ABSTRACT

The Effect of Education, Contraception, and Reproductive Health Knowledge on Unplanned Pregnancy and Child Death in Rural Western Kenya

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East Africa carries the highest burden of unplanned pregnancy worldwide. Many studies have stressed the importance of family planning programs in preventing unplanned pregnancy as well as maternal and child morbidity and mortality. However, even when services are available, a decrease in birth rate and poor birth outcomes, including child death, does not necessarily follow. In the context of the highest HIV rates in East Africa, this failure is particularly alarming. Child death in the Nyanza province of Kenya is the highest nationally, and HIV rates among the Luo tribe of that area are also the highest in the country.

This cross-sectional study analyzes 2011 survey data from a sample of 112 Luo women from a culturally traditional, rural part of the Nyanza Province in western Kenya. Women had an average of 4.51 children, and over one-third had had at least one child die. Despite available family planning resources, only 54.63% of women had ever used birth control, while 26.92% of women were currently using birth control. The results of the study indicate that the subset of women who use scientific birth control are statistically significantly younger, more educated, and more knowledgeable about family planning, yet the use of birth control has not been effective in decreasing their number of births or infant deaths. On the other hand, there appears to be another group of women (less educated, older, less knowledgeable) for whom the very notion of planning births or birth intervals seems foreign. More than half of the overall sample said that they knew no women who had more babies than they wanted.

These results show that a single approach to educating and providing family planning methods without acknowledging vast cultural barriers will not be successful. However, knowledge alone is not enough, and structural barriers must also be addressed for successful family planning.

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THE EFFECT OF EDUCATION, CONTRACEPTION, AND REPRODUCTIVE HEALTH KNOWLEDGE ON UNPLANNED PREGNANCY AND CHILD DEATH IN RURAL WESTERN KENYA

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TABLE OF CONTENTS

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CHAPTER ONE

Introduction

Total fertility rates (TFRs), rates of unplanned pregnancy and infant and child death are higher in sub-Saharan Africa than anywhere else in the world. Furthermore, contraceptive use in this region is also the lowest in the world. It is women in rural sub-Saharan African countries, such as Kenya, that experience the extreme effects of these problems. These women are often uneducated, married early and begin childbearing at an early age, putting them at increased risk for adverse birth outcomes. Furthermore, rural Kenyans already suffer from food insecurity and high unemployment, further contributing to health, economic and social hardship.

In traditional agricultural societies, like the Nyakach Plateau of Western Kenya, where mortality is high, fertility will also be high as to ensure the population's survival. As a country develops ("modernizes"), industrialization, urbanization, increased education and public health investments increase energy and cost of children. This increased cost of children along with further decline in mortality increases the desire for smaller families, which facilitates the increase in demand for birth control to lower fertility (Bongaarts 2006).

Utilization of birth control provides a host of benefits for women, their children and their societies. Benefits for women include decreased rate of maternal mortality, morbidity and induced abortion, increased opportunity for educational and vocational obtainment, and improved economical power in the community. Benefits for the children

include increased pregnancy intervals; decreased risk of prematurity, low birth weight and child death; increased duration of breastfeeding; and increased opportunity for education. Benefits extended to society include further facilitation of the demographic transition; curbing population growth and decreasing poverty.

While many sub-Saharan African nations have entered the demographic transition, CPRs are still low, especially in rural areas. In sub-Saharan Africa, only 18% of married women use a modern method of contraception, compared to 63% in Latin America and 61% in Asia (Cleland et al. 2006). CPRs in sub-Saharan Africa are at their absolute lowest in rural areas where women are least likely to have access and least likely to possess correct knowledge about family planning methods. Furthermore, there is doubt that CPR will increase in sub-Saharan Africa because the desired total fertility rate (TFR) remains high (Zlotnik 2005). Thus, utilization of effective birth control not only provides health benefits to individuals and their families, it also expedites the escape from perpetual poverty.

Many factors, however, induce or impede contraceptive use, including barriers related to fertility values, education, access and cultural acceptance. Thus, some of the most effective ways of increasing contraceptive prevalence rates (CPRs) are methods that educate women in reproductive health topics and remove access barriers to contraception.

It is widely believed that increasing contraceptive use will be the most powerful determinant in reducing parity, unplanned pregnancy and, consequently, rates of infant and child death. The focus of this study is to measure the effect of education, reproductive health knowledge and contraceptive use on birth outcomes such as increased parity, unplanned pregnancy and child death.

CHAPTER TWO

Literature Review

Maternal, Infant and Child Health Worldwide

In developing nations, deaths and poor health among women and newborns have persisted despite international agreements to improve health among these populations (Singh, Darroch, Vlassoff & Nadeau 2009).

In 2000, the United Nations adopted the United Nations Millennium Declaration. Within this Declaration were eight goals that the 193 United Nations member states agreed to achieve by the year 2015. Millennium Development Goal (MDG) 4 was to "reduce by two-thirds, between 1990 and 2015, the under-five mortality rate". MDG 5 was twofold: a) to reduce by three-quarters the maternal mortality ratio (MMR) and b) to achieve universal access to reproductive health. Because the health of mothers is crucial for the health of their infants, investments in family planning in conjunction with maternal and newborn health services are both cost-effective and synergistic in their positive effects (Singh, Darroch, Vlassoff & Nadeau 2009).

While concerted international efforts have been effective in curbing maternal, neonatal and child deaths in some areas, most developing countries, especially those in sub-Saharan Africa, are largely off-track and will not meet the MDGs by 2015 (Hogan, Foreman, Naghavi et al. 2010; Murray, Laakso, Shibuya, Hill & Lopez 2007). In order to facilitate continued declines in maternal, neonatal and child mortality and fortify health

among these groups, it is essential to identify effective interventions as well as barriers in achieving these goals for women, infants and children.

The Importance of Family Planning Worldwide

In developed and developing nations where scarce resources cannot meet the needs of large families, access to family planning methods has saved countless lives, allowed economies to prosper, and conveyed many other benefits to society. Reducing family size and increasing inter-pregnancy intervals has reduced maternal and infant mortality rates (Ten Greatest Public Health Achievements 1999). Contraception is unique among health interventions in the breadth of its positive results (Cleland et al. 2012).

Contraception provides multifaceted benefits to the mother, her children and her society at-large.

Benefits for the Mother

Averting maternal mortality & morbidity. The main ways family planning averts maternal mortality and morbidity are through preventing high-risk pregnancies, which include pregnancies among women younger than 15 and older than 35, and women who have recently given birth; preventing pregnancies which would end in abortion, exposing the mother to further risk; and reducing suffering from anemia, infections, obstetric fistula and other adverse results of pregnancy and childbirth.

Although contraceptive use has risen dramatically in the past 40 years across the developing world, unintended pregnancies in low-income countries remain a serious obstetric problem due to lack of access to both effective maternity services and safe

abortion services (Cleland & Ali 2004). In 2008 alone, 41% of the 208 million pregnancies that occurred were unintended (Singh, Sedgh & Hussain 2010). The tragedy is not only that these pregnancies occur, but also that many women and their families suffer as a result. Though a portion of unintended pregnancies are *desired* even though they were unplanned, the physical burden remains the same. Between 1994 and 2000, 21% of all maternal deaths were the result of a pregnancy that was unintended (Daulaire et al. 2002). Every pregnancy brings exposure to the risk of maternal death; thus, "every unintended pregnancy, but particularly those in high-maternal-mortality settings, subjects the woman to a life-threatening event not of her choosing" (Gipson, Koenig & Hindin 2008; Campbell & Graham 2006). Furthermore, unintended pregnancies are more likely than planned pregnancy to be high risk: "of higher parity and/or to be experienced by very young or older women, for whom the risks of maternal death are inherently greater (Gipson, Koenig & Hindin 2008; Campbell & Graham 2006).

