by neighborhood type (informal/formal) and asset-based poverty categorized by household wealth (poor/intermediate/rich). Previously, using wealth indices derived from household assets, investigators analyzed national-level DHS data from 55 countries and found that modern contraceptive use has increased in the developing world while uptake among the poor remains low (Clements and Madise 2004, Gakidou and Vayena 2007, Gillespie 2007, Ezeh *et al.* 2009). Our research focused on ascertaining whether the urban poor are less likely to use contraception than the urban rich by determining the separate effects of household wealth and neighborhood type as indicators of poverty on contraceptive use. In addition, we determined the impact of the new slum variable (slum/intermediate/non-slum), as developed

by Zulu and colleagues on contraceptive use patterns among urban Kenyan women. We used two indicators to measure contraceptive use among women, one indicator including all women categorized as current/former/never users and another indicator specific to current contraceptive users who were further classified as using their first method, those who had switched from a less to a more effective method and vice versa. Finally, our study interviewed a large representative sample of women across three Kenyan major urban centers.

Bivariate analyses revealed that women from rich households were older, more educated, employed and listened to FP messages on the radio more frequently than poorer women. Furthermore, the rich were more likely to be current users than the poor (52% vs. 44%). Among current users, rich women were more likely to have switched contraceptive methods when compared to women from poor and intermediate wealth households. The association between FP use and wealth groups remained the same after controlling for the above-mentioned characteristics, such as city, age, and education. Therefore, our analysis shows that rich women are more likely to use contraception and switch methods. These findings support our hypothesis that rich women may be more motivated and empowered to seek FP. They may also have more support from their partners and family members to space and limit the number of children they have. Furthermore, they may be aware of more locations where they can access a broader range of FP methods. Poorer women on the other hand appear to stop using contraception after their first method rather than switch to a different method that might better suit their needs. It should be borne in mind that other factors possibly affecting switching patterns such as distance to healthcare facility and the

quality of services accessed remain unknown. In conclusion, we note that household wealth has an impact on contraceptive use patterns among urban Kenyan women.

The results show that after controlling for household wealth and other variables, contraceptive use, in terms of current/former/never use, did not vary by neighborhood type. Among current contraceptive users, there was also no significant difference in switching patterns from the previous method when comparing women living in informal vs. formal neighborhoods. This may be due to the fact that women living in informal neighborhoods may be accessing FP services located nearby, even though previous findings suggest that the quality of these services are poor (Ezeh et al. 2010). Furthermore, women can use public transportation to get around the city as well and hence access healthcare facilities located far away. In summary, household wealth has a significant impact on contraceptive use patterns while neighborhood type, within an urban setting, does not.

We then generated a slum variable based on the three important household assets of electricity, piped water and an indoor toilet. This slum variable was first created a decade ago to test the impact of slum residence on sexual behavior within the urban Kenyan context (Zulu et al. 2002). In our study, a household was designated a slum if it had none of the three household amenities, an intermediate area if it had one of the household amenities and a non-slum if it had two or three. Controlling for other control variables, we found that women living in non-slums are more likely to be current users than women living in slums. Furthermore, among current users, nonslum dwellers are more likely to switch contraceptive methods than be using their first method. These significant findings are similar to our earlier findings using the usual wealth index. In addition, the two out of the three assets used to establish the slum variable are among the 21 assets representing household wealth. Hence,

36

our analysis shows that the slum variable is an indicator of household wealth (poor/intermediate/rich) and not the neighborhood type, *i.e.*, informal versus formal settlement.

An analysis of the reasons that current users gave for switching from their previous method showed that women who switched to a less effective method were more likely to cite method-related reasons, such as side-effects, when compared to women who switched to a more effective method. This suggests that women tend to switch to a less effective method when they have experienced method-related problems, thus supporting the existing evidence that method choice affects contraceptive switching (Blanc et al. 2002). It should be kept in mind, however, that a key difference in method choice is that active discontinuation methods such as IUDs and implants have higher continuation than passive discontinuation methods such as pills and condoms. A more detailed analysis among women who have switched from a less to a more effective method showed that poor women were more likely to do so because of method-related issues and partner opposition as compared to rich women. This suggests that poor women are more likely to seek more long-term permanent methods, such as the IUD/implant/sterilization, as they can be used more discreetly compared to shorter term less effective methods such as pills and condoms; they might do this because they experience fewer side-effects from the long-term methods, or their use is more discreet with long-term method use. Compared to the poor, rich women tend to switch to more effective methods on the recommendations of others and after learning about new more effective methods through the media (noted as some of the "other reasons"). Hence, they appear to have access to good quality services and be more informed than poor women. In summary, our study's findings on the reasons for switching are consistent with previous work but provide a unique

perspective of comparisons by neighborhood type and household wealth. Furthermore, we have distinguished women's switching patterns by the methods' effectiveness. Interestingly, household wealth seems to have a more significant effect on contraceptive use patterns than neighborhood type.

2.4.1 Limitations

An important limitation of this study is that we cannot determine causality as we are using cross-sectional data. Furthermore, since the analysis involves recollection of the previous contraceptive methods, there is a possibility of recall bias. It is also possible that the primary variables of interest of household wealth and neighborhood type are endogenous with contraceptive use, *i.e.*, there are other factors that affect wealth, neighborhood and contraceptive use that cannot be accounted for, such as the demand for FP (noted as personal motivation and the influence of other family members and healthcare providers on contraceptive use), and the supply for FP (notably access to FP services and availability of different contraceptive methods to name a few). Another limitation is that the classification of neighborhood types, as defined by formal or informal housing, may not have been conducted using scientific methods. Despite these limitations, our study controlled well for various sociodemographic characteristics and found a strong association between household wealth and contraceptive use and switching. A limitation when analyzing the reasons women give for switching methods is that the first reason that women state may not be the only reason; extensive probing is necessary to identify all the primary reasons for switching methods. Furthermore, the reasons are unranked and hence the relative importance of factors affecting women's choices cannot be determined.

2.4.2 Future research

Further research is needed to identify other community-level factors affecting contraceptive use among urban women, such as FP service accessibility, direct and indirect costs, as well as quality of services received. A qualitative study will help bring to light other individual- and community-level factors affecting contraceptive use and the reasons women give for discontinuing and switching methods.

2.4.3 Programmatic implications

FP programs need to target the urban poor in order to increase contraceptive use among this most vulnerable population. Recent evaluations of FP interventions in other settings have shown that the urban poor do not use FP services even though they live in close proximity to them (Hennink and Clements 2005, Kumar *et al.* 2010), so FP interventions need to reach out to the urban poor women, living in formal and informal settlements. Local leaders and outreach health workers can be empowered to identify the urban poor (DFID 2001). Even though the urban poor are scattered across the city, the majority of the poor live in informal settlements and small clusters within formal settlements; focusing on these geographic areas will help to identify the largest numbers of urban poor women. Local outreach workers can give them adequate information on the benefits of FP, answer any concerns the women may have in using FP, and inform and educate them on available FP methods and the locations of good quality services. High quality services that include a wide range of contraceptive methods can further be made available to the poor at an accessible location and cost through voucher programs specifically targeting the poor (UHI 2010). Subsidizing social services, such as healthcare, can provide the poorest citizens with necessary services (World Bank 2002). Adequate follow-up is also needed to ensure that the

women continue using a method of their choice best suited to their needs. Improving the quality of services and training staff will ensure that women receive the attention they need to prevent unwanted pregnancies. Further, women identified at postpartum visits and their children's under-5 follow-up visits can be counseled on the availability of existing services. In this manner, the desired contraceptive needs of women with the greatest need for FP, particularly urban poor women, can be met.

2.4.4 Conclusion

This study used a large population-based survey of urban Kenyan women from Nairobi, Mombasa and Kisumu. By separating the effects of neighborhood type and household wealth in the urban population, the results show that household wealth has an impact on contraceptive use patterns; poor women are less likely to be current contraceptive users than rich women. Among current users, poor women are also less likely to have switched to more effective methods, potentially signifying that they have fewer available FP method options available. Hence, through targeted interventions that identify the urban poor, the FP needs of this population can be reduced.

2.5 Tables and Figures

Table 2.1: Weighted distribution of background characteristics of urban women in Kenya, by neighborhood type and household wealth

Characteristics	Total	Neighborhood type		Household wealth		
		Informal	Formal	Poor	Interm.	Rich
	(n=4968)	(n=1056)	(n=3912)	(n=1575)	(n=1633)	(n=1761)
Neighborhood type				**		
Formal	78.7			65.5	77.2	92.0
Informal	21.3			34.5	22.8	8.0
Household wealth (3-city tertiles)		**				
Poor	31.7	51.4	26.4			
Intermediate	32.9	35.2	32.2			
Rich	35.4	13.4	41.4			
City		**				
Nairobi	75.3	74.6	75.5	70.7	79.8	77.1
Mombasa	19.2	7.4	22.3	21.9	16.1	18.3
Kisumu	5.5	18.0	2.2	7.4	4.0	4.6
Age		*		**		
15-19	6.6	8.8	6.0	8.5	5.7	5.4
20-24	27.2	29.9	26.4	31.1	31.5	21.4
25-29	26.5	26.4	26.6	26.7	25.5	26.7
30-34	16.5	14.5	17.0	14.0	16.4	18.6
35-39	11.7	11.3	11.8	9.1	13.2	13.3
40-44	7.1	6.0	7.5	7.2	3.9	9.0
45-49	4.4	3.2	4.7	3.4	3.8	5.6
Marital status		**		**		
Never married	24.4	18.7	26.0	21.4	17.4	33.6
Married/ Cohabiting	63.7	68.6	62.3	62.3	72.2	57.5
Separated/ Divorced/ Widowed	11.9	12.8	11.7	16.3	10.4	8.9
Religion		**				
Catholic	23.8	27.3	22.8	24.2	26.1	22.3
Protestant/ Other Christian	65.2	67.5	64.6	63.2	66.0	66.6
Muslim/ Other/ None	11.0	5.2	12.6	12.6	7.9	11.1
Education		**		**		
None/ Primary incomplete	17.0	19.4	16.4	26.3	17.3	8.8
Primary complete	27.0	35.4	24.8	37.5	30.5	16.1
Secondary: some/complete	38.4	36.3	38.9	30.5	46.5	41.4
Post-secondary	17.6	8.9	19.9	5.7	5.7	33.7
Number of living children		†		**		
0	21.6	18.5	22.4	17.5	13.7	28.8
1	30.9	30.4	31.0	30.5	36.0	28.7
2	22.6	22.9	22.5	23.0	25.3	21.1
3+	24.9	28.2	24.1	29.0	25.0	21.4
Employed for cash, in the last 12 months		†		**		
Yes	64.2	60.5	65.2	58.8	57.5	72.0
No	35.8	39.5	34.8	41.2	42.5	28.0

Migration to city		†		*		
Migrated in the past 11 months	5.8	4.9	6.0	6.9	4.1	5.7
Migrated in the past 1-10 years	8.1	9.9	7.7	10.2	6.9	6.9
Lived in city for >10 years	86.1	85.2	86.3	82.9	89.0	87.4
Heard FP message on radio in the past 12 months				*		
Yes	60.0	58.4	60.4	55.0	61.5	63.2
No	40.0	41.6	39.6	45.0	38.5	36.8

p-value: †≤0.10, *≤0.05, **≤0.01

Table 2.2: Percentage distribution of contraceptive use among all women and current contraceptive users by neighborhood type and household wealth among urban women with knowledge of FP, aged 15-49 in Kenya

Contraceptive use	Total	Neighborhood type		Household wealth		
		Informal	Formal	Poor	Interm.	Rich
All women	(n=4968)	(n=1056)	(n=3912)	(n=1575)	(n=1633)	(n=1761)
Current users	52.0	52.8	51.7	44.0**	59.1	52.4
Former users	31.6	33.0	31.3	35.5	26.9	32.7
Never users	16.4	14.1	17.0	20.5	14.0	14.9
Current users	(n=2582)	(n=557)	(n=2024)	(n=693)	(n=965)	(n=924)
First method	53.6	54.7	53.3	58.4*	57.3	46.0
Switched from less→ more effective	28.4	30.4	27.9	26.0	26.1	32.6
Switched from more→ less effective	18.0	14.9	18.8	15.6	16.6	21.4
Among current users, current method mix		**		**		
		(n=558)	(n=2024)	(n=693)	(n=965)	(n=924)
Long-term permanent	13.7	11.2	14.3	9.5	9.9	20.7
Injectables	37.9	50.0	34.5	53.0	42.3	21.9
Pills	24.1	17.7	25.8	16.2	27.8	26.1
Condoms	14.9	12.1	15.6	10.4	11.8	21.3
Traditional	9.6	9.0	9.7	10.9	8.2	10.0
Among current users, previous method mix						
		(n=350)	(n=1223)	(n=559)	(n=438)	(n=575)
Long-term	7.0	5.0	7.6	4.1	5.4	10.2
Injectables	29.8	30.3	29.7	31.0	33.0	26.4
Pills	37.9	35.3	38.6	36.1	40.6	36.8
Condoms	13.7	16.8	12.9	16.5	10.8	14.5
Traditional	11.5	12.6	11.2	12.3	10.2	12.2

p-value: †≤0.10, *≤0.05, **≤0.01

Table 2.3: Multinomial logistic regression coefficients for current contraceptive use among women who are ever users in urban Kenya, n=5086

Independent variables	Model 1: All women			Model 2: All women		
	Current users	**Former users**	**Current users**	**Current users**	**Former users**	**Current users**
Ref group	*never users*	*never users*	*former users*	*never users*	*never users*	*former users*
Neighborhood type; ref: formal residence						
Informal	0.12 (0.10)	0.03 (0.10)	0.09 (0.07)	0.07 (0.12)	0.05 (0.11)	0.02 (0.08)
Household wealth; ref: rich						
Poor	- 0.54** (0.12)	- 0.35** (0.12)	- 0.19* (0.08)	- 0.45** (0.14)	- 0.26* (0.13)	- 0.19* (0.09)
Intermediate	-0.15 (0.12)	- 0.27* (0.15)	0.12 (0.09)	- 0.25 (0.13)	- 0.28 (0.13)	- 0.03 (0.10)
City; ref: Nairobi						
Mombasa	- 0.38** (0.06)	- 0.28** (0.06)	- 0.11* (0.04)	- 0.32** (0.07)	- 0.23** (0.06)	- 0.09† (0.05)
Kisumu	- 0.04 (0.04)	- 0.05 (0.04)	-0.001 (0.028)	- 0.08† (0.05)	- 0.06 (0.04)	- 0.02 (0.03)
Age; ref: 20-24						
15-19				- 0.05 (0.16)	- 0.13 (0.15)	0.09 (0.13)
25-29				0.10 (0.12)	0.26* (0.12)	- 0.16† (0.10)
30-34				0.004 (0.16)	0.32* (0.16)	- 0.30** (0.11)
35-39				- 0.68** (0.18)	- 0.25 (0.17)	- 0.43** (0.14)
40-44				- 0.97** (0.23)	- 0.04 (0.24)	- 0.93** (0.17)
45-49				- 1.84** (0.26)	- 0.38 (0.25)	- 1.46** (0.20)
Marital status; ref: married/cohabiting						
Never married				- 0.42** (0.13)	- 0.38** (0.13)	- 0.04 (0.11)
Separated/ Divorced/ Widowed				- 0.41* (0.17)	0.62** (0.16)	- 1.02** (0.10)
Religion; ref: Protestant/ Other Christian						
Catholic				0.27* (0.11)	0.09 (0.12)	0.18* (0.08)
Muslim/ Other/ None				- 0.55** (0.16)	- 0.37* (0.15)	- 0.19 (0.12)
Education; ref: some/all secondary						
None/primary incomplete				- 0.83** (0.12)	- 0.53** (0.13)	- 0.30** (0.10)
Primary complete				- 0.45** (0.11)	- 0.28* (0.11)	- 0.17* (0.08)
Post-secondary				0.89** (0.17)	0.68** (0.17)	0.20† (0.10)

Number of living children; ref: 1			
0	- 1.43** (0.13)	- 0.51** (0.14)	- 0.92** (0.12)
2	0.95** (0.13)	0.60** (0.13)	0.35** (0.10)
3+	1.47** (0.15)	0.87** (0.16)	0.61** (0.11)
Employed for cash, in the last 12 months; ref: yes			
No	- 0.46**(0.10)	- 0.26** (0.09)	- 0.21** (0.08)
Migration to city; ref: lived in city for >10 years			
Migrated in the past 11 months	- 0.24 (0.16)	0.03 (0.16)	- 0.27† (0.14)
Migrated in the past 1-10 years	0.19 (0.15)	0.12 (0.15)	0.08 (0.10)
Heard FP message on radio in the past 12 months; ref: yes			
No	- 0.30** (0.09)	- 0.36** (0.09)	0.05 (0.07)

p-value: †≤0.10, *≤0.05, **≤0.01; all models adjusted for clustering at the PSU level

Figure 2.1: Predicted probabilities of contraceptive use, by neighborhood type and household wealth

Table 2.4: Multinomial logistic regression coefficients for current contraceptive use among women who are current contraceptive users in urban Kenya, n=2568

Independent variables	Model 1: Current users			Model 2: Current users		
	1st method users	1st method users	Switched less→ more effective	1st method users	1st method users	Switched less→ more effective
Ref group	*less→more effective switch*	*more→less effective switch*	*more→less effective switch*	*less→more effective switch*	*more→less effective switch*	*more→less effective switch*
Neighborhood type; ref: formal residence						
Informal	- 0.019 (0.113)	0.10 (0.14)	0.11 (0.13)	0.05 (0.12)	0.10 (0.14)	0.05 (0.13)
Household wealth; ref: rich						
Poor	0.29* (0.13)	0.62** (0.15)	0.33* (0.14)	0.31* (0.14)	0.40* (0.17)	0.12 (0.15)
Intermediate	0.29* (0.12)	0.44** (0.13)	0.15 (0.17)	0.34** (0.13)	0.31* (0.14)	0.01 (0.17)
City; ref: Nairobi						
Mombasa	0.18* (0.07)	0.14 (0.09)	- 0.05 (0.09)	0.17* (0.07)	0.16 (0.10)	- 0.02 (0.10)
Kisumu	- 0.09* (0.05)	- 0.04 (0.05)	0.05 (0.05)	- 0.07 (0.05)	- 0.05 (0.05)	0.01 (0.05)
Age; ref: 20-24						
15-19				0.09 (0.24)	1.38** (0.48)	1.30* (0.50)
25-29				0.16 (0.14)	- 0.18 (0.16)	- 0.34* (0.18)
30-34				0.16 (0.16)	- 0.60** (0.19)	- 0.75** (0.20)
35-39				- 0.07 (0.19)	- 0.73** (0.22)	- 0.65** (0.24)
40-44				- 0.18 (0.24)	- 1.21** (0.28)	- 1.00** (0.25)
45-49				0.13 (0.30)	- 0.27 (0.38)	- 0.36 (0.41)
Marital status; ref: married/cohabiting						
Never married				0.17 (0.18)	0.06 (0.21)	- 0.10 (0.24)
Separated/ Divorced/ Widowed				- 0.43* (0.17)	- 0.33 (0.21)	0.12 (0.19)
Religion; ref: Protestant/ Other Christian						
Catholic				- 0.03 (0.11)	0.28* (0.14)	0.32* (0.14)
Muslim/ Other/ None				0.35* (0.18)	0.12 (0.22)	- 0.20 (0.22)
Education; ref: some/all secondary						
None/primary incomplete				- 0.11 (0.14)	0.002 (0.18)	0.12 (0.53)
Primary complete				0.001 (0.12)	0.35* (0.15)	0.34* (0.16)
Post-secondary				- 0.30* (0.16)	- 0.15 (0.17)	0.20 (0.18)

47

Number of living children; ref: 1			
0	0.95** (0.22)	0.39 (0.23)	- 0.57* (0.26)
2	- 0.02 (0.13)	- 0.02 (0.18)	- 0.01 (0.19)
3+	- 0.33* (0.14)	0.02 (0.19)	0.34† (0.19)
Employed for cash, in the last 12 months; ref: yes			
No	0.22* (0.10)	0.06 (0.13)	- 0.17 (0.14)
Migration to city; ref: lived in city for >10 years			
Migrated in the past 11 months	- 0.01 (0.22)	- 0.005 (0.27)	0.07 (0.29)
Migrated in the past 1-10 years	0.18 (0.16)	- 0.08 (0.19)	- 0.25 (0.21)
Heard FP message on radio in the past 12 months; ref: yes			
No	0.32** (0.11)	0.32* (0.13)	0.01 (0.13)

p-value: †≤0.10, *≤0.05, **≤0.01; all models adjusted for clustering at the PSU level

Figure 2.2: Predicted probabilities of current contraceptive use, by neighborhood type and household wealth
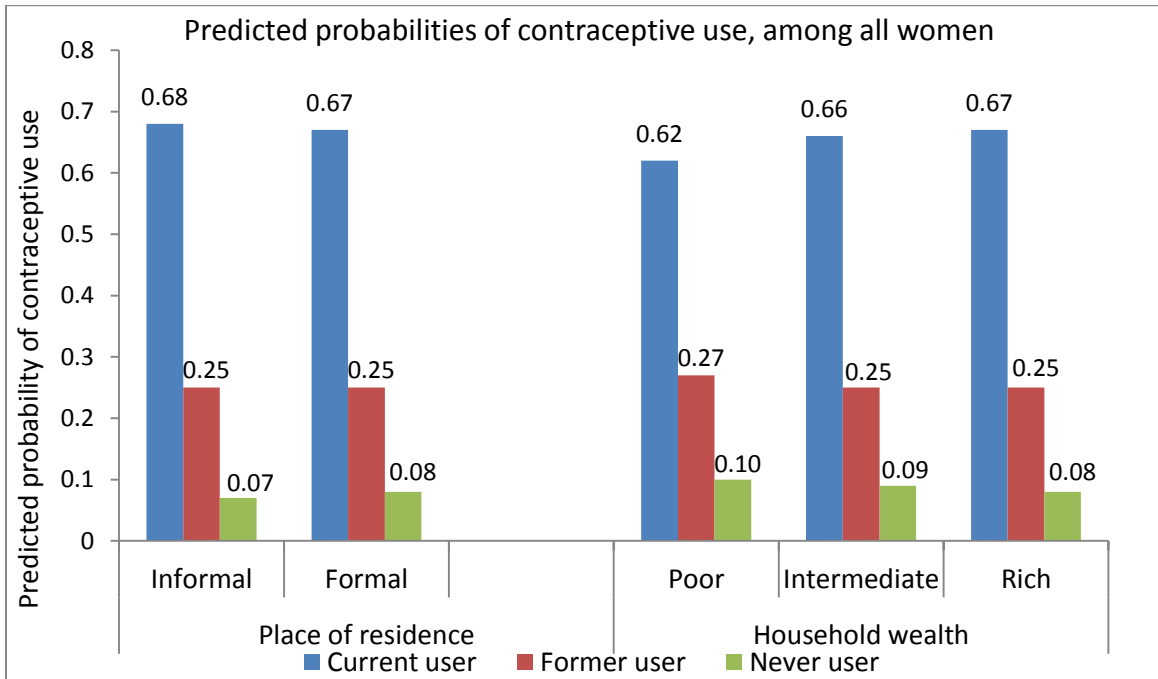

Predicted probabilities of current contraceptive use, among current users
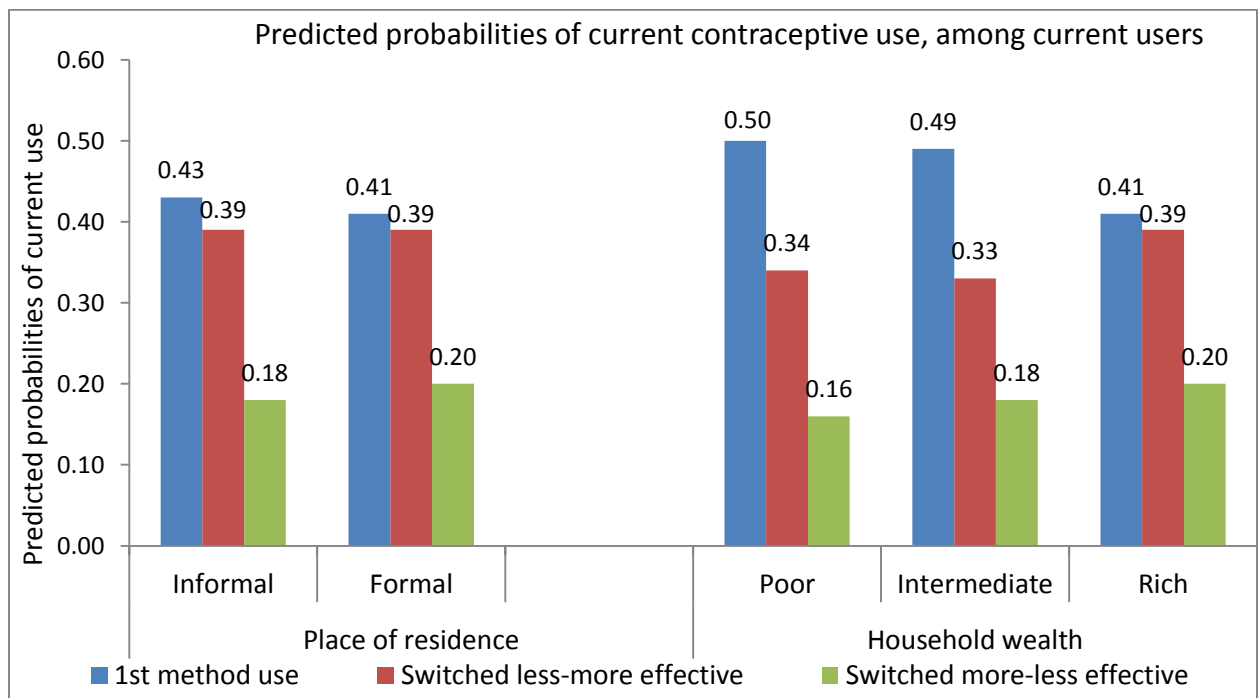
Table 2.5: Multinomial logistic regression coefficients for current contraceptive use by slum residence among women who are ever users in urban Kenya, n=5086