By reducing the number of unplanned pregnancies, contraceptive use has decreased the number of maternal deaths in the developing world by 40% over the past twenty years (Cleland et al. 2012). Since approximately 99% of maternal deaths occur in developing nations, the problem of maternal mortality is paramount in the developing world (Hill, AbouZahr & Wardlaw 2001).

Increasing the length of pregnancy intervals. Births that are unwanted or mistimed can increase health risks for the mother and the infant. Bad consequences for mothers and children occur when births are "are closely spaced, when a woman is too young or too old to bear children safely, or when she already has several children or is ill-

prepared to care for a child" (Brown and Eisenberg 1995; Marston and Cleland 2003; Gipson, Koenig & Hindin 2008).

Evidence gathered from meta-analyses and systematic reviews indicates that short as well as long pregnancy intervals are independently associated with "increased risk of adverse maternal, perinatal, infant and child outcomes" (Conde-Agudelo, Rosas-Bermudez & Kafury-Goeta 2006, 2007; Rutstein 2008). In a study of 456,889 parous Latin American women delivering singleton infants, interpregnancy intervals of 5 months or less had increased risks for maternal death (OR=1.73; 95% CI: 1.22 to 5.38), bleeding in the third trimester (1.73; 1.42 to 2.24), premature rupture of the membranes (1.72; 1.53 to 19.3), puerperal endometritis (1.33; 1.22 to 1.45), and anemia (1.30; 1.18 to 1.43) (Conde-Agudelo & Belizan 2000). While maternal mortality is a colossal problem, some claim it is but the "tip of the iceberg: for every woman who dies, approximately 30 women suffer infections, injuries and/or disabilities" (USAID 2006). These adverse outcomes could be largely avoided by increased use of contraception and increased access to safe delivery services.

Preventing abortion. A common immediate outcome of unplanned pregnancies is induced abortion. While induced abortion is a relatively common method of unintended pregnancy termination, roughly "one in four of the world's women live in countries that ban the procedure or permit it only to save the woman's life" (Gipson, Koenig & Hindin 2008). In many countries that have highly restrictive abortion laws, an unsafe abortion can damage a mother's health and sometimes even result in her death (Grimes et al. 2006). Strikingly, roughly half of unintended pregnancies end in abortion (Singh, Sedgh & Hussain 2010).

The estimated 136,000 maternal deaths that occur each year from abortion are caused largely by complications during delivery or and following unsafe abortion (Mutangadura 2002). Unsafe abortions are abortions performed by individuals lacking skills or in settings below medical standards, or both (WHO 1993; Singh et al. 2009b). In 2003, about 47% of all abortions performed worldwide were considered unsafe. More than 95% of those unsafe abortions occurred in developing nations (Singh 2009b).

Morbidity is a much more common result of unsafe abortion, causing short-term and potentially long-term reproductive health complications. An estimated 20-30% of unsafe abortions performed result in "reproductive tract infections, of which 20-40% result in infection of the upper reproductive tract and infertility" (Ahman & Shah 2004). The long-term complications include chronic reproductive tract infections, infertility and increased risks to future pregnancies. Furthermore, approximately 2% of women of reproductive age are infertile as a result of unsafe abortion; 5% suffer from chronic infections as a result of unsafe abortion (Ahman & Shah 2004).

In 2002, the WHO determined that 90% of abortion-related deaths and injuries could be averted by the utilization of effective contraceptive methods (WHO 2002).

Enhancing women's rights and power through delayed childbearing. The family planning movement over the past fifty years has represented a "sometimes uncomfortable alliance between those who were primarily motivated by demographic considerations—mainly governments—and those whose motivation was more humanitarian, a group that included some governments, but was mainly comprised of NGOs" (Sinding 2008). According to Sinding of the Alan Guttmacher Institute, the actions of some governments to reduce high birth rates violated a basic tenet of family planning "that it should be an

entirely voluntary service for people to avail themselves of according to their own needs and desires" (Sinding 2008). Thus, a basic tenet of family planning is that it increases a woman's ability to manage reproduction in a way that suits their needs and desires, thereby enhancing women's power and autonomy.

Since the pivotal 1994 International Conference on Population and Development (ICPD) in Cairo, a major change within the movement has occurred: a paradigm shift from the concept of "family planning" to that of "reproductive health", the latter being comprised of more than the provision of contraception and including "assessing and treating reproductive morbidity at the time of contraceptive provision and thereafter" (Caldwell, Phillips & Barkat-e-Khuda 2002).

Benefits for the Child

Increased length of pregnancy intervals. By preventing pregnancy in the months following a birth, i.e. lengthening the "pregnancy interval", many adverse birth outcomes can be averted as well as increasing the length of time that the first child is breast-fed, fortifying infant and child health.

Reducing risk for prematurity, LBW and infant death. Studies conducted in both rich and poor countries show that "conceptions taking place within 18 months of a previous live birth are at greater risk of fetal death, low birthweight (LBW), prematurity, and being small size for gestational age (SGA)" (Conde-Agudelo, Rosas-Bermúdez & Kafury-Goeta 2006; Zhu 2005; Cleland, Bernstein, Ezeh, Faundes, Glasier & Ennis 2006). In a meta-analysis of studies examining the association between birth spacing and relative risk of adverse perinatal outcomes, infants born to women with pregnancy

intervals shorter than 6 months had pooled unadjusted ORs (95% CIs) of 1.77 (1.54-2.04), 2.12 (1.98-2.26) and 1.39 (1.20-1.61) for preterm birth, LBW, and SGA, respectively, compared with infants born to women with intervals of 18 to 23 months. When odds ratios were adjusted, the associations remained statistically significant (Conde-Agudelo, Rosas-Bermúdez & Kafury-Goeta 2006).

The mechanisms underlying these increased risk factors are assumed to be related to nutritional depletion of the mother following the first pregnancy. It is probable that "a close succession of pregnancies and periods of lactation worsen the mother's nutritional status because there is not adequate time for the mother to recover from the physiological stresses of the preceding pregnancy before she is subjected to the physiological stresses of the next" (Winkvist, Rasmussen & Habicht 1992; Conde-Agudelo, Rosas-Bermúdez & Kafury-Goeta 2006).

The folate depletion hypothesis claims that maternal concentrations of folate decrease consistently from the fifth month of pregnancy for the duration of the pregnancy and remain low for a fairly long time after delivery. Thus, women who become pregnant before folate restoration is complete have an increased risk of insufficient folate at the time of conception, therefore posing an increased risk for neural tube defects, intrauterine growth restriction, preterm birth and LBW (Smits & Essed 2001).

Increased length of time breast-fed. Preventing unplanned pregnancies and increasing the length of pregnancy intervals increases the likelihood of prolonged breastfeeding, fortifying infant and child health. One analysis of DHS (Demographic Health Survey) data from 18 countries found a significant association between unplanned pregnancy and less likelihood of prolonged breastfeeding in developed and developing

countries (OR= 0.90; 95% CI= 0.85-0.96, n=12,896) (Hromi-Fiedler & Pérez-Escamilla 2006). Studies also show that breastfeeding beyond the first year of a child's life is beneficial for children's growth in developing countries (Marquis et al. 1997; Onyango, Esrey & Kramer 1999). A prospective cohort study of 264 children in western Kenya investigated the nature of association between breastfeeding and growth. In this analysis, children with the longest duration of breastfeeding gained more weight and grew more linearly than children in the intermediate group or the short duration group. The results showed a dose-response association between breastfeeding duration and linear growth (Onyango, Esrey & Kramer 1999).

While studies in developing countries have demonstrated that there are several factors, such as infant height, appetite and nutritional status that contribute to a mother's decision to wean an infant, a mother's unfavorable attitude toward her unplanned pregnancy can be a significant factor of duration of breastfeeding (Hromi-Fiedler & Pérez-Escamilla 2006; Simondon et al. 2001; Simondon & Simondon 1998). Thus, children who result from unplanned pregnancies are, overall, less likely to be breastfed for extended periods of time, possibly compromising their health. Conversely, children who result from planned pregnancies are more likely to be breastfed for longer periods of time and, therefore, are more likely to grow and be healthier.

Benefits for society

Demographic trends in Africa. Following the Second World War, annual rate of world population growth increased consistently at the same time that mortality reductions were accelerating in the developing world (Zlotnik 2005). The late 1960s was the turning point for fertility in many developing countries, showing marked tendencies for fertility

decline that continued in the 1970s (Bongaarts 2006; Zlotnik 2005). It is estimated that the worldwide average total fertility rate (TFR) per woman dropped from 5.0 in 1960-1965 to 2.7 in 2000-2005 (Zlotnik 2005).

With increasing evidence of declining mortality and TFR in developing countries, Notestein's (1953) classical demographic transition theory emerged. This framework points to a pattern of decreased fertility following declining mortality (Eatwell & Milgate 1989). These demographic trends seemed likely to predict future population patterns (Zlotnik 2005).

Increased mortality due to HIV/AIDS in sub-Saharan Africa. The emergence of the HIV/AIDS epidemic in the 1980s has interrupted the demographic transition that had been occurring in the affected regions in prior decades. Eastern and southern Africa were the hardest hit by the epidemic. Eastern Africa, where the epidemic first took hold showed stabilization of HIV prevalence by 2000. In contrast, southern Africa, where the epidemic started later, still continued to suffer soaring HIV prevalence (Zlotnik 2005). Contrary to the predictions of the demographic transition theory, 26 of the 54 countries in Africa suffered a reduction of life expectancy between 1985 and 2005, largely due to the HIV/AIDS epidemic (United Nations 2005).

The HIV/AIDS epidemic has also greatly hindered the trend of reduced child mortality. Several African countries that had relatively low under-five mortality rates before the HIV/AIDS epidemic, such as Botswana and Swaziland, have since then suffered dramatic increases in child mortality rates. Sub-Saharan Africa, the region where child mortality decline has historically been the slowest, is on track to continue

having the highest child mortality rate in the world because of the impact of AIDS (Zlotnik 2005).

Stalled fertility decline in sub-Saharan Africa. Due to the toll of HIV/AIDS in sub-Saharan Africa, there are doubts as to whether the region will actually undergo the demographic transition (Zlotnik 2005).

The decline in mortality as related to decreased TFR is especially important in reduction of child mortality "as parents realize that it [is] not necessary to give birth to so many children to ensure the survival of the number they desired" (Zlotnik 2005). Improving socioeconomic development is also a cause of fertility decline over time as "changes in the cost/benefit ratio lead parents to want fewer children" (Bongaarts 2006). While the world, overall, has shown marked declines in fertility rates, Africa has had a significantly different experience for many reasons: a) mortality has declined at a slower rate and b) socio-economic conditions of sub-Saharan Africa are such that children are considered an asset. Consequently, 14 of the 17 countries whose TFR remains above 6 are in sub-Saharan Africa. Most of these countries are also currently suffering from political and economic instability that militate against basic services for their booming populations (Zlotnik 2005). Thus, continuation of rapid population growth through fertility likely poses crippling challenges to future development of countries in sub-Saharan Africa.

Contraception and fertility decline in sub-Saharan Africa. A rise in contraceptive use is the main proximate facilitator of fertility decline (Bongaarts and Potter 1983). Trends in decreasing mortality and improved socioeconomic development have, in turn,

raised the demand for birth control (Bongaarts 2006). Taking into account modern methods of contraception (contraceptive pill, IUD, sterilization, condom and injectables), about one in five married women were using contraception in 2000 (Zlotnik 2005). In order for fertility to decrease in the region, contraceptive prevalence rates (CPRs) must increase. However, there is doubt that CPR will increase in sub-Saharan Africa because the desired TFR remains high (Zlotnik 2005).

A country is considered to have stalled in fertility decline if its "TFR failed to decline between two DHS surveys while the country was in midtransition". A country is defined as "midtransitional" if "its TFR was between 2.5 and 5 births per woman at the time of the most recent DHS survey" (Bongaarts 2006).

Decreasing TFR, thereby curbing population growth, will decrease poverty. The increase in child survival alongside the "rising cost and declining economic value of children is considered to be the fundamental driving force of the fertility transition" (Bongaarts 2006). Thus, in traditional agricultural societies, where mortality is high, fertility will also be high as to ensure the population's survival. As a country develops ("modernizes"), industrialization, urbanization, increased education and public health investments increase energy and cost of children. This increased cost of children along with further decline in mortality increases the desire for smaller families, facilitating the increase in demand for birth control to lower fertility (Bongaarts 2006).

Existence of a strong correlation between household poverty and childbearing was demonstrated in a 2005 study of 56 developing nations. On average, "the poorest fifth of women had a fertility rate of 6 births, compared with the 3.2 births in the healthiest fifth" (Gwatkin, Rutstein, Johnson, Suliman & Wagstaff 2004). Furthermore, households with

more children are more likely to become poor and less likely to recovery from poverty than families with fewer children (Greene & Merrick 2005). Therefore, having fewer children facilitates better economic outcomes for the family and those children in the future.

As further evidence, a 1999 study of 45 countries estimated that "the proportion of people living in poverty would have fallen by a third if the crude birth rate had decreased by five per 1000 since the 1980s" (Eastwood & Lipton 1999; Eastwood & Lipton 2001; Cleland, Bernstein, Ezeh, Faundes, Glasier & Innis 2006). Thus, if overall birth rates decrease, fewer individuals will be trapped in perpetual poverty.

Particular importance of family planning in sub-Saharan Africa

Many sub-Saharan African nations have entered the demographic transition, yet maternal and child mortality rates are the highest worldwide, while CPRs are among the lowest (Cleland et al. 2006). In this region, only 18% of married women use a modern method of contraception, compared to 63% in Latin America and 61% in Asia. Current CPRs in sub-Saharan Africa have shown a small rise of just 13% since the late 1990s (PRB 2002 and 2008). CPRs in sub-Saharan Africa are at their absolute lowest in rural areas where women are least likely to have access and least likely to possess correct knowledge about family planning methods.

Many Sub-Saharan African Nations have entered the Demographic Transition

Population growth in Africa accelerated sharply after 1950 as improvements in medical technologies, including antibiotics and vaccinations, reduced death rates while TFRs remained high (Bongaarts & Sinding 2011). An assessment of fertility trends in

sub-Saharan Africa notes that some countries in east and southern Africa are well-established in the fertility transition and are progressing rapidly; most notable were Kenya and Zimbabwe (Kirk & Pillet 1998).