Independent variables	Model 1: All women			Model 2: All women		
	Current users	Former users	Current users	Current users	Former users	Current users
Ref group	*never users*	*never users*	*former users*	*never users*	*never users*	*former users*
Slum categories; ref: non-slum						
Slum	- 0.36** (0.15)	- 0.26† (0.15)	- 0.19* (0.08)	- 0.35** (0.13)	- 0.16* (0.13)	- 0.19* (0.09)
Intermediate slum	-0.13 (0.12)	- 0.16 (0.13)	-0.02 (0.08)	- 0.23† (0.13)	- 0.13 (0.12)	- 0.11 (0.08)
City; ref: Nairobi						
Mombasa	- 0.38** (0.06)	- 0.27** (0.06)	- 0.10* (0.04)	- 0.30** (0.07)	- 0.22** (0.06)	- 0.08 (0.05)
Kisumu	- 0.01 (0.04)	- 0.03 (0.04)	-0.02 (0.03)	- 0.05 (0.05)	- 0.05 (0.04)	- 0.003 (0.03)
Age; ref: 20-24						
15-19				- 0.03 (0.16)	- 0.12 (0.15)	0.09 (0.13)
25-29				0.10 (0.12)	0.26* (0.12)	- 0.16† (0.10)
30-34				0.004 (0.16)	0.33* (0.16)	- 0.30** (0.11)
35-39				- 0.65** (0.18)	- 0.23 (0.17)	- 0.43** (0.14)
40-44				- 0.94** (0.23)	- 0.36 (0.24)	- 0.93** (0.17)
45-49				- 1.81** (0.26)	- 0.38 (0.25)	- 1.46** (0.20)
Marital status; ref: married/cohabiting						
Never married				- 0.42** (0.13)	- 0.38** (0.13)	- 0.05 (0.11)
Separated/ Divorced/ Widowed				- 0.41* (0.17)	0.61** (0.16)	- 1.03** (0.10)
Religion; ref: Protestant/ Other Christian						
Catholic				0.27* (0.11)	0.09 (0.12)	0.18* (0.08)
Muslim/ Other/ None				- 0.55** (0.16)	- 0.37* (0.15)	- 0.20 (0.12)
Education; ref: some/all secondary						
None/primary incomplete				- 0.86** (0.12)	- 0.53** (0.13)	- 0.31** (0.10)
Primary complete				- 0.47** (0.11)	- 0.28* (0.11)	- 0.18* (0.08)
Post-secondary				0.93** (0.17)	0.68** (0.17)	0.19† (0.10)
Number of living children; ref: 1						
0				- 1.43** (0.13)	- 0.51** (0.14)	- 0.92** (0.12)
2				0.94** (0.13)	0.60** (0.13)	0.34** (0.10)
3+				1.48** (0.15)	0.87** (0.16)	0.61** (0.11)

Employed for cash, in the last 12 months; ref: yes				
No		- 0.47**(0.11)	- 0.26** (0.09)	- 0.21** (0.08)
Migration to city; ref: lived in city for >10 years				
Migrated in the past 11 months		- 0.24 (0.16)	0.03 (0.16)	- 0.28† (0.14)
Migrated in the past 1-10 years		0.20 (0.15)	0.13 (0.15)	0.07 (0.10)
Heard FP message on radio in the past 12 months; ref: yes				
No		- 0.32** (0.09)	- 0.36** (0.09)	0.04 (0.07)

p-value: †≤0.10, *≤0.05, **≤0.01; all models adjusted for clustering at the PSU level

Figure 2.3: Predicted probabilities of contraceptive use, by slum residence

Predicted probabilities of contraceptive use, among all women

|	Slum	Intermediate	Non-slum
Current user	0.62	0.64	0.67
Former user	0.27	0.26	0.25
Never user	0.11	0.10	0.08

Y-axis: Predicted probability

Table 2.6: Multinomial logistic regression coefficients for current contraceptive use by slum residence among women who are current contraceptive users in urban Kenya, n=2568

Independent variables	Model 1: Current users			Model 2: Current users		
	1st method users	1st method users	Switched less→ more effective	1st method users	1st method users	Switched less→ more effective
Ref group	*less→ more effective switch*	*more→ less effective switch*	*more→ less effective switch*	*less→ more effective switch*	*more→less effective switch*	*more→ less effective switch*
Slum categories; ref: non-slum						
Slum	0.48* (0.14)	0.45** (0.16)	0.40 (0.16)	0.10 (0.14)	0.31* (0.18)	0.22 (0.17)
Intermediate slum	0.20† (0.12)	0.35** (0.13)	0.15 (0.14)	0.24† (0.13)	0.27† (0.14)	0.03 (0.14)
City; ref: Nairobi						
Mombasa	0.18* (0.07)	0.11 (0.09)	- 0.07 (0.09)	0.16* (0.07)	0.13 (0.10)	- 0.02 (0.10)
Kisumu	- 0.09* (0.05)	- 0.08† (0.05)	0.02 (0.05)	- 0.07 (0.05)	- 0.08 (0.05)	0.001 (0.05)
Age; ref: 20-24						
15-19				0.08 (0.24)	1.37** (0.48)	1.30* (0.51)
25-29				0.14 (0.14)	- 0.19 (0.16)	- 0.33* (0.18)
30-34				0.11 (0.16)	- 0.64** (0.19)	- 0.75** (0.20)
35-39				- 0.11 (0.19)	- 0.76** (0.22)	- 0.65** (0.24)
40-44				- 0.24 (0.24)	- 1.24** (0.28)	- 1.00** (0.26)
45-49				0.06 (0.30)	- 0.31 (0.38)	- 0.37 (0.42)
Marital status; ref: married/cohabiting						
Never married				0.16 (0.18)	0.07 (0.21)	- 0.09 (0.24)
Separated/ Divorced/ Widowed				- 0.41* (0.17)	- 0.30 (0.20)	0.11 (0.19)
Religion; ref: Protestant/ Other Christian						
Catholic				- 0.05 (0.11)	0.28* (0.14)	0.32* (0.14)
Muslim/ Other/ None				0.32† (0.18)	0.13 (0.22)	- 0.20 (0.21)
Education; ref: some/all secondary						
None/primary incomplete				- 0.06 (0.14)	0.07 (0.18)	0.13 (0.19)
Primary complete				0.06 (0.11)	0.40** (0.15)	0.34* (0.15)
Post-secondary				- 0.38* (0.16)	- 0.19 (0.17)	0.20 (0.18)
Number of living children; ref: 1						
0				0.95** (0.22)	0.38 (0.23)	- 0.57* (0.26)
2				- 0.05 (0.13)	- 0.02 (0.18)	- 0.01 (0.19)
3+				- 0.32* (0.14)	0.02 (0.19)	0.34† (0.15)

Employed for cash, in the last 12 months; ref: yes				
No		0.23* (0.10)	0.06 (0.13)	- 0.17 (0.14)
Migration to city; ref: lived in city for >10 years				
Migrated in the past 11 months		- 0.01 (0.22)	- 0.005 (0.27)	0.02 (0.29)
Migrated in the past 1-10 years		0.18 (0.16)	- 0.08 (0.19)	- 0.24 (0.21)
Heard FP message on radio in the past 12 months; ref: yes				
No		0.32** (0.11)	0.32* (0.13)	0.01† (0.13)

p-value: †≤0.10, *≤0.05, **≤0.01; all models adjusted for clustering at the PSU level

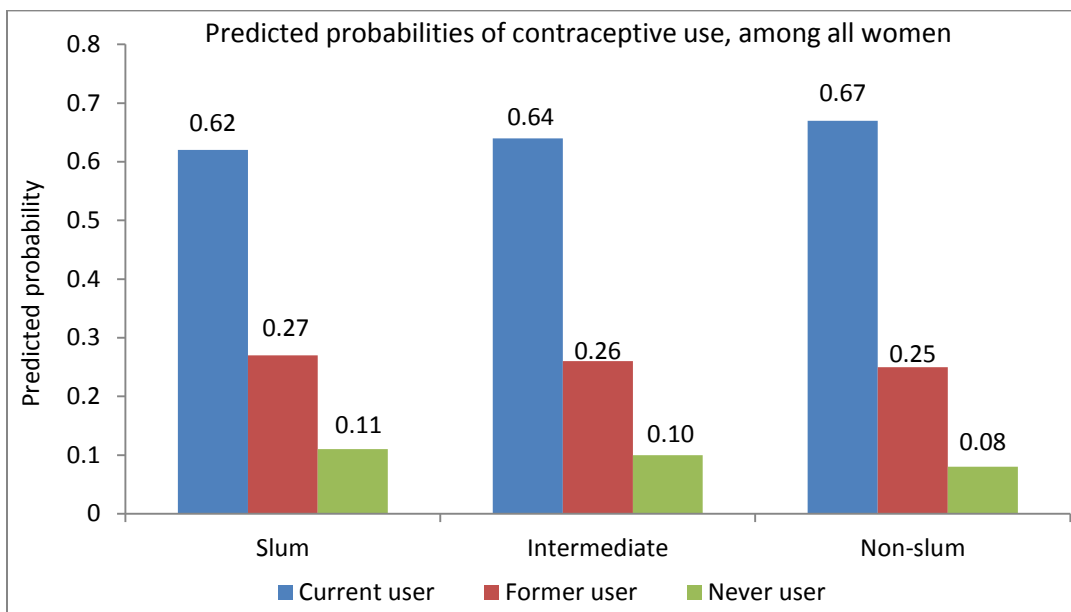**Figure 2.4: Predicted probabilities of current contraceptive use, by slum residence**

Predicted probability of current contraceptive use, among current users
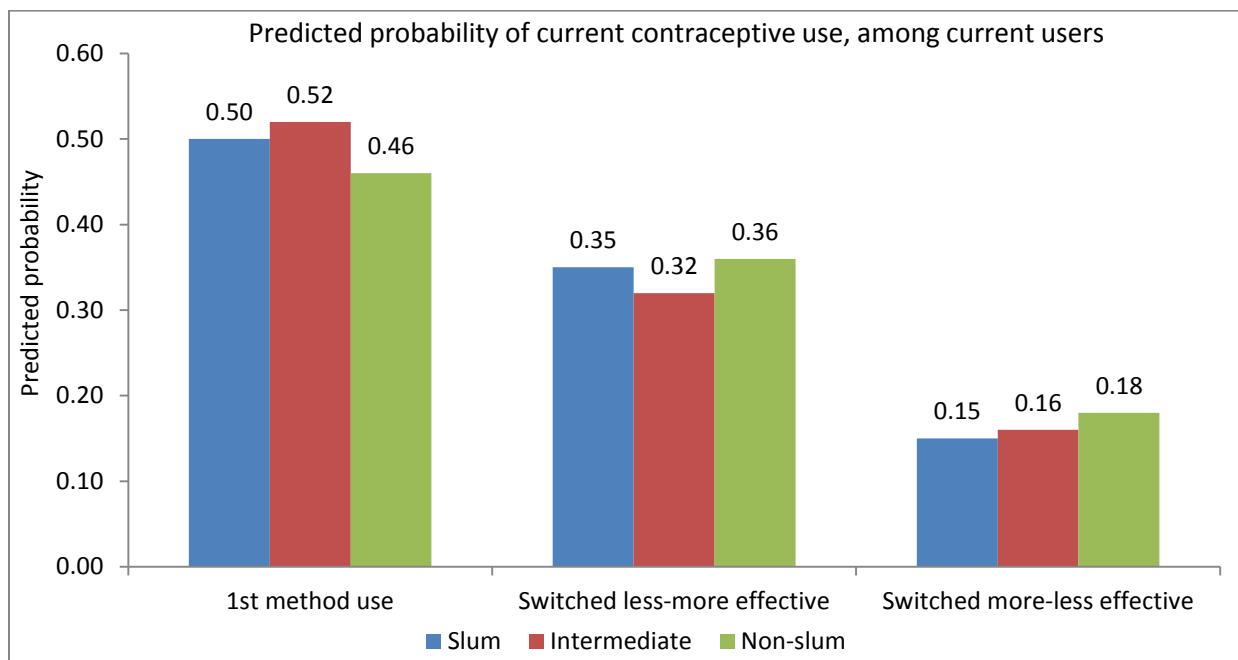
Table 2.7: Reasons for switching among current users who are urban women in Kenya, in weighted percentages