Other sources, however, suggest that many sub-Saharan African nations are now in "fertility stagnation". Past records of fertility decline in the developing world suggest that once fertility decline begins, it often continues until the replacement level is reached (Bongaarts 2008). Average pace of fertility decline in sub-Saharan African countries slowed significantly between 1992 and 2004 (Bongaarts 2008). Stalls in fertility transition may be attributable in part to a lower priority of family planning programs in recent years compared to in years past (Blanc & Tsui 2005; Cleland et al. 2006).

Highest Child & Maternal Mortality Rates in the World

Maternal mortality is the death of women during "pregnancy, childbirth, or in the 42 days after delivery" (Hogan et al. 2010). The United Nations Millennium Development Goal 5 (MDG 5) aimed for a 75% reduction in maternal mortality rate (MMR) between 1990 and 2015 (UN 2000). In an analysis of maternal mortality from 1990 to 2008, MMR in sub-Saharan Africa remained the highest in the world. In part of this analysis, when deaths attributed to HIV infection were removed, the data demonstrated that the permeating HIV epidemic was not the sole cause for increase in MMR in some regions of sub-Saharan Africa since 1990. Examination of MMR rates with HIV-related deaths excluded revealed that east and southern Africa had declined in non-HIV-related MMR, while parts of Central and West Africa actually had increased in non-HIV-related MMR between 1990 and 1998 (Hogan et al. 2008).

The most powerful drivers of decreased maternal mortality include TFR, income per head in the household, maternal educational attainment and giving birth in the presence of a skilled birth attendant (Ronsmans & Graham 2006; Vahidnia 2007; Borghi et al. 2006; United Nations 2008). Thus, in countries where these four factors are on the rise, a decrease in MMR should not be surprising.

Highest Rates of Teenaged Pregnancy in the World

Along with having the highest birth rates in the world, sub-Saharan African nations have some of the youngest mothers in the world. Contributing to the frequent poor birth outcomes among adolescent pregnancies are the roles of biological immaturity and the social disadvantage that accompanies teenaged pregnancy. Studies in several areas worldwide have indicated a positive association between adolescent pregnancy and unfavorable birth outcomes, such as low birth weight (LBW), premature births and pregnancy wastage (defined as abortions or stillbirths) (Magadi 2006; Fraser, Brockert & Ward 1995; Wang & Chou 2003). These unfavorable birth outcomes for teenaged mothers and their infants are of particular importance in sub-Saharan Africa, where the incidence of teenaged pregnancy is higher than that of any other region of the world. This is frequently attributed to a lack of contraception for adolescents (Treffers 2003).

Highest Fertility Rates (TFRs) in the World

Fertility levels in sub-Saharan Africa are the highest of any major region in the world (Kirk & Pillet 1998). As mentioned in the previous section, MMR and TFR are strongly correlated (United Nations 2000; Vahidnia 2007). Societies in which TFR

decreased also experienced declines in MMR—"whether this relation is causal or mediated through social change that drives both is not clear" (Hogan et al. 2010).

In an analysis of DHSs of eight sub-Saharan African countries from 1988 to 2006, all eight "have higher total fertility than wanted fertility, which, along with their high unmet need for family planning, suggests programmatic opportunity" for family planning programs (Jacobstein, Bakamjian, Pile & Wickstrom 2009). The discrepancy between TFR and wanted fertility also indicates the large unmet need for modern contraceptives in these areas and others.

Highest Wanted Total Fertility Rates (WTFRs) in the World

Although investments in family planning can reduce unwanted fertility, their effect on desired family size is weak or nonexistent (Freedman 1997). The implication of this finding is that countries in which wanted fertility has stalled well above the replacement level will require a change in cultural and social values to complete their fertility transition. Such declines are usually improvements in socioeconomic conditions. Among the seven stalled countries, Kenya and Ghana have relatively high wanted fertility levels (3.6 and 3.7 births per woman, respectively), and their levels of development measured by real GDP per capita, child survival, and proportion of women schooled are low and have mostly leveled off. In these two countries, improvements in development will almost certainly be needed for desired family size and actual fertility to fall substantially below current levels." (Bongaarts 2006)

Lack of Access to Family Planning, Especially in Rural Areas

Despite evidence that many sub-Saharan African nations are presently in the demographic transition, annual rates of unintended pregnancies are highest in Africa, at 86 per 1,000 women aged 15-44. Furthermore, regional rates of unintended pregnancy are highest in eastern Africa: 118 per 1,000 women (Singh 2009b).

Such high rates of unplanned pregnancy indicate an unmet need for modern contraceptives. And, indeed, the unmet need for modern contraception is high in this region. Women with unmet need for modern contraceptives are defined as those who "want to avoid a pregnancy but are not using a modern contraceptive method" (Singh, Darroch, Vlassoff & Nadeau 2009). Twenty-nine of the 31 sub-Saharan African nations where a recent DHS (Demographic Health Survey) has been conducted reported levels of unmet need for contraception exceeding 20%. In some countries, unmet need is higher than current use, or "met need" and, in some instances, substantially higher. In total, it is estimated that 18 million married women in sub-Saharan Africa currently use modern contraception, while 25 million lack a modern method of preventing pregnancy (Westoff 2006).

Furthermore, many of the most successful family planning programs in sub-Saharan Africa are considered "fragile"—"they have experienced a marked reduction in their rate of progress, if not a complete halt." In Uganda, Nigeria and Kenya, for example, the rise in modern contraceptive prevalence has ceased altogether since 1998 (Jacobstein, Bakamjian, Pile & Wickstrom 2009).

Use of modern contraceptives is constrained by limited access to family planning services and weak government programs (Tsui et al. 2010). In addition to lack of

physical access, many women lack knowledge about the existence and availability of contraception and have exaggerated fears of side effects. Opposition from husbands or other family or community members is also a barrier (Casterline & Sinding 2000). However, the removal of these barriers is not a guarantee of effective use. Some women start to use contraceptives but discontinue use due to problems with methods or supplies. Misuse and nonuse of contraceptives, including discontinuation, in addition to poor understanding of the risk of pregnancy constitute proximate factors to unplanned pregnancy (Singh, Sedgh & Hussain 2010).

Health Effects of HIV/AIDS Pandemic

HIV/AIDS is important to discuss in the context of reproductive health in sub-Saharan Africa because of its high prevalence and because of its implications for policy and funding for reproductive health programs in the region of interest.

AIDS is a disease of the immune system caused by infection with the *human immunodeficiency virus (HIV)*. Infection with the virus "progressively reduces the integrity of the immune system and renders afflicted individuals susceptible to opportunistic infections and certain types of cancer" (Harris 2013). The virus can be transmitted through blood, semen, or vaginal fluid. The virus enters the body when body fluid containing the live HIV virus comes into contact with mucous membranes of the vagina, anus or oral cavity (Harris 2013).

HIV/AIDS received profound attention in the United States in the early 1980s when an outbreak occurred in Los Angeles among young homosexual men who developed several opportunistic infections in addition to a rare type of pneumonia initiated by *Pneumocystis carini* (MMWR 1981a). Subsequently, others developed

Kaposi sarcoma, a rare tumor that is characteristic of immunodeficiency (MMWR 1981b, 1982a). In the next two years, similar symptoms manifested in "Haitians, drug addicts, hemophiliacs and other transfusion recipients, infants, female sex contacts of afflicted men, prisoners, and Africans (MMWR 1982b, 1982c, 1982d, 1982e; Masur et al., 1981, 1982; MMWR, 1983a, 1983b; Harris 2013). Other opportunistic infections and complications typical of those infected were "candidiasis, cytomegalovirus infection, mycobacterial infection, herpes infection, toxoplasmosis, fungal infection, varicella, and non-Hodgkin's lymphoma (Harris 2013).