Reasons for switching, among current users	Total	Neighborhood type		Household wealth		
		Informal	Formal	Poor	Intermediate	Rich
Among those who switched from less to more effective						
	(n=733)	(n=169)	(n=564)	(n=180)	(n=252)	(n=301)
Fertility-related reasons	15.2	7.8	17.4**	13.2	14.7	17.0
Method-related reasons	85.0	88.9	83.8†	88.2	89.2	79.6*
Cost and access-related	2.8	3.7	2.5	4.5	3.7	1.0†
Partner opposes	5.8	6.9	5.3	9.6	5.6	3.5*
Recommended by others	5.3	4.0	5.7	2.9	3.5	9.5*
Other reasons	18.4	15.8	19.2	12.3	16.3	23.9+
Among those who switched from more to less effective						
	(n=466)	(n=83)	(n=383)	(n=108)	(n=160)	(n=198)
Fertility-related reasons	13.0	13.5	12.8	9.4	12.2	15.5
Method-related reasons	86.7	87.6	86.6	90.0	91.3	81.3†
Cost and access-related	1.8	2.4	1.7	3.8	25.6	2.8
Partner opposes	3.6	0.9	4.2**	0.7	2.5	4.0
Recommended by others	6.5	5.3	6.8	3.7	6.6	8.0
Other reasons	14.4	14.7	14.3	6.7	13.2	19.7†

p-value: †≤0.10, *≤0.05, **≤0.01

Chapter 3: Impacts of Couple Characteristics on Contraceptive Use among Women and their Male Partners in Urban Kenya

3.1 Background

In 1994, participants at the International Conference on Population and Development (ICPD) were encouraged to think of new ways to improve family planning (FP) and reproductive health in the developing world. It was emphasized through the ICPD's Program of Action that the active participation of both men and women was essential to reducing the unmet need for FP (UN 1994, Becker and Robinson 1998). As a result, men's role in FP has been highlighted at various public health conferences and in messages to donor agencies, governments and the media. This is particularly important because a lack of male involvement places the heavy burden of reproductive health decision-making solely on the woman and in certain societies, the man's consent is legally required to make contraception-related decisions (Clark et al. 2008). The husbands' opinions of FP use may therefore result in additional barriers to use. For example, analysis of the 1992 Morocco DHS data found that husbands' fertility desires have a significant effect on women's contraceptive use after controlling for the women's own fertility desires (Speizer 1999). Hence, men's involvement in FP programs and policies is necessary in order to increase contraception uptake and reduce unmet need for FP (Ezeh 1993).

It is important to interview both spouses in order to identify the FP needs of couples and account for the different attitudes, views and needs of both partners. In a study conducted

in rural India, couples gave highly consistent responses on reproductive health events such as the number of living children as well as their use of contraception, but fewer couples had similar attitudes towards contraception (84%) and fertility desires (88%) (Yadav et al. 2010). Unfortunately, both spouses are not always interviewed; many studies of couples include the partner's perceived responses with the assumption that the surveyed person is fully aware of their partner's thoughts and desires. For example, Demographic and Health Survey (DHS) data obtained from six countries included only the wives' responses to measure the couples' approval/disapproval towards contraceptive use (Bongaarts 2006). Since a spouse may not be fully aware of their partner's attitudes and desires, information from both partners is needed to produce a more precise understanding of husband-level factors affecting contraceptive use.

3.1.1 Social Ecological Theory

In order to identify factors affecting couples' contraceptive use behavior, it is imperative that we utilize an easily comprehensible, inclusive, and relevant model. One such model, the Social Ecological Theory, examines the effects of multiple levels and contexts on an individual's behavior (Bronfenbrenner 1977, Bronfenbrenner 1979). This model suggests that an individual's behavior is impacted by at least three spheres of influence, individual characteristics, interpersonal features and environmental factors (Appendix 3.I).

Several demographic studies have identified individual-level traits or sociodemographic characteristics that affect contraceptive use, most notably formal education (Islam *et al.* 2010); however, the findings on the relative importance of the husband's versus the wife's education are inconsistent (Hossain *et al.* 2007, Gubhaju 2009). A study from Nepal, conducted by Gubhaju, determined that the husband's education has a greater influence than the wife's education on contraceptive use, especially in relation to

male-controlled methods such as male sterilization and condom use (Gubhaju 2009). On the other hand, a Bangladesh DHS study showed that both partners' education levels were significant determinants of reported contraceptive use (Islam et al. 2010). In contrast, a study using survey data from Bangladesh showed that the wife's education is more strongly predictive of contraceptive use than the husband's preference for additional children (Hossain et al. 2007). Unlike the previously mentioned Nepali study conducted by Gubhaju, analysis of data from 14 SSA countries revealed that a woman's education is a stronger predictor of contraceptive use than her husband's education (Uchudi 2001, Gubhaju 2009). This difference in findings between South Asia and SSA might reflect differences in the gender context across the two regions. Since larger proportions of SSA women live alone and raise their children singlehandedly as compared to women in Asia, the African woman's education level would be a greater predictor of contraceptive use than her partner's. A wife's educational level can also have a significant and positive effect on the husband's familiarity with FP methods (Pillai 1993). Other individual-level factors associated with contraceptive use include spousal age difference and religion. Two studies conducted in Ghana comparing actual couples-level data determined that a smaller age difference between spouses and adherence to different religions (such as, Christian and Muslim) increased contraceptive use (Oheneba-Sakyi and Takyi 1997, Gyimah *et al.* 2008). Hence, we note that studies primarily analyzing national-level data across countries have found that spouses' education levels, ages and religious affiliations all affect their contraceptive use.

The Sociological Ecological Theory also posits a role for relationship-level factors on contraceptive use. Hence, besides determining the effects of individual traits on contraceptive use, some research has been conducted to identify the effects of relationship-level factors,

59

such as the husband and wife's fertility desires and reported communication, on contraceptive use. Few studies interviewed both spouses in order to determine the effect of men's fertility desires on the couple's reported contraceptive use. Some such studies conducted in Nigeria and Pakistan noted that women tend to use contraception when their husbands are satisfied with the number of children they have (Mahmood and Ringheim 1996, Ogunjuyigbe *et al.* 2009). Another study of Kenya DHS data found that women were twice as likely to use contraception if their husband desired no more children than when they alone felt so (39.2% vs. 23.2%) (Dodoo 1998). However, in cases where women did not desire additional children in the near future in contrast to their partners, disagreements on contraceptive use arose. For example, in a study of couples in the Nairobi slum of Baba Dogo and the rural area of Chwele in western Kenya, a lack of partner agreement on contraceptive use was cited by the women as a major barrier to contraceptive use (Kamau et al. 1996). Similarly, analysis of data from five Asian countries suggested that women have an unmet need for contraception if their husband wants more children (Mason and Smith 2000). In cases in which women used contraception discreetly, their partners often considered it a sign of disrespect and held them in contempt (Population Council 1998). Other couples studies present opposite findings that the wives' fertility preferences and decisions to use contraception are more predictive of use than their husband's true preferences (Coombs and Chang 1981, Bankole and Singh 1998, Dodoo 1998, Maharaj and Cleland 2005). For example, a recent study of 238 married/cohabiting couples in Kwa Zulu Natal, South Africa noted that the wives' fertility preferences were key determinants of use while the husbands' desires were not significant (Maharaj and Cleland 2005). Given these inconsistencies, more

couple-level analyses are needed to study the impact of both spouses' fertility desires and perceptions of ideal family size on contraceptive use.

Beyond fertility desires, another dimension of relationship-level factors that affect contraceptive use is couple communication. Several studies conducted across Africa and South Asia have suggested that communication about fertility and contraception between spouses is important as it encourages contraceptive use and results in smaller family sizes (Hardee-Cleveland 1992, Isiugo-Abanihe 1994, Salway 1994, Lasee and Becker 1997, Bawah 2002, Azimi and Atiya 2003, Klomegah 2006, Ogunjuyigbe *et al.* 2009, Yue *et al.* 2010, Link 2011). For example, a study of Kenyan 1993 DHS data on a set of 1257 couples found that couples where both partners reported discussing FP were more likely to be ever-users of FP (Kimuna and Adamchak 2001). However, the impact of couple communication after controlling for individual- and environmental-level characteristics within a more defined context, such as an urban setting, remains uninvestigated. Hence, there is a greater need to examine the effect of relationship-level factors on couples' contraceptive use

Based on the Social Ecological Theory, environmental factors have also been identified as affecting contraceptive use. Few studies have looked at the effects of household characteristics and community factors on women's contraceptive use alone. Most research done in this regard has focused on the impact of household wealth on women's contraceptive use using national level data for developing countries and often control for urban versus rural differences. For example, a recent analysis of DHS data from 13 sub-Saharan countries by Creanga *et al* revealed that women residing in households from the poorest tertile were less likely to use contraception than those from the wealthiest one (Creanga et al. 2011) and DHS data from over 41 countries showed that unwanted births in the poorest wealth tertiles were

more than twice the levels of those in the wealthiest tertiles (Gillespie et al. 2007). As a

result, women in the lowest wealth tertile have the lowest contraceptive use resulting in the

highest unmet need, unwanted pregnancies and hence fertility rates (Potts and Fotso 2007,

Shah and Chandra-Mouli 2007, Prata 2009). Few studies have examined the impacts of

community factors, such as neighborhood type, on women's contraceptive use (Ezeh et al.

2010). A survey conducted in Nairobi by the African Population and Health Research Center

(APHRC) showed that women slum dwellers used less contraception than non-slum dwellers

(APHRC 2002) but this analysis did not account for household wealth. Furthermore, no

studies to date have determined the effects of household characteristics (*e.g.*, household

wealth) and community factors (*e.g.*, neighborhood type) together on couple's contraceptive

use, within and across different urban settings. Since none of these studies accounted for both

spouses' characteristics, there is a need to better understand factors affecting couples'

contraceptive use.

3.1.2 Country context

Kenya is an East African country in which urban centers have been growing rapidly

in the absence of basic infrastructure and services. Nairobi, the largest city in Kenya, is

plagued with rapidly growing slums and has some of the largest slums in Africa; the city's

urban poor population doubled recently in the span of just five years, and now makes up 60%

of the city's 2.7 million people, while taking up only 5% of the land area (Matrix

Development Consultants 1993, Central Bureau of Statistics (CBS) Ministry of Planning and

National Development 2000). This growth is unmanageable considering that the basic

infrastructure and employment opportunities have not grown proportionately. As a result,

slum dwellers live in cramped conditions and lack access to even the most basic of healthcare services.

The quality of life of slum dwellers must improve in order to achieve several of the Millennium Development Goals (MDGs), including improving maternal health (MDG5) and ensuring gender equality and empowering women (MDG3) (Amnesty International 2010). A sub-target of Millennium Development Goal 7 – Improve Environmental Sustainability, involves improving the lives of slum dwellers (United Nations Statistics Division 2012). Encouragingly, in recent times, there has been increased interest in the effect of slum-dwelling on health outcomes. As the number of slum dwellers just in the sub-Saharan African region surpasses 200 million and the number of households increase exponentially, the poorest people are further marginalized and unable to receive even basic healthcare (Bartram *et al.* 2012, Habumuremyi and Zenawi 2012). Specifically in Kenya, recent studies of urban women have focused on slum dwelling's effects on sexual behavior and reproductive health risks (Zulu *et al.* 2002, Dodoo *et al.* 2007, Greif *et al.* 2011). Although there is increased literature exploring the effects of individual characteristics on contraceptive use, the effects of characteristics relating to couple interaction, after controlling for environmental factors such as neighborhood type and household wealth, on contraceptive use among couples living in these ever-expanding urban centers have not been jointly studied. Therefore, we aim to determine the effects of couple characteristics on contraceptive use among married/cohabiting couples in three urban centers of Kenya: Nairobi, Mombasa and Kisumu. The hypothesis is that if both spouses desire a smaller family size, the couple is more likely to use contraception. Furthermore, if both partners acknowledge communicating about the desired number of children and using family planning, these couples are more

63

likely to be using contraception, as better communication increases partner support in using contraception and spacing/limiting childbearing.

3.2 Methods

To study the effect of couple interactions on contraceptive use among married/cohabiting couples, we utilized baseline survey data collected for the Measurement, Learning & Evaluation (MLE) Project which works to identify interventions increasing contraceptive prevalence among urban populations, especially the urban poor. The MLE project is the evaluation component of the Bill & Melinda Gates Foundation-funded Urban Reproductive Health Initiative (Urban RH Initiative) which aims to improve the health of the urban poor in Kenya, Nigeria, Senegal, and Uttar Pradesh, India. In Kenya, Tupange, a 5-year project of the Urban RH Initiative, is assisting the Kenyan government revitalize its urban FP programs; the MLE project is evaluating the Tupange interventions.

The MLE Project in Kenya collected population-level data between September and November 2010 from women in Nairobi, Mombasa, Kisumu, Machakos and Kakamega and from men in Nairobi, Mombasa and Kisumu. Prior to sample selection, the 2009 census sampling frame was used to classify all primary sampling units (PSU) in the three study cities as predominantly formal or informal. Representative samples of women and men (only in Nairobi, Mombasa and Kisumu) were then selected and interviewed using a two-stage sampling method. In the first stage, random samples of PSUs were selected to represent the cities' populations, with half selected from the formal settlement strata and the other half from the informal settlement strata. In the second stage, from each selected PSU, a random sample of 30 households was chosen for household and female interviews. In half of these

selected households in Nairobi, Mombasa and Kisumu, men were also interviewed. All eligible women aged 15-49 and men aged 15-59 were invited to participate in a pencil-and-paper interviewer-led survey covering basic sociodemographic characteristics, reproductive health and FP use.

A total of 5774 women and 2503 men were interviewed across the three cities. For this analysis, a couples dataset was created with the male partners identified as the households' head and the female partners as the spouses of the heads of the household, resulting in a maximum of one couple per household. As shown in Appendix 3.II, 2452 women and 1079 men were dropped from the analysis as they were not legally married or cohabiting, *i.e.*, living together in the same household as a couple; 61 women and 16 men were dropped as they were not full-time residents of the home; 1,515 women were dropped as their homes were not selected for male interviews; 306 women were dropped as they were not designated as the spouses of the heads of their households; and 64 men were dropped as they were not noted as the heads of their households. Another 557 women were dropped from the analysis as their male partners had not completed the interview and 461 men were dropped because their wives had not completed the interview. After the data had been sorted in this way, a total of 883 couples were identified, resulting in a representation of 840 couples after applying women-level population weights. Hence, the weighted sample of 840 couples represents married/cohabiting male heads of the household and their wives across the three cities of Nairobi, Mombasa and Kisumu who completed the interview.

3.2.1 Variables

The first outcome of interest is current contraceptive use as reported by the woman. The women's reported contraceptive use was used for this analysis because some men may

have other partners and they may vary their FP use patterns with these different partners. Therefore, men's reported contraceptive use may not accurately reflect the couple's use. The second outcome of interest is intention to use contraception, among women currently not using contraception.

The primary independent variables of interest were relationship-level characteristics representing couple interactions. A relationship-level characteristic, ideal family size, was determined by asking each spouse the following question, "If you could have exactly the number of children you wanted to have in your whole life, how many would that be?" A second relationship-level characteristic was communication between spouses in the prior 6 months on their desired number of children. Each spouse was asked the following questions, "Have you and your spouse/partner discussed the number of children you would like to have?"; if yes, "How often have you talked to your spouse/partner about this subject in the last six months?" A third relationship-level characteristic was communication between spouses on family planning use, in the past 6 months. Each spouse was asked the following question, "Have you and your spouse/partner discussed the use of a family planning method?"; if yes, "How often have you talked to your spouse/partner about this subject in the last six months?" Table 3.2 describes the categorization and distribution of these variables.

We also analyzed other individual characteristics and community factors. The individual characteristics included both spouses' ages, education levels and religions. The community-level factors included neighborhood type and household wealth, with neighborhood type capturing place-based poverty and household wealth being an indicator of asset-based poverty (Rutstein and Johnson 2004). Based on census data received from the Kenya National Bureau of Statistics, the neighborhood types were defined as informal or

formal housing. All households within a PSU were classified as informal if built on land that

the government had not allocated for housing and formal if built on land allocated for

housing. Housing wealth was created by constructing a linear index from 21 asset ownership

indicators[2], using principal components analysis (Filmer and Pritchett 2001). This

information, as reported by the head of the household, was retrieved from the household

questionnaire. The wealth index variable was measured in tertiles and the population was

assigned to three categories: poor, intermediate and rich. Based on the Social Ecological

Theory's framework, "neighborhood type" is a community factor of interest and "wealth"

represents a household characteristic further described in Table 3.1. The city of residence

was controlled as a community-level variable, *i.e.*, Nairobi, Mombasa and Kisumu, also

described in Table 3.1.

3.2.2 Analysis plan

    This study includes a subsample of all married women and men. Therefore, chi-

squared tests were performed between the sample of all married women and the subsample of

married women included in this analysis to determine if the subsample was representative of

the married/cohabiting population. We also present cross-tabulations of the responses given

by husbands and wives to each question/variable individually to compare the frequency of

concordant responses and to quantify inter-rater agreement using percentage (%) agreement

and kappa statistics. The kappa coefficient ranges from -1 to +1 and takes into account

agreement by chance. There is no consensus in the existing literature as to which kappa

magnitudes are considered high or low agreement. However, the first and frequently used

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[2] The 21 assets included owning a vehicle, computer, TV, bicycle, clock, refrigerator, electric stove, mosquito net, VCR, iron, sofa, torch; having domestic help; the number of rooms in the house; whether the house has a separate kitchen, electricity, toilet, home insurance, and the types of floors and walls.

guideline was that of Landis and Koch (1977) who proposed the following kappa statistics: a) < 0 indicates no agreement, b) 0–0.20 = slight, c) 0.21–0.40 = fair, d) 0.41–0.60 = moderate, e) 0.61–0.80 = substantial, and f) 0.81–1.0 = almost perfect agreement (Landis and Koch 1977).

For the multivariate analyses, the couple is the unit of analysis: the multivariate analyses that test the association between couple interactions (*i.e.,* ideal family size, partner discussion on the desired number of children and family planning use in the prior six months) with contraceptive use control for couples' individual characteristics (*i.e.,* age, education, religion) and environmental factors (*i.e.,* household wealth, type of residence and city of residence).

We used Stata 12 software for all statistical computations (Stata Corp 2011). All analyses were further conducted after population weights were applied to represent the married/cohabiting urban population of the three cities involved. We obtained ethical clearance from the University of North Carolina at Chapel Hill Institutional Review Board (UNC IRB) and the Kenya Medical Research Institute (KEMRI) to conduct the surveys. This secondary data analysis was exempted by the UNC IRB.

3.3 Results

After city-level population weights were applied, a total of 4778 married/cohabiting women and 1448 married/cohabiting men completed the interview. Upon matching, 840 couples were identified for this analysis. Chi-squared statistics were performed to determine if the sub-sample of women identified as couples were similar to the full sample of married/cohabiting women in the sample interviewed. The null hypothesis for the tests was

68

that the characteristics of the subsample of 840 women were similar to that of the population's married/cohabiting women. As noted in Appendix 3.III, the p-values from the chi-squared statistics show that we failed to reject the null hypothesis, indicating that the sub-sample of married/cohabiting wives who matched for this study have characteristics similar to the full sample of married/cohabiting women.

3.3.1 Characteristics of women and their partners

Table 3.1 presents the overall distribution of the key individual, couple and community-level characteristics for this analysis. Wives were generally younger with over a quarter (27%) of the women being between 15 and 24 years old while only 9% of men were within that age range. On the other hand, a quarter (25%) of the wives and almost half (44%) the husbands interviewed were 35 and older. With regards to education, 15% of wives and 9% of husbands had not completed primary education but husbands were generally more educated as 71% of them have received at least some secondary education compared to only 57% of wives. In general, the majority of the couples adhered to the same religion with 74% agreement. Less than a quarter were Catholic, two-thirds Protestant and approximately 10% were Muslim or belonged to other Faiths. There was generally very low agreement between husbands' and wives' responses to their ideal family size, as documented by a 34% agreement score and a kappa statistic of 0.11 (slight inter-rater agreement). Almost three-quarters (70%) of wives wanted three or fewer children while only 57% of husbands wanted the same. In addition, about 50% of the wives stated that they had discussed the number of children they would like to have with their partner in the prior six months while a higher (67%) percentage of husbands stated the same. Furthermore, less than half (46%) of the wives stated that they had communicated with their partners regarding family planning use

while about two-thirds of the husbands reported discussing family planning use with their wives. About one-quarter (24%) of all couples were living in informal housing, while the remaining three-quarters (76%) were in formal settlements. One-third (36%) of the couples were poor while a quarter (23%) had intermediate wealth and the remaining 41% were the richest in the population. Further, three-quarters (76%) of the couples resided in Nairobi, one-fifth (19%) in Mombasa and 4% in Kisumu. Among non-users of contraception, husbands (23%) were more often unsure about future intention to use FP than wives (11%).

Table 3.2 compares the women and their male partners' individual-level and relationship-level characteristics. In general, men were married/cohabiting with partners in the same age range or younger; 45% of all participants were men 25-34 years of age with a partner 34 years or younger. When comparing partners' education levels, a majority of husbands and wives had similar education levels and husbands were generally not married/cohabiting with a partner more educated than themselves. In comparing partners' religions, we note that most partners belonged to the same religious denominations. When asked about their desired number of children, 45% of couples responded that they wanted three or less children while another 18% wanted more than three children. About a quarter of the couples had discordant desires, with a greater percentage of husbands wanting more than three children than their female partners. When comparing couples' communication about their desired numbers of children, 38% of husbands stated that they had discussed the subject with their wives, while their wives stated that they had not discussed the subject with them. Furthermore, one-third (33%) of the couples responded that they had both discussed family planning use with their spouses. In summary, spouses often gave different responses to individual and relationship-level characteristics.

70

3.3.2 Characteristics of couples

For the analyses that follow, the couple is the unit of analysis; the husbands' and wives' characteristics were combined to create couples' characteristics representing the concordance on a specific variable. In Table 3.3, we present the percentage of couples using FP by the characteristics of the couples and test the statistical significance of the difference using a chi-squared test. Overall, 60% (507) of wives were using contraception. Couples with at least one partner 35 years and older were more likely to use contraception than younger couples in which both partners were less than 35 years old; this difference was not significant. Among couples in which both partners had completed some primary education, around half of them (52%) used contraception; among couples in which both partners had some secondary education or more, almost two-thirds (65%) of couples had used contraception; this difference was also not significant. Around two-thirds of couples used FP if both partners were Protestant or belonged to different religions (usually one partner being Protestant) whereas a significantly smaller percentage of the Catholic couples (50%) and Muslim couples (37%) were currently using contraceptives. Couples for which the wife wanted three children or fewer were more likely to use FP than couples for which the wife wanted more children, irrespective of her husband's preference; this difference was borderline significant at p<0.10. Couples where both partners agreed to having discussed their desired number of children with each other had a higher probability of contraceptive use than couples where both partners did not discuss fertility desires; however, this difference was not statistically significant. Couples where both spouses agreed to discussing FP use had a significantly higher likelihood of using contraception (73%) than couples where one/both partner(s) did not agree to discussing FP use with their spouse (58%) and this difference was

statistically significant (p-value <0.001). Almost two-thirds (61%) of couples living in formal

settlements used FP compared to 57% of couples living in informal settlements; this

difference was not statistically significant. However, the poor were significantly less likely

to use contraception than those living in richer households; 50% of poor couples used

contraception versus 68% among the rich households. Further, Nairobi-based couples were

more likely to use contraception (63%) followed by couples in Kisumu (55%) and Mombasa

(52%), with a p-value of 0.05.

3.3.3 Multivariate findings

In Table 3.4, the multivariate logistic regression odds ratios and 95% confidence

intervals are presented for the analysis of couples' relationship characteristics on women's

contraceptive use. Three models are presented: Model 1 includes the key variables of

interest, *i.e.*, couple's ideal family size and inter-partner communication regarding desired

number of children and family planning use; Model 2 includes the addition of the couple's

demographic characteristics, *i.e.*, age, education and religion; and Model 3 has additional

environmental variables, *i.e.,* neighborhood type, household wealth and the city of residence.

The analysis shows that the couples in which only the wife wants three children or less have

almost twice the odds of using contraception than couples for which both partners want more

than three children; this finding is significant across all three models. Couples where

one/both partners said that they discussed their desired number of children are 1.5 times more

likely to use contraception than couples where both partners said they did not discuss desired

fertility, and this finding is significant. Also, couples where both partners said they had

discussed family planning use with their spouse are 5 times more likely to use family

planning than couples where both spouses said they had not discussed family planning with

each other and more than 2 times as likely to use family planning if at least one partner reported discussing family planning use with their partner, and these findings are significant. The three models produced similar results. Models 2 and 3 also show that the odds of using contraception among couples for which both partners are Protestant is almost 3 times greater than the odds of using contraception for which both partners are Muslim. Further, couples belonging to different religions also have more than a 2.5 times greater odds of using contraception than couples in which both partners are Muslim.

We repeated multivariate analyses to determine the odds of intention to use contraception among couples currently not using contraception. Table 3.5 presents the multivariate logistic regression odds ratios and 95% confidence intervals for the analysis of couple characteristics on the couple's intent to use contraception. Similar to Table 3.4, we present three models. Based on Model 1, couples have a 1.5 times higher odds of intending to use contraception if only the wife wants less than three children as compared to couples where both partners want more than three children. Couples where only one partner reported communicating about desired family size with their partner were 2.5 times more likely to have an intention to use contraception than couples where both partners had not communicated with each other on family size (Model 3). Also, couples where both spouses agreed to discuss family planning use were 6 times more likely to have an intention to use family planning than couples where both partners reported not discussing family planning with each other. Hence, it appears that the effect of couple characteristics on intention to use contraception presented in Table 3.5 is similar to the effect of couple characteristics on contraceptive use tested in Table 3.4.