According to 2009 data from the World Health Organization on HIV/AIDS, approximately 22.5 million people in sub-Saharan Africa have HIV/AIDS, constituting 72% of infections worldwide. Unlike infection patterns in other regions of the world, most of those infected with HIV/AIDS in sub-Saharan Africa are women (61%) (WHO 2010). Studies have been conducted on why women are more at risk in sub-Saharan Africa. In a 2001 cross-sectional study conducted in urban areas with high HIV prevalence in Kisumu, Kenya and Ndola, Zambia, Glynn et al. examined factors responsible for the apparent disparity in HIV prevalence between young men and young women. Although the prevalence of STIs partially explains the difference in HIV prevalence between males and females, it does not fully explain the discrepancy. After adjusting for behavioral risk factors and for STI infection, the odds ratio for HIV infection associated with female gender was between 6 and 7 for ages 15-19 years and between 2 and 3 for ages 20-24 years (CI: 95%) (Glynn, Carael, Auvert et al. 2001). In a study comparing the efficiency of male-to-female and female-to-male sexual transmission of the HIV virus, logistic regression included gender and controlled for

condom use, frequency of intercourse, anal sex, partner's CD4+ cell count and clinical stage, sexually transmitted diseases, genital infections, and contraceptive use. Still, the efficiency of male-to-female HIV transmission was 2.3 times greater than female-to-male transmission (CI: 95% = 1.1-4.8) (Nicolosi, Leite 1994). Anatomical and histological differences in male and female genital organs likely contribute toward the greater susceptibility of women to the virus (Nicolosi, Leite 1994). Therefore, the greater area and more receptive contact surface exposed during sexual intercourse likely makes women more susceptible to contracting the HIV virus.

HIV/AIDS not only affects those who contract the virus through sexual intercourse. It is important to emphasize that the HIV virus can also be transmitted by contaminated needles and from an infected mother to her infant during pregnancy, childbirth or breastfeeding (Harris 2013). In fact, "most of the 2.25 million young children living with HIV and AIDS who were infected by their mothers live in sub-Saharan Africa. A number of analyses in the citation (USAID 2006) indicate that family planning services prevent HIV infection transmission to more infants than does antiretroviral therapy and at a lower cost" (Jacobstein, Bakamjian, Pile & Wickstrom 2009).

HIV/AIDS Pandemic & Funding Paradigm Shift in 1990s-2000s

In addition to altering reproductive health intentions and practices, the HIV/AIDS pandemic has had a direct impact on the funding available for family planning programs in sub-Saharan Africa. Family planning was relatively neglected with regard to funding in the 1990s and early 2000s. Causes for this neglect included: shifting attention from population growth to the HIV/AIDS epidemic and subsequent reallocation of resources,

and increasing conservative religious and political opposition (United Nations Commission on Population and Development 2009; Bongaarts & Sinding 2011). Between 1995 and 2008, funding to developing countries for HIV and AIDS programs increased nearly 300%, while funding to developing countries for sustainable family planning programs declined by about 30% (Bongaarts 2008).

Not only has there been a net increase in domestic and foreign dollars spent on HIV/AIDS care, but there has also been a shift in programmatic attention and resources toward HIV/AIDS care. This phenomenon drives skilled health personnel away from providing family planning care and services (Jacobstein, Bakamjian, Pile & Wickstrom 2009).

Even more concerning: high fertility and rapid population growth may represent a bigger threat to the achievement of the Millennium Development goals than HIV/AIDs (Cleland et al. 2006). These poignant facts make family planning access particularly important in sub-Saharan Africa in the devastating HIV/AIDS Pandemic.

The Future of Family Planning in sub-Saharan Africa

The future of family planning in sub-Saharan Africa is largely dependent on funding and increased programming from governments, non-governmental organizations and other contributors. With a booming population, sub-Saharan Africa must expand its 2005 family planning provision levels by 30% in 2015, 50% in 2020 and 90% in 2030 in order to merely maintain current low CPRs (Jacobstein, Bakamjian, Pile & Wickstrom 2009).

Furthermore, if CPR in sub-Saharan Africa does not increase, unmet need for modern contraception will remain high—"higher than desired or desirable. Individual

health and well-being will be jeopardized, poverty will become even more widespread, and national development goals will be difficult if not impossible to achieve" (Jacobstein, Bakamjian, Pile & Wickstrom 2009). Determining factors in family planning use in sub-Saharan Africa is, therefore, not only relevant for the women themselves, but for their families, communities, countries and sub-Saharan African region as a whole.

Family Planning in Kenya

Kenya has been selected as a case study because of its strong history of family planning in policy and government programs; and notable success in fertility decline.

One of the Most Successful Fertility Transitions in History

In 1967, Kenya was the first country in sub-Saharan Africa to adopt a national family planning policy (Khasaiani 1988; Warwick 1982: 3). In general, fertility changes have been greater among urban and educated women living in areas of lower childhood mortality. Thus, the first stage of fertility transition in sub-Saharan Africa appear to conform, in broad terms, to the classic theory of demographic transition. However, countries more advanced in the transition are those where strong and efficient family planning programs have been implemented. The rapid fertility decline in Kenya suggests the influence of diffusion and social interaction processes.

The synergistic family planning program efforts of public and private sectors facilitated Kenya's transition from the country with the highest TFR in the world in the 1970s, to the country that has undergone one of the most dramatic fertility transitions in human history (Magadi & Curtis 2003).

Family Planning in Kenya vs. Uganda

Family planning effectiveness in Kenya is realized when contextualized with that of nearby nations, such as Uganda. In a natural experiment of how family planning programs influence reproductive behavior, fertility trends and determinants of Kenya were compared to those of neighboring Uganda, which has similar social, economic and cultural characteristics, but does not have strong family planning programs (Blacker et al. 2005 & Bongaarts 2011). Between the mid-1970s and mid-1990s, TFR decreased about 40%; TFR in neighboring Uganda, on the other hand, decreased only 10%.

As major factors in fertility decline, this analysis discussed that the differences in fertility decline may be attributed to, in part, by economic development following country independence and government policy for family planning. The analysis of fertility determinants in the two countries concluded that the "divergence in fertility between the two countries is almost entirely attributable to the fact that more women are using contraception in Kenya than in Uganda" (Blacker et al. 2005). While both countries show great increases in CPR from the mid-1970s to mid-1990s, Uganda has been lagging behind Kenya by more than a decade. In the pair of Kenya and Uganda, unmet need for contraceptives was much higher in Uganda and a much higher proportion of women in Kenya obtained modern contraceptives from government hospitals and clinics. The differences between contraceptive access and utilization among Kenya and Uganda may reflect the longer history of Kenya's population policy and promotion of family planning. Unlike Kenya, Uganda did not adopt its National Population Policy for Sustainable Development until 1995. Before this time, family planning methods had been available in Uganda through NGOs and almost exclusively in the cities, causing the greatest gap in

access to be in rural areas, where the majority of Ugandans reside (Blacker et al. 2005). Thus, family planning has a long-standing and effective presence in Kenya, as evidenced in comparison to neighboring countries.

Kenya: A Current Case Study

CPR & Method Choice Differ Between Regions of Kenya

Although Kenya, as a whole, has entered the fertility transition, which results in an increase in total CPR, substantial regional differences in CPR persist (Kimani & K'Oyugi 2004). Literature on determinants of contraceptive use suggests three possible explanations for CPR differences among regions of Kenya: socio-economic status, cultural differences and implementation of family planning programs (Kimani & K'Oyugi 2004; Omondi-Odhiambo 1997; Bongaarts & Bruce 1997). In a 2004 study that aimed to examine the role of each of these three explanations for their contribution to the observed CPR differences in Kenya, the degree of implementation of family planning programs appeared to have the greatest impact on variations in CPR, followed by socioeconomic factors (Kimani & K'Oyugi 2004). Conclusions from this study appear to be quite consistent with the demographic transition theory, which shows that it is not socioeconomic factors that drive fertility transition, but rather the diffusion of family planning through regions that contributes most (Coale & Watkins 1986). According to classical fertility transition theory, CPR increases and TFR decreases first in urban areas, then diffuses out to more rural areas.

High HIV Prevalence

The Kenya DHS estimates that prevalence of HIV among Kenyan adults ages 15-49 is about 6.3%. However, prevalence differs drastically by province and by gender. Nationally, HIV prevalence in Kenya is 8.0% for women ages 15-49, and 4.3% for men ages 15-49, yielding a female-to-male ratio of 1.9 to 1.0, which is higher than that found in most African population-based studies (KDHS 2008-2009).

HIV Prevalence by Gender and Province in Kenya

Province	**Women HIV Prevalence**	**Men HIV Prevalence**	**Total HIV Prevalence**
Nairobi	10.8	3.4	7.0
Central	6.3	2.6	4.6
Coast	5.8	2.3	4.2
Eastern	3.8	3.0	3.5
Nyanza	16.0	11.4	13.9
Rift Valley	6.3	2.8	4.7
Western	9.2	3.4	6.6
North Eastern	0.9	0.9	0.9

Table II.1
**Kenya DHS 2008-2009

While true HIV prevalence is difficult to obtain, several community HIV prevalence studies have indicated that HIV prevalence in the general adult population (aged 15-49 years) is similar to the prevalence of women attending antenatal care (ANC) clinics in the same area (Garcia-Calleja et al. 2005). A number of possible confounders and limitations exist in using this method do estimate the HIV prevalence of a country, and more than 30 countries have conducted population-based HIV prevalence studies. These population-based studies, however, are much "more costly than sentinel surveillance and are therefore impractical for tracking intermediate trends as they are conducted approximately every 5 years" (Kenya DHS 2008-2009).

Most national HIV prevalence estimates in Kenya have been derived from sentinel surveillance in pregnant women at ANC clinics. Since 2005, the Kenyan national sentinel surveillance has consisted of data from 46 sites across the country to adequately "represent the different groups, regions, and rural and urban populations in the country". In this way, pregnant women receiving ANC are "used as a proxy for the general population and their results are used to report indicators for the national strategic plan [for HIV interventions] as well as international indicators" (Kenya DHS 2008-2009).

The KDHS survey conducted in 2003 showed that the ANC sentinel system had been overestimating the adult HIV prevalence because "prevalence among men is substantially lower than among women" (Kenya DHS 2008-2009). This fact is not surprising and is true in most countries: the risk of HIV and other sexually transmitted infections (STIs) is higher among women, and specifically among high-risk women, than among the general population (Riedner, Rusizoka, Hoffmann et al. 2003; Nagot, Ouangre, Ouedraogo et al. 2002; Walden, Mwangulube, Makhumula-Nkhoma 1999; Kapiga, Sam, Shao et al. 2002; Mgalla & Pool 1997).

How the funding paradigm shift of the 1990s & 2000s affected Kenya

The National Council for Population and Development (NCPD) of Kenya published *National Population Advocacy and IEC Strategy for Sustainable Development, 1996-2010* in 1996 with the aim of promoting use of modern contraceptive methods among less educated women and achieving demographic objectives of TFR of 2.5 and infant mortality rate of 59 per 1,000 births by 2010 (Macrae et al. 2001). The beginning of the IEC strategy implementation coincided with a time period in which the UNFPA experienced shortages in funding and resources. At the same time, UNFPA's policies

underwent a paradigm shift toward HIV/AIDS and other STI care (Blacker et al. 2005). In 2000, funding for the IEC strategy was pulled. Discontinuation of IEC had devastating consequences on family planning in Kenya, including interruptions in supply of contraceptive methods, increase in unmet need and high rates of contraceptive discontinuation. These changes are shown clearly in Kenya's 2003 DHS, which exhibits a faltering in fertility decline as well as faltering in increasing CPR (Blacker et al. 2005).

Current CPR by region by method (Kenya DHS data)

In the 2008-09 Kenya DHS, Kenya had the highest CPR in East Africa: 46% of currently married women using any contraceptive method (KDHS 2008-09). CPR of specific contraceptive methods are determined by two processes: the decision to use contraception and the choice of method (Magadi & Curtis 2003).

Contraceptive Prevalence Rate (CPR) by Method and Province

Background Characteristic	Any method	Any modern method	Female sterilization	Pill	IUD	Injectables	Implants	Male Condom	LAM	Any traditional method
Residence										
Urban	53.1	46.6	3.0	11.1	2.9	23.5	2.7	2.7	0.8	6.5
Rural	43.1	37.2	5.3	6.1	1.2	21.0	1.7	1.5	0.4	5.9
Province										
Nairobi	55.3	49.0	2.7	13.8	3.9	18.2	4.4	4.4	1.7	6.3
Central	66.7	62.5	8.1	19.4	5.1	25.7	3.2	0.7	0.3	4.2
Coast	34.3	29.7	2.1	5.4	0.7	17.8	1.4	1.5	0.8	4.6
Eastern	52.0	43.8	3.9	9.1	1.4	26.5	1.6	0.6	0.6	8.3
Nyanza	37.3	32.9	5.7	3.1	0.4	18.0	1.8	3.6	0.3	4.4
Rift Valley	42.4	34.7	4.1	3.7	0.9	23.0	1.7	1.0	0.2	7.7
Western	46.5	41.1	7.9	5.9	0.8	22.2	1.2	2.8	0.3	5.4
North Eastern	3.5	3.5	0.0	0.3	0.0	2.1	0.6	0.0	0.4	0.0
Total	45.5	39.4	4.8	7.2	1.6	21.6	1.9	1.8	0.5	6.0

Table II.2
Percent distribution of currently married women age 15-49 by contraceptive method currently used, according to background characteristics Kenya 2008-2009.

In a 2003 analysis, data from the first three KDHS sets were merged to "test whether the determinants of [contraceptive] method choice [were] significantly different across survey years" (Magadi & Curtis 2003). Analyses of method-specific trends in

KDHS data show that the contraceptive method mix in Kenya shifted "from one in which almost half of all women practicing contraception were using traditional methods and in which modern-method use was fairly evenly divided among sterilization, the pill and the IUD, to one in which hormonal methods, particularly injectables, dominate" (Magadi & Curtis 2003). The 2003 study also showed no difference between rural and urban women related to choice of method. In the 2008-09 KDHS, injectables remained the most common contraceptive method choice among women in all 8 provinces.

Unplanned pregnancy and CPR are especially low in rural areas. This is likely in part due to a lack of knowledge of family planning methods in these areas as well as decreased physical access to various methods due to increased distance from clinics and sparse method variety available. While Kenya has a national family planning/population policy and family planning services are, for the most part, free—many rural women still do not utilize contraception.

Reproductive Health among Luo people of Western Kenya

An assessment of determinants of contraceptive method choice among the Luo people must be done in the context of Luo culture, particularly those attributes that affect reproductive health ideas and choices. Because the Kenya DHS stratified most data across province instead of tribe, many of the following characteristics are specific to Nyanza, but can be attributed to the Luo because Nyanza is largely comprised of Luo people (Rutenberg & Watkins 1997).