3.4 Discussion

In this study, we performed a detailed and informative couples-level analysis of the insufficiently studied urban populations of three Kenyan cities. The most recent Kenya DHS shows that one-fifth (20.2%) of urban women aged 15-49 have an unmet need for contraception, about half of which is for spacing (10.7%) and the other half for limiting (9.5%) (Kenya National Bureau of Statistics (KNBS) and ICF Macro 2010). We undertook a couples-level analysis and systematically examined the roles of communication between the partners regarding fertility desires, the partners' ages, education levels, and religions on family planning use. The analysis also controlled for environmental factors such as household wealth, neighborhood type and city of residence. Our study went one step further by interviewing a large number of urban women and men and generating valuable couples' data on 883 couples. Finally, we determined the impacts of couple characteristics on couples' intentions to use contraception.

Our analysis showed that almost 60% of the couples interviewed reported current contraceptive use. In addition, the relationship-level characteristic of the ideal number of children each partner wanted showed that there was very low inter-rater agreement (34%). Husbands generally desired more children than their wives, a finding documented in previous studies too (Bankole and Singh 1998, Wambui *et al.* 2009). Less than one-third of both spouses, within a couple, reported talking about desired number of children and family planning use with their spouse. Multivariate analyses found that the wife's desire to have fewer children is a strong motivator to be a current user of contraception or intend to use contraception in the near future. These findings also contradict earlier DHS analyses conducted in Kenya that found that women were more likely to use contraception if their

husband desired fewer children (Dodoo 1998). These findings also did not support our hypothesis that both spouses' desires for fewer children is associated with contraceptive use. This suggests that as urban women have more information and access to FP services around them, this may lead to their changing fertility desires and increased couple-level family planning use. Our analyses also showed that communication among partners about family planning use had a significant effect on current use and future intent to use. Similar findings were noted in the analysis of data from couples across Kenya where higher proportions of ever-use of contraception was noted among couples that reported spousal communication (Kimuna and Adamchak 2001). The findings also support our hypothesis that contraceptive use and intention to use is higher among couples where both partners report communicating about family planning.

Our analysis of other individual-level characteristics showed that 90% of the urban Kenyan women were married to men with similar or higher education levels, a finding consistent with previous studies conducted in Central Asia and the Middle East (Del Boca et al. 2000). Further, our bivariate and multivariate analyses indicate that couples where husbands had more than a primary education were more likely to use contraception compared to couples for which only the woman was more educated. These findings are similar to a previous couple study where husbands' formal education had a greater influence on contraceptive use than wives' education (Gubhaju 2009). After controlling for other factors, religion also has a significant impact on contraceptive use. The evidence suggests that contraceptive use is high when both spouses are Protestant, and is consistent with increased acceptability in the Protestant community (Gyimah et al. 2008). Discordant couples in which

the partners adhered to different religions were more likely to use contraception, as also noted in other couple studies in Ghana (Oheneba-Sakyi and Takyi 1997, Gyimah *et al.* 2008).

In summary, we note that our findings on the effect of couple and individual-level characteristics on contraceptive use are consistent with other studies, but add important new insights relating to the urban setting. Finally, by accounting for the characteristics of the husband and the wife in an urban environment, we have highlighted that women's desire for a smaller family and better spousal communication has an important effect on couples' contraceptive use and intention to use.

3.4.1 Limitations

Our study is limited by its use of cross-sectional data; we cannot establish temporality or causality regarding the effect of poverty on contraceptive use. Furthermore, the survey may suffer from recall bias; for example, participants may not recall discussing the desired number of children in the prior six months. There is also the possibility of potential interviewer bias since reporting of reproductive health practices or discussions around family planning are generally private matters. To mitigate this potential bias we utilized well-trained interviewers who ensured that the interviews were conducted privately. It is also noteworthy that the key independent variables of communication between partners regarding desired number of children and family planning use in the prior 6 months may be correlated or possibly endogenous. The correlation tests showed a 33% correlation between the two variables; we determined that the variables are independent enough to be included as separate variables in the multivariate analyses models.

3.4.2 Future research

More studies need to focus on the needs of urban couples in order to determine their barriers to accessing FP services. A longitudinal study that follows couples through their reproductive cycles is needed to determine the specific challenges they face in deciding to use contraception and access FP services. A qualitative and/or a longitudinal study in urban settings would help better understand the timing of change in certain couple-level factors, for example, how changes in couples' fertility desires over time influence FP use (especially as one partner's desires changes before the other's). Also, the study we conducted could be replicated in another setting with lower contraceptive prevalence to determine whether our results are reproducible or different depending upon the populations involved.

3.4.3 Programmatic implications

We show that couple communication has an impact on current contraceptive use as well as future intention to use, among non-users. FP programs need to ensure that men are more involved in family planning decision-making. Through male motivation campaigns, the importance of involving men in family planning decision-making can be brought to light (Kim *et al.* 1996). These male motivation campaigns can have several components to them. For example, men can be counseled and trained in interpersonal communication. At the same time, the campaign can work towards better couple communication by counseling and training both partners together in couple communication sessions. Multimedia advertising can make the public aware of the existence of such a program and also begin to highlight the importance of couple communication, thus encouraging men to participate in male motivation campaigns and couple communication sessions. Outreach health workers can be empowered to approach couples to teach them basic skills on how to better communicate on

family planning issues, address some of their concerns right away and encourage them to participate in the ongoing male motivation campaign (DFID 2001). In addition, considering that our study found that the more knowledge the female partner has on the subject of FP methods and services, the more likely they are to use them, it is therefore critically important to provide adequate education on these subjects. In this manner, the findings of this study can influence couples to use FP methods to space and limit the number of children they desire, across urban centers in Kenya and other regions.

3.4.4 Conclusion

This study indicates that communication between partners on family planning and their desired number of children is associated with contraceptive use and intention to use. This implies that efforts should be made to involve men in family planning decision-making and improve communication on family planning-related matters between partners. Interventions that target urban couples and reduce their barriers to FP use will help ensure that all urban couples in Kenya and elsewhere are served by FP programs appropriately.

3.5 Tables and Figures

Table 3.1: Percentage distribution and comparison of sociodemographic characteristics of married/cohabiting women and men using percentage agreement and kappa statistics, in urban Kenya

Characteristics	Wives (n=840)	Husbands (n=840)	Percentage agreement	Kappa statistic
Individual characteristics				
Age			55.7	0.33
15-24	27.2	9.0		
25-34	48.2	46.8		
35-49	24.6	44.2		
Education			55.3	0.26
None/some primary	15.2	8.8		
Primary complete	28.2	20.1		
Some secondary/more	56.7	71.2		
Religion			74.1	0.45
Catholic	21.8	23.3		
Protestant	68.9	66.4		
Muslim/other/none	9.3	10.3		
Couple characteristics				
Ideal family size			34.1	0.11
≤2	37.5	28.6		
3	32.0	28.2		
4	22.5	26.3		
5+	8.0	16.9		
Discussed desired number of children with spouse, in the past 6 months			55.2	0.12
Yes	50.3	67.3		
No	49.7	32.7		
Discussed family planning use with spouse, in the past 6 months			57.2	0.16
Yes	45.8	67.2		
No	54.2	32.8		
Environmental characteristics				
Neighborhood type			--	--
Informal	24.0			
Formal	76.0			
Household wealth			--	--
Poor	31.7			
Intermediate	35.8			
Rich	32.5			
City			--	--
Nairobi	76.3			
Mombasa	19.4			
Kisumu	4.4			

Among non-users of contraception	(n=333)	(n=265)		
Future intention to use contraception			58.2	0.33
Yes	36.7	30.3		
No	52.7	46.5		
Don't know	10.6	23.3		

Table 3.2. Comparison of percentage distribution of sociodemographic characteristics of married/cohabiting women and men, in urban Kenya, n=840

Wife's characteristics	Husband's characteristics			Total
	AGE			
	15-24	25-34	35+	
15-24	7.6	17.3	2.4	**27.2 (229)**
25-34	1.4	27.9	18.9	**48.2 (404)**
35+	0.0	1.7	22.9	**24.6 (207)**
Total	**9.0 (75)**	**46.8 (393)**	**44.2 (371)**	**100 (840)**
	EDUCATION			
	None/some primary	Primary complete	Some secondary/more	
None/some primary	3.6	5.7	5.8	**15.2 (127)**
Primary complete	3.8	9.2	15.2	**28.2 (237)**
Some secondary/more	1.4	5.1	50.2	**56.7 (476)**
Total	**8.8 (74)**	**20.1 (168)**	**71.2 (598)**	**100 (840)**
	RELIGION			
	Catholic	Protestant	Muslim/other/none	
Catholic	11.4	10.0	0.4	**21.8 (183)**
Protestant	11.3	54.4	3.2	**68.9 (579)**
Muslim/other/none	0.6	2.0	6.7	**9.3 (78)**
Total	**23.3 (196)**	**66.4 (558)**	**10.3 (86)**	**100 (840)**
	IDEAL FAMILY SIZE			
	≤3		>3	
≤3	45.0		24.6	**69.6 (584)**
>3	12.0		18.4	**30.4 (256)**
Total	**57.0 (478)**		**43.0 (362)**	**100 (840)**
	DISCUSSED DESIRED NO. OF CHILDREN WITH SPOUSE			**Total**
	Yes		No	
Yes	29.3		20.4	**50.3 (423)**
No	38.1		12.2	**49.7 (417)**
Total	**67.3 (566)**		**32.7 (274)**	**100 (840)**
	DISCUSSED FAMILY PLANNING USE WITH SPOUSE			**Total**
	Yes		No	
Yes	32.6		21.6	**45.8 (385)**
No	34.6		11.2	**54.2 (455)**
Total	**67.2 (564)**		**32.8 (275)**	**100 (840)**

Table 3.3: Percentage distribution of characteristics of married couples, by current contraceptive use

Variables	Wife's current contraceptive use		Total	p-value of chi-squared test
	Yes (n=507)	No (n=333)	n=840 (%)	
Individual characteristics				
Age				0.61
Husband 15-34, wife 15-34	58.2	41.8	454 (54.1)	
Husband 35+, wife 35+	63.7	36.3	193 (22.9)	
Spouses belong to different age categories	62.1	37.9	193 (23.0)	
Education				0.18
Both completed primary/less	51.7	48.3	187 (22.3)	
Husband some secondary/more, wife primary/less	59.9	40.1	177 (21.1)	
Wife some secondary/more, husband primary/less	56.1	43.9	55 (6.5)	
Both had some secondary/more	64.9	35.1	421 (50.1)	
Religion				0.01*
Both Protestant	64.2	35.8	457 (54.4)	
Both Catholic	49.6	50.4	96 (11.4)	
Both Muslim/other	37.4	62.6	56 (6.7)	
Spouses belong to different religions	62.7	37.3	231 (27.5)	
Couple characteristics				
Ideal family size				0.09†
Both spouses want ≤3 children	59.2	40.8	377 (44.9)	
Only wife wants ≤3 children	69.8	30.2	207 (24.7)	
Only husband wants ≤3 children	55.0	45.0	101 (12.0)	
Both want >3 children	53.9	46.1	155 (18.5)	
Discussed desired no. of children with spouse in last 6 months				0.39
Both spouses agree to discussing desired fertility	63.7	36.3	320 (38.1)	
Both spouses agree not to discussing desired fertility	62.0	38.0	172 (20.4)	
Spouses had discordant responses	56.4	43.6	348 (41.5)	
Discussed family planning use with spouse in last 6 months				<0.001**
Both spouses agree to discussing FP use	72.9	27.1	291 (34.7)	
Both spouses agree not to discussing FP use	44.9	55.1	182 (21.6)	
Spouses had discordant responses	58.0	42.0	367 (43.7)	
Environmental characteristics				
Neighborhood type				0.38
Informal	57.2	42.8	202 (24.0)	
Formal	61.3	38.7	638 (76.0)	
Wealth				0.01*
Poor	50.4	49.6	266 (31.7)	
Intermediate	37.4	62.6	301 (35.8)	
Rich	67.5	32.5	273 (32.5)	
City				0.05*
Nairobi	62.7	37.3	640 (76.3)	
Mombasa	52.1	47.9	163(19.4)	
Kisumu	54.8	45.2	37 (4.4)	

Note: †p≤0.10, *p≤0.05, **p≤0.01

Table 3.4: Odds ratios (and 95%confidence intervals) from logistic regression analyses assessing the association between explanatory variables and women's reported current contraceptive use, n=840