The Luo people are an ethnic group populating western Kenya, eastern Uganda and northern Tanzania. Currently, the Luo are the third-largest ethnic group in Kenya after the Kikuyu and the Luhya. The population of the Nyanza province is culturally and

socioeconomically homogenous. Primary mode of income in rural areas is subsistence agriculture, and education is highly valued as a way out of poverty. Market activity in rural areas is fairly high, facilitating a high concentration of social interaction (Kohler, Behrman & Watkins 2001).

Marriage and Age at First Birth in the Nyanza Province

In the Nyanza province, women get married earlier than their counterparts in other provinces in Kenya. Women who marry earlier, on average, begin childbearing earlier and have overall higher fertility rates during their lifetime. Median age at first marriage for women aged 25-49 years in Nyanza is lower than any other province in Kenya: 18.9 years of age at first marriage (Kenya DHS 2008-2009).

The median age at first birth in Nyanza is the lowest nationally, at 19 years, compared to Nairobi, the highest nationally, at 23 years at first birth. Consequently, Nyanza also has the burden of the highest rates of teenage pregnancy and motherhood: 27% of women age 15-19 have begun childbearing (Kenya DHS 2008-2009). A younger median age at first birth typically has a "positive effect on fertility levels because the exposure period is increased" (Kenya DHS 2008-2009).

Total Fertility Rates (TFRs) and Desired Fertility in the Nyanza Province

In a 1997 study examining the role of informal social interaction in influencing ideas about family size and the use of family planning in rural Kenya, most women interviewed "considered both men and the elderly as members of social categories who wanted many children" (Rutenberg & Watkins 1997). The 2008-2009 Kenya DHS demonstrates a similar trend: men tend to be a bit more pro-natalist than women.

Among men in Nyanza (age 15-54), the mean ideal number of children was 4.1, while the mean ideal number of children among women in Nyanza (age 15-49) was 3.7.

Currently, the Nyanza province has the third-highest TFR (5.4) behind the nearby Western province (5.6) and the North Eastern province (5.9) (KDHS 2008-2009).

In a framework of fertility causation, desired family size and wanted total fertility rate (WTFR) are used as indicators of fertility preferences (Bongaarts 2006). WTFR is calculated using the same method as total fertility rate, except that unwanted births are excluded. A birth is defined as wanted if the "number of living children at the time of conception is less than the ideal number of children reported by the respondent" (Kenya DHS 2008-2009). WTFR for Kenya is 3.4, compared to the current national TFR: 4.6. In every Kenyan province and across all measured background characteristics (urban/rural residence, education, wealth quintile), the WTFR is lower than the TFR. However, the gap between WTFR and TFR is most dramatic among poor, rural, and less educated women (Kenya DHS 2008-2009).

The difference between observed TFR and the WTFR is defined as the "unwanted total fertility rate" (UTFR). UTFR is primarily caused by the "unmet need for contraception to limit family size" (Bongaarts 2006).

Contraceptive Use in Nyanza

32.9% of currently married women in Nyanza age 15-49 use a modern method of contraception. This is the third-lowest CPR nationally (North Eastern province: 3.5%; Coast province: 29.7%). While Nyanza has the third-lowest CPR, the province has the highest percentage of married women with an unmet need for family planning (31.7%), which includes unmet need for family planning for birth-spacing purposes and for birth-

limiting purposes. Among women in Nyanza who utilize modern contraception, the most common forms are injectables (18.0%), female sterilization (5.7%), pills (3.1%) and male condoms (3.6%) (Kenya DHS 2008-2009).

A unique aspect of injectable contraception is that it is much easier for a woman to hide contraceptive use from her husband than it is with other forms of contraception, such as the pill. In Nyanza, 16.2% of husbands of women using contraception do not know about their wife's contraceptive use. Lack of knowledge among husbands is higher in Nyanza than in any other province (Kenya DHS 2008-2009).

Approximately 36% of Kenyan family planning users discontinue their contraceptive method within 12 months of beginning its use. Discontinuation rates are highest among condoms (59%) and the pill (43%), and lowest for injectable contraception (29%), which is the most common form of contraception in Nyanza (Kenya DHS 2008-2009).

Infant and Child Mortality

Fertility preferences are intricately related to the number of living children a person has (Bongaarts 2006). In Kenya, one in every 19 children die before its first birthday (infant mortality rate= 52 per 1,000 live births); one in every 14 does not survive to age five (child mortality rate= 74 per 1,000 live births). Sixty per cent of infant deaths in Kenya occur during the first month of life (Kenya DHS 2008-2009).

The Nyanza province, in particular, has the highest rates of both under-five mortality and infant mortality. With an under-five mortality rate of 149 in 1,000, nearly one in seven children in Nyanza dies before reaching his or her fifth birthday.

Furthermore, infant mortality is the highest in Nyanza: 95 deaths per 1,000 births (Kenya DHS 2008-2009).

Infant mortality is largely influenced by the length of the birth interval. Studies have shown that children born sooner than 24 months after a previous sibling are at a higher risk of poor health. In the Nyanza province, 27.1% of non-first births occur less than 24 months following the previous birth (Kenya DHS 2008-2009). This rate is second only to North Eastern and Western provinces (34.2% and 28.8%, respectively). Furthermore, birth intervals are shorter for children born whose preceding sibling died; children of rural areas and children born to mothers with no education are also shorter.

Infant and child death can also impact decisions to utilize family planning methods. In a 2004 study examining the role of socioeconomic status, cultural differences and family planning program implementation in accounting for the observed regional differences in contraceptive use in Kenya, the proportion of women who experienced at least one child or infant death was over 40% in the Nyanza/Western region, nearly twice that of the Eastern/Central region and nearly four times that of Nairobi. In fact, in a comparison of national and regional coefficients, infant mortality was related to contraceptive use only in the Nyanza/Western region. Women who had not lost any children were more likely to use contraception than their counterparts who had lost at least one child (OR =1.4; p=0.3476) (Kimani & K'Oyugi 2004). Reasoning for this could be that higher infant and child mortality rates could lead to higher TFR in order to reach desired number of children.

High HIV Prevalence

Kenya has a heterogeneous HIV epidemic, with large differences in prevalence by region. Three Kenyan provinces, in total containing half of the national population, have 65% of the HIV infections: "Nyanza province has over one-third, Rift Valley province has one-fifth, and Nairobi province has one-tenth of HIV infections in Kenya" (Kenya DHS 2008-2009).

HIV prevalence in the Nyanza province is 13.9%, nearly double that of the Nairobi province, where HIV prevalence is second-highest nationally. Among the Luo people, adult HIV prevalence is 20.2%, nearly triple that of the second-highest ethnic group, the Luhya (prevalence = 7.0%). Among Luo women, HIV prevalence is even higher than that of men: 22.8% and 17.1%, respectively (Kenya DHS 2008-2009).

High Density of Social Networks that Affect Fertility Decisions

Due to the rural lifestyle of people in the Nyanza province, a great deal of informal social interaction takes place among people while performing everyday activities, such as walking to the market, fetching water, working in the garden, or meandering along the paths that criss-cross the area (Rutenberg & Watkins 1997). This provides plenty of opportunities for conversations about family planning. In a culture where ideas, stories and experiences are so readily exchanged, it is likely that the opinions and experiences of other women, namely friends, neighbors and family members, contribute to women's ideas and understanding of family planning methods.