Characteristics	Wife's current contraceptive use		
	Model 1	Model 2	Model 3
Primary characteristics of interest			
Ideal family size			
Both spouses want ≤3 children	1.20 (0.68, 2.13)	1.09 (0.62, 1.90)	1.01 (0.56, 1.80)
Only wife wants ≤3 children	1.97 (1.11, 3.52)*	1.95 (1.09, 3.48)*	1.88 (1.05, 3.40)*
Only husband wants ≤3 children	1.00 (0.47, 2.11)	0.89 (0.44, 1.83)	0.92 (0.44, 1.90)
Both want >3 children	1.00	1.00	1.00
Discussed desired no. of children with spouse in the last 6 months			
Both spouses agree to discussing desired fertility	1.45 (1.23, 1.89)*	1.48 (1.24, 1.93)*	1.45 (1.24, 1.87)*
Both spouses agree not to discussing desired fertility	1.00	1.00	1.00
Spouses had discordant responses	1.48 (1.24, 1.97)	1.51 (1.27, 1.99)*	1.51 (1.27, 1.96)*
Discussed family planning use with spouse in the last 6 months			
Both spouses agree to discussing family planning use	5.22 (2.79, 9.75)**	5.25 (2.80, 9.86)**	5.28 (2.79, 9.99)**
Both spouses agree not to discussing family planning use	1.00	1.00	1.00
Spouses had discordant responses	2.36 (1.44, 3.87)**	2.16 (1.30, 3.60)**	2.20 (1.33, 3.66)**
Other variables of interest			
Age			
Husband 15-34, wife 15-34		0.64 (0.36, 1.17)	0.72 (0.38, 1.37)
Husband 35+, wife 35+		1.00	1.00
Spouses belong to different age categories		0.96 (0.49, 1.86)	1.03 (0.51, 2.07)
Education			
Both completed primary/less		1.00	1.00
Husband some secondary/more, wife primary/less		1.30 (0.74, 2.28)	1.19 (0.66, 2.16)
Wife some secondary/more, husband primary/less		1.00 (0.37, 2.73)	0.97 (0.35, 2.72)
Both had some secondary/more		1.58 (0.94, 2.65)†	1.30 (0.72, 2.35)
Religion			
Both Protestant		3.21 (1.43, 7.22)**	2.85 (1.19, 6.80)*
Both Catholic		1.93 (0.74, 5.02)	1.70 (0.62, 4.68)
Both Muslim/other		1.00	1.00
Spouses belong to different religions		3.11 (1.32, 7.32)**	2.84 (1.13, 7.10)*
Neighborhood type			
Informal			0.84 (0.55, 1.29)
Formal			1.00

Wealth			
Poor			1.00
Intermediate			1.26 (0.76, 2.07)
Rich			1.48 (0.85, 2.58)
City			
Nairobi			1.41 (0.92, 2.16)
Mombasa			1.02 (0.78, 1.35)
Kisumu			1.00

Note: †p≤0.10, *p≤0.05, **p≤0.01

Table 3.5: Odds ratios (and 95%confidence intervals) from logistic regression analyses assessing the association between explanatory variables and women's reported intention to use contraception, among non-users n=333

Characteristics	Couple intends to use contraception		
	Model 1	Model 2	Model 3
Primary characteristics of interest			
Ideal family size			
Both spouses want ≤3 children	1.66 (0.30, 2.45)	1.57 (0.24, 2.32)	1.62 (0.28, 2.41)
Only wife wants ≤3 children	1.48 (1.20, 2.13)*	1.46 (1.19, 2.09)*	1.48 (1.20, 2.13)*
Only husband wants ≤3 children	0.55 (0.22, 1.42)	0.49 (0.18, 1.37)	0.55 (0.22, 1.42)
Both want >3 children	1.00	1.00	1.00
Discussed desired no. of children with spouse in the last 6 months			
Both spouses agree to discussing desired fertility	2.55 (0.84, 7.77)†	1.68 (0.54, 5.22)	1.62 (0.52, 5.06)
Both spouses agree not to discussing desired fertility	1.00	1.00	1.00
Spouses had discordant responses	3.31 (1.34, 8.20)**	2.66 (1.01, 6.99)**	2.45 (0.93, 6.44)*
Discussed family planning use with spouse in the last 6 months			
Both spouses agree to discussing family planning use	6.20 (2.02, 19.00)**	5.58 (1.84, 16.93)**	5.92 (2.01, 17.43)**
Both spouses agree not to discussing family planning use	1.00	1.00	1.00
Spouses had discordant responses	2.50 (0.97, 6.43)†	2.19 (0.74, 6.47)	2.32 (0.79, 6.85)
Other variables of interest			
Age			
Husband 15-34, wife 15-34		4.90 (1.67, 14.38)**	4.29 (1.40, 13.20)*
Husband 35+, wife 35+		1.00	1.00
Spouses belong to different age categories		2.97 (0.95, 9.29)†	2.81 (0.90, 8.72)*
Education			
Both completed primary/less		1.00	1.00
Husband some secondary/more, wife primary/less		1.82 (0.82, 4.04)	1.76 (0.74, 4.18)
Wife some secondary/more, husband primary/less		0.28 (0.05, 1.51)	0.26 (0.05, 1.49)
Both had some secondary/more		0.87 (0.42, 1.80)	0.92 (0.41, 2.10)
Religion			
Both Protestant		2.48 (0.79, 7.84)	2.03 (0.65, 6.32)
Both Catholic		3.67 (0.93, 14.42)†	2.67 (0.67, 10.63)
Both Muslim/other		1.00	1.00
Spouses belong to different religions		2.33 (0.72, 7.57)	1.71 (0.52, 5.68)
Neighborhood type			
Informal			1.10 (0.57, 2.14)
Formal			1.00

Wealth			
Poor			1.00
Intermediate			0.85 (0.42, 1.75)
Rich			0.58 (0.21, 1.58)
City			
Nairobi			2.02 (0.92, 4.45)†
Mombasa			1.14 (0.71, 1.84)
Kisumu			1.00

Note: †p≤0.10, *p≤0.05, **p≤0.01

Chapter 4: Conclusion

Kenya's urban population is growing at an alarming rate. Every day, scores of people are moving to the cities in hopes of a better job and life. With the cities swelling, new immigrants find themselves in cramped neighborhoods. As a result, the poor live in homes and neighborhoods that lack even the basic of services such as tap water and electricity (Matrix Development Consultants 1993, Cohen 2004). In addition, despite living in cities, the poor have limited resources and hence are unable to access healthcare services readily available in urban centers (Fotso et al. 2008). Often, couples living in poverty have a great need for healthcare services such as family planning. Hence, factors preventing the uptake of contraception in this population need to be better understood.

The aims of this dissertation therefore were to determine factors affecting contraceptive use in urban Kenya. The specific aims were to estimate the effect of poverty on women's contraceptive use patterns and determine the impact of relationship-level characteristics on couples' contraceptive use, within an African urban setting. It used baseline population-based survey data collected from men and women across the Kenyan cities of Nairobi, Mombasa and Kisumu. In this urban setting, poverty is measured using two indicators, neighborhood type as a measure of place-based poverty and household wealth as a measure of asset-based poverty. Neighborhood type is categorized into formal and informal neighborhoods, a formal neighborhood being one where the land had been allocated by the government for building houses while an informal neighborhood was one where the land had not been allocated for housing. Household wealth is generated by creating an index to

determine how many of the 21 pre-determined assets each household owned. The population of households is then divided into three groups called tertiles representing the poor, intermediate and rich. Furthermore, the relationship-level characteristics include the concordance of the response given by both spouses as to their ideal family size, and communication within the last 6 months regarding the desired number of children and family planning use.

The first paper estimates the impacts of neighborhood type and household wealth on contraceptive use patterns and reasons for switching methods among urban women in Kenya. The data show that 52% of the 4968 women in our sample are current users; this finding is similar to the most recent DHS data collected from Kenya (Kenya National Bureau of Statistics (KNBS) and ICF Macro 2010). Multivariate analyses show that poor women (62% probability) are less likely to be current users than former or never users as compared to rich women (67% probability). Also, examining current users' switching patterns is important as over one-third of Kenyan women who initiate contraceptive use discontinue within the first year of use, often due to method-related reasons (Bradley et al. 2009b). The analysis shows that poor women have a 50% probability of using their first method while rich women have a 41% probability. Once household wealth is controlled for, neighborhood type (informal vs. formal) does not have an impact on contraceptive use. Since family planning is widely used and accepted in urban Kenya, couples living in informal settlements may be seeking FP services nearby (Kenya National Bureau of Statistics (KNBS) and ICF Macro 2010). Furthermore, we test the impact of a new slum variable (slum/intermediate/non-slum) on contraceptive use. A household was designated a slum if it did not have any of the amenities, an intermediate household if it had one of the amenities and a non-slum if it had two/three.

Multivariate analyses show that the results are similar to household wealth where women living in slums are less likely to be current users than nonslum women. Further, women living in slums who are current users are more likely to be using their first method and less likely to have switched methods than women living in non-slums. Hence, these results suggest that this new slum variable is actually an indicator of household wealth and not necessarily neighborhood type. An analysis of the reasons women give for switching methods shows that urban women switch primarily due to fertility-related reasons like frequent/infrequent sex, and method-related reasons like unpleasant side-effects. Across household wealth categories, poor women are more likely to cite method-related reasons and partner opposition for switching to more effective methods as compared to the rich. On the other hand, rich women are more likely to switch to more effective methods than the poor as a result of recommendations from others including healthcare providers and other reasons, such as learning about a new more effective method from radio or television broadcasts. Hence, we once again see that wealth has an impact on contraceptive use patterns.

The second paper determines the effects of couples' relationship-level characteristics on contraceptive use and future intention to use among urban Kenyan couples. A population of 840 couples is analyzed in this paper. Around 60% of couples are currently using a modern or traditional form of contraception. Interestingly, the odds of using contraception are high if the wife wants fewer children than when both partners want more children. Also, couples were more likely to use contraception if they had communicated about the desired number of children or about family planning methods. Among couples not using contraception, we also noted that the odds of intending to use contraception increased if the

woman desired fewer children or if there was communication between spouses regarding the desired number of children and potential use of family planning.

These findings have many programmatic implications. With the help of government support, FP programs need to identify the poor women and couples and provide adequate, good quality family planning services to them, irrespective of whether they live in formal and informal housing neighborhoods. For example, with the help of local leaders and outreach workers, the urban poor can be identified within neighborhoods. Further, local healthcare outreach workers can educate urban poor women and couples on the various methods available, where to access them and help address other concerns. Vouchers can be distributed among the poor and most in need allowing improved access to quality family planning services. In addition, FP programs should identify strategies to encourage men to become more involved in family planning through male empowerment workshops. By learning to better communicate with each other on sensitive topics such as family size and contraception, husbands and wives will be able to support each other and work together to meet their desired family size. A long-term impact can also be attained by ensuring that children from poor households receive good quality education. Education will lead to increased wealth in the long-run and hence more contraceptive use among women and couples. Furthermore, programs providing vocational training can help poor families seek employment or start new businesses which will also improve the family's wealth and thus lead to better outcomes. Future research is needed to determine the impact of specific programs in increasing contraceptive uptake and hence reducing unmet need.

In summary, this dissertation provides a unique approach to identifying the impact of multiple couple-level factors, such as ideal family size and couple communication, and

environmental factors, such as neighborhood types and household wealth, on contraceptive use in urban Kenya. The first paper concentrates on contraceptive use patterns among all women and switching patterns specifically among current users. Reasons for switching are also differentiated by switching patterns and compared by neighborhood types and household wealth. The second paper takes into account the contraceptive needs of couples after controlling for both the partners' individual characteristics and environmental factors. This dissertation examines data collected from a large population-based survey that is representative of the population of the three cities in Kenya that the data were collected from. Hence, this dissertation clarifies the specific impact of environmental and couple-level factors among the growing urban population in Kenya.

The findings show that there is a great need for FP, especially among the urban poor. It is a basic human right of every individual to have access to basic healthcare services. This can be translated as the right of every woman and couple to good quality voluntary FP services (Cottingham *et al.* 2012). Hence, governments must design policies and programs to support family planning services, disseminate correct information on the benefits of smaller families to all strata of society and ensure that the most marginalized and disadvantaged citizens have access to correct information and services (Cottingham *et al.* 2012). In order to assist developing countries in providing FP services to the poorest people, donor countries and organizations need to realign their efforts and provide greater funding to FP programs (Osotimehin 2012, Van Braeckel *et al.* 2012). The most recent estimates show that there is a current shortfall of about US$3-4 billion annually (Osotimehin 2012, Van Braeckel *et al.* 2012). With greater commitment from donor countries, international foundations as well as the governments of the developing countries themselves, couples can have the desired

91

number of children at the right intervals and thus eliminate the present unmet need in FP.

This will eventually result in a much healthier, prosperous and more equitable society.

Appendix A: Chapter 1

Figure A.1: Conceptual framework examining factors affecting impact of environmental factors on women's contraceptive use patterns

```
┌─────────────────────────────┐
│  Individual characteristics │
│  Age, marital status,       │ ─────────────────────┐
│  religion, education,       │                      │
│  parity, employment,        │                      ▼
│  migration, heard FP        │        ┌──────────────────────────┐
│  radio messages             │        │  Women's contraceptive   │
└─────────────┬───────────────┘        │      use patterns        │
              │                        └──────────────────────────┘
              ▼                              ▲              ▲
┌─────────────────────────────┐ ────────────┘              │
│  Environmental factors      │                            │
│  Neighborhood types,        │                            │
│  household wealth           │                            │
└─────────────┬───────────────┘                            │
              ▲                                             │
              │                                             │
┌─────────────────────────────┐ ────────────────────────────┘
│  Environmental characteristic│
│  City of residence          │
└─────────────────────────────┘
```
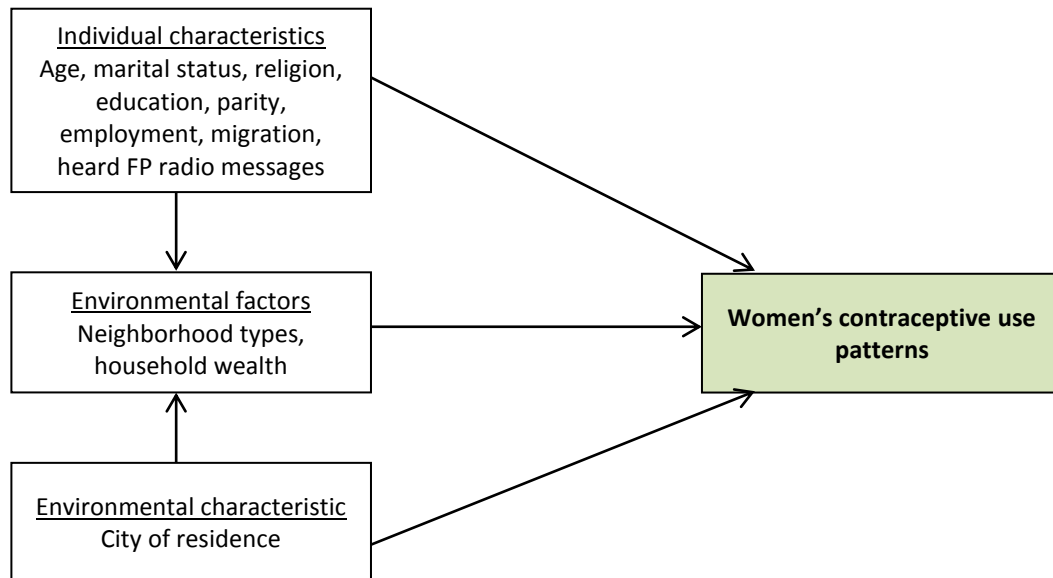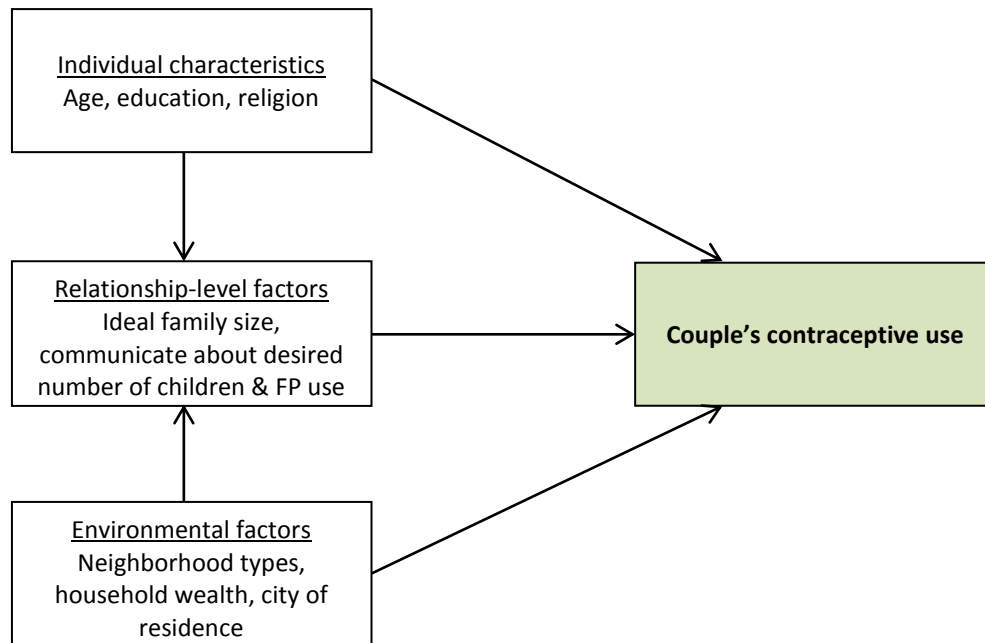
Figure A.2: Conceptual framework examining factors that impact the effect of relationship-level characteristics on contraceptive use patterns

Appendix B: Chapter 2

Table B.1: Contraceptive methods used to generate less→more effective and more→less effective methods

Method	Those who switched from less→more effective methods		Those who switched from more→less effective methods	
	Current method	Previous method	Current method	Previous method
Female/male sterilization	01		01	
Implant	02	02	02	02
IUD	03	03	03	03
Injectable	04	04	04	04
Daily pill	05	05	05	05
Emergency pill	06	06	06	06
Male/female condom/ Spermicide/ foam/ jelly	07	07	07	07
Natural methods (SD/ withdrawal)/ Breastfeeding/ LAM/ Other	08	08	08	08

Table B.2: Percentage distribution of switching categories, among current users, n=1259

Previous method	% (N)	Current method			Total
		Traditional	Short-term	Long-term	
Traditional	11.5 (145)	4.1	85.4	10.5	100.0 (145)
Short-term	81.5 (1026)	11.2	68.4	20.4	100.0 (1026)
Long-term	7.0 (88)	10.0	51.7	38.3	100.0 (88)

Note: Traditional methods natural methods (such as standard days, withdrawal) and LAM; short-term methods included female/male condoms, daily pills, emergency pills and injectables, and; the long-term methods comprised of the IUD, implant and female/male sterilization.

Figure B.1: Percentage distribution of new housing variables and corresponding household characteristics that define the new variable, N=5,086 households
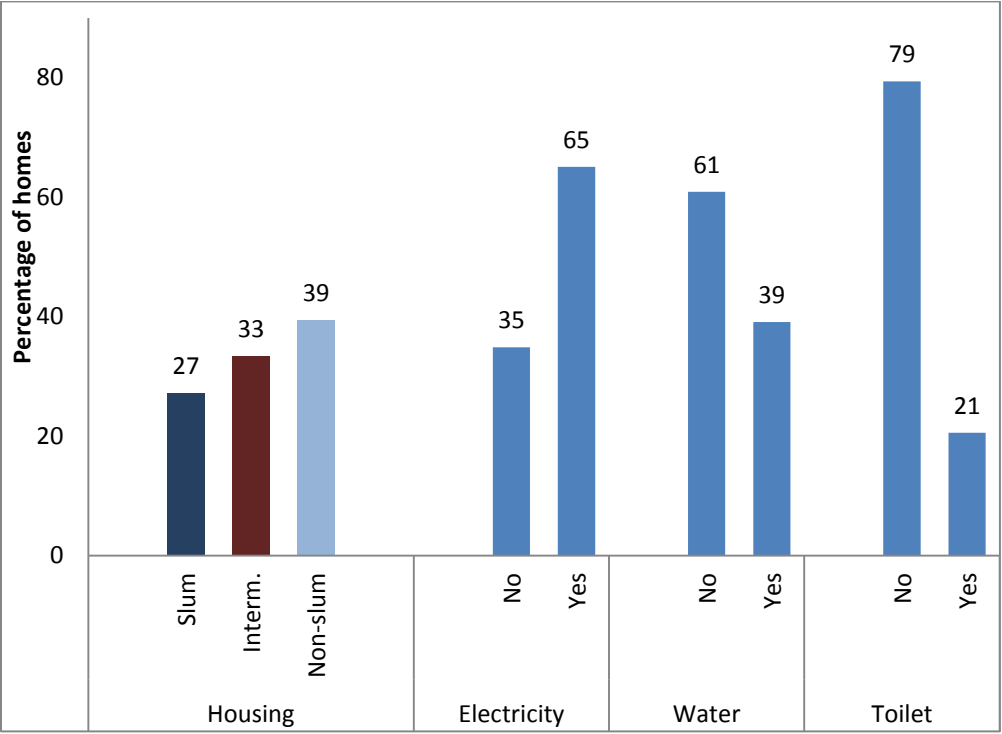
Table B.3: Reasons for discontinuation, by method categories

Reasons for switching, among current users	Less to more effective switch		
	Traditional → Short-term	Traditional → Long-term	Short-term → Long-term
	(n=124)	(n=15)	(n=209)
Fertility-related reasons	34.2	2.5	6.5
Method-related reasons	81.1	86.2	87.5
Cost and access-related	0.0	0.0	2.4
Partner opposes	3.7	0.0	2.7
Recommended by others	2.5	0.9	11.6
Other reasons	16.6	18.4	19.2
Reasons for switching, among current users	**More to less effective switch**		
	Long-term → Short-term	Long-term → Traditional	Short-term → Traditional
	(n=46)	(n=34)	(n=115)
Fertility-related reasons	7.3	0.0	12.0
Method-related reasons	83.4	87.0	80.5
Cost and access-related	2.9	0.0	0.5
Partner opposes	5.1	0.0	7.0
Recommended by others	10.4	0.0	1.9
Other reasons	27.4	15.0	23.3

Appendix C: Chapter 3

Figure C.1: The impact of factors affecting couple's contraceptive use, based on the Social Ecological Theory
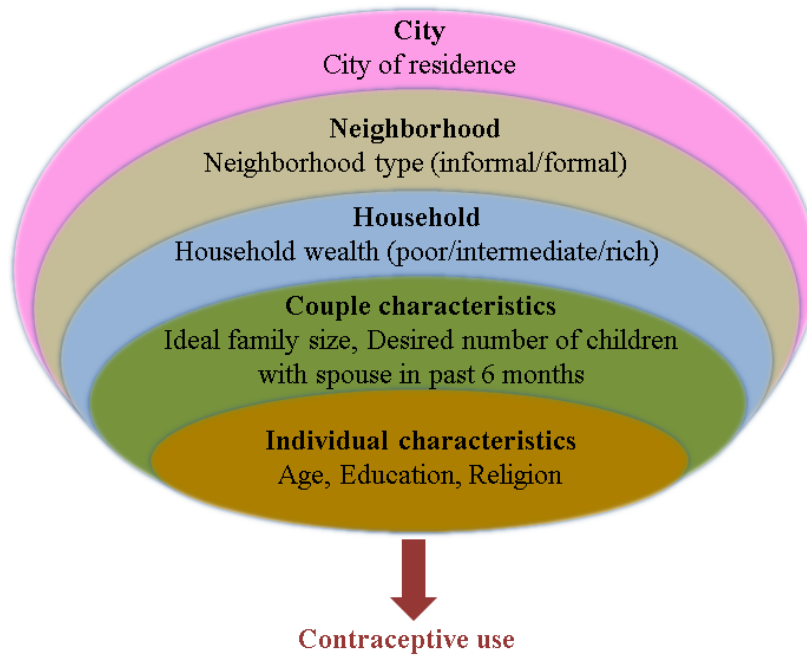
Table C.1: Explanation of sample size selected for final analysis from Nairobi, Mombasa and Kisumu

Categories	Women	Men
Total number of participants identified in selected households	**11761**	**12126**
Did not begin/complete an interview	5987	9623
Not married/cohabiting	2452	1079
Not full-time resident of home	61	16
Household not selected for male survey	1515	0
Not spouse/head of household	306	64
Households where spouse did not complete survey	557	461
Final sample who matched as a couple (unweighted)	**883**	**883**

Table C.2: Percentage distribution of sociodemographic characteristics of all married/cohabiting women and the subsample of interviewed women who were coupled with their male partners for this analysis, in urban Kenya

Characteristics	Wives		p-values
	Full married sample (n=4,778)	Coupled sub-sample (n=840)	
Dependent variable			
Among all women			
Current family planning use			0.90
Yes	59.5	60.4	
No	40.5	39.6	
Among non-users	**Full married sample (n=1,934)**	**Coupled sub-sample (n=333)**	
Future intention to use contraception			0.96
Yes	37.2	36.7	
No	51.0	52.7	
Don't know	11.8	10.6	
Independent variables of interest			
Ideal family size			0.99
≤2	39.2	37.5	
3	29.5	32.0	
4	22.2	22.5	
5+	9.1	8.0	
Discussed desired number of children with spouse in past 6 months			>0.99
Yes	50.2	50.3	
No	49.8	49.7	
Discussed family planning use with spouse in past 6 months			0.92
Yes	44.6	45.8	
No	55.4	54.2	
Other variables of interest			
Age			0.90
15-24	30.3	27.2	
25-34	46.0	48.2	
35+	23.7	24.6	
Education			0.83
None/some primary	17.7	15.2	
Primary complete	28.7	28.2	
Some secondary/more	53.6	56.7	
Religion			0.63
Catholic	23.2	21.8	
Protestant	64.3	68.9	
Muslim/other/none	12.5	9.3	
Neighborhood type			0.74
Informal	22.0	24.0	
Formal	78.0	76.0	
Wealth			0.94
Poor	32.1	31.7	
Medium	34.8	35.8	
Rich	33.1	32.5	

City			0.76
Nairobi	73.1	76.3	
Mombasa	21.0	19.4	
Kisumu	5.9	4.4	

Note: p-values of the chi-squared statistics compare the sub-sample of married men and women included in the couple analysis to the full sample of married men and women interviewed;

All percentages are weighted at the city level;

*p≤0.05, **p≤0.01

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