Social interactions encompass two distinct processes that can affect family planning behavior: *social learning* and *social influence*. *Social learning* emphasizes that decisions regarding contraceptives are "subject to substantial uncertainty: for example,

about the medical side effects of modern contraception and/or the benefits of choosing to have future children." Hearing about the experiences of other trusted women may reduce the uncertainty present and thus change the probability that a woman utilizes contraception. *Social influence,* on the other hand, "captures the fact that preferences regarding modern contraception and/or number of children are affected by the fertility-related opinions and behaviors that prevail in an individual's social environment" (Kohler, Behrman & Watkins 2001).

While increasing the quantity or quality of knowledge of family planning providers in clinic can be thought to increase the knowledge and practice of family planning among women in rural areas, it is essential to remember that women are not isolated. Women in these areas make their decisions about family planning based on information obtained through informal social networks: "they supplement the providers' instructions through conversations held on the way to the lake or home from the market with women whose bodies and circumstances they regard as being more like their own" (Rutenberg & Watkins 1997).

Because the existence of social interaction modifies evaluation of family planning program impact (Kohler, Behrman & Watkins 2000; Montgomery & Casterline 1996), understanding mechanisms of social interaction and how it affects women's ideas about contraception as well as other topics related to reproductive health could facilitate improved design and optimal use of family planning programs in such areas (Kohler, Behrman & Watkins 2001).

Myths and Rumors about Ill Effects of Contraception

In a two-part study conducted in South Nyanza, informal social interactions influencing ideas about family size and the use of family planning in rural Kenya were examined. In this study, household surveys were used to describe women's conversational partners while in-depth interviews and focus groups were used to describe the family planning conversation content. In the household survey component of the study, one-half of the women reported having had a conversation about family planning in the last month; half of those had occurred in the week before the interview. Study participants further indicated that these conversations typically occurred during daily activities, as women walked to the market or visited each other in their homes (Rutenberg & Watkins 1997).

The vast majority (93%) of the conversational partners that women in the aforementioned study discussed family planning with were other women. Women in this study were most likely to talk with a sister-in-law or co-wife, friends or to a sister. It is important to note that study participants weren't necessarily emotionally close to their conversational partners; "the relatively small proportion of network partners who were confidantes suggests that family planning is not a taboo topic [in the Nyanza province], to be discussed only with intimates" (Rutenberg & Watkins 1997).

One of the most salient characteristics of the "network partners" was that they tended to be women who the study participants believed had personal experience with family planning. While the network partners tended to have more experience with contraceptives, their lifestyles were much more similar to those of the study participants; while the lifestyles of the nurses at the clinics tended to be different from those of the

study participants. Thus, women frequently "try to maintain a delicate balance between relying on a trained clinic personnel for information that may not be right for them and evaluating this information with women who are more like themselves [their network partners]" (Rutenberg & Watkins 1997). While advice from network partners is useful in making decisions, it can also perpetuate false rumors and myths about contraceptives that can actually be counter-productive in healthy reproductive health choices of individual women.

In the 2008-2009 Kenya DHS, 55% of married Kenyan women were not currently using contraception. 15.8% of these women cited "fear of side effects" as the reason for not intending to use contraception in the future.

Furthermore, a 1991 study conducted in the Siaya District, which is also a Luo area of Nyanza, cited that family planning practice was low because of "myths, rumors and men's opposition [to family planning]" (Were, Suda & Olenja 1991). In the study by Rutenberg & Watkins, side effects were the most common topic of conversation with regard to family planning; only eight of the 40 participants did not mention side effects when detailing their discussions about family planning. The majority of side effects were associated with the pill, and included "life-threatening masses in the stomach, delivery of a baby with two heads or no skin" and other grotesque deformities of the newborn (Rutenberg & Watkins 1997). Other more expected side effects include "nausea, irregular bleeding, and weight fluctuations" (Hatcher et al. 2007). Side effects of the pill fall into categories: those that affect the woman herself and those that affect the unborn children, sometimes future children. While women who have illnesses thought to be associated with family planning are seen at a clinic, many others who have other ailments

related to pregnancy, such as "*rariew"*, a Luo term for locally defined ailments typically associated with the late stages of labor and with multiparous women" typically visit a traditional healer or a traditional birth attendant (TBA) (Rutenberg & Watkins 1997).

Low Utilization of Clinics for Deliveries

Mothers in rural areas are more than twice as likely to deliver babies at home than are urban women. In Nyanza, 55% of live births in the 5 years preceding the Kenya DHS took place at home, while 44.2% took place in a health facility. Among women who did not deliver in a health care facility, 45.7% said that they did not deliver in a health care facility because it was too far away and/or no transport was available (Kenya DHS 2008-2009). Traditional birth attendants largely assist women in rural areas with deliveries. In Nyanza, over one quarter (26.2%) of live births in the five preceding years were assisted by a traditional birth attendant. Births of higher parity were less likely to take place in a clinic and less likely to be assisted by a health professional (Kenya DHS 2008-2009).

High Incidence of Poor Pregnancy Outcome

In a 2001 study of Kenya DHS data, Luo women were found to have the highest incidence of pre-term deliveries in Kenya (Magadi 2001). This study observed that the odds of premature birth among Luo women were seven times higher than that of Kikuyu women and about 10 times higher than the other ethnic communities in Kenya combined (excluding Luhya, Kisii and Kikuyu). While this problem may be confounded by environmental or other health-health related factors, such a striking finding can indicate cultural practices or factors of the local health care system that may contribute to risk of premature birth and other unfavorable birth outcomes among Luo women (Magadi 2006).

Summary

Due to high infant and child mortality rates, high TFRs, low CPRs and short birth intervals in the Nyanza province of Kenya, it is essential to describe the dynamics of determinants of these unfavorable outcomes.

CHAPTER THREE

Hypothesis

The general goal of this study is to understand the impact of traditional values about fertility among rural Luo women and how those ideas are related to women's choices and birth outcomes. Assuming that traditional values about fertility are indicated by women who say that they do not know anyone who has more children than she wants, the following hypotheses will be tested:

Hypothesis 1:

Traditional women are more likely than modern women to be older, less educated, younger when married, and younger at first birth.

Null Hypothesis

There is no difference between traditional and modern women in current age, education, and age at marriage and first birth.

Hypothesis 2:

a. Women with less education, younger age at first marriage and older current age are less likely to use birth control than their younger, more educated counterparts who are older when they marry.

Null Hypothesis

Age, education, and age at marriage are not associated with utilization of birth control.

b. Traditional women are more likely than modern women to used birth control.

Hypothesis 3:

a. Women with less education, younger age at first marriage and older current age are more likely to be HIV positive than their younger, more educated counterparts who are older when they marry.

   Null Hypothesis

   Age, education, and age at marriage are not associated with HIV status.

b. Traditional women have higher HIV rates than modern women.

   Null Hypothesis

   There is no relationship between traditional values about fertility and HIV status.

Hypothesis 4:

a. Women with less education, younger age at first marriage and older current age will have less reproductive health knowledge than their younger, more educated counterparts who are older when they marry.

   Null Hypothesis

   Age, education, and age at marriage are not associated with degree of reproductive health knowledge.

b. Traditional women have less knowledge of reproductive health than modern women.

   Null Hypothesis

   There is no relationship between traditional values about fertility and degree of reproductive health knowledge.

Hypothesis 5:

a. Women with less education, younger age at first marriage and older current age will have increased parity, more unplanned pregnancies, and more child death than their younger, more educated counterparts who are older when they marry.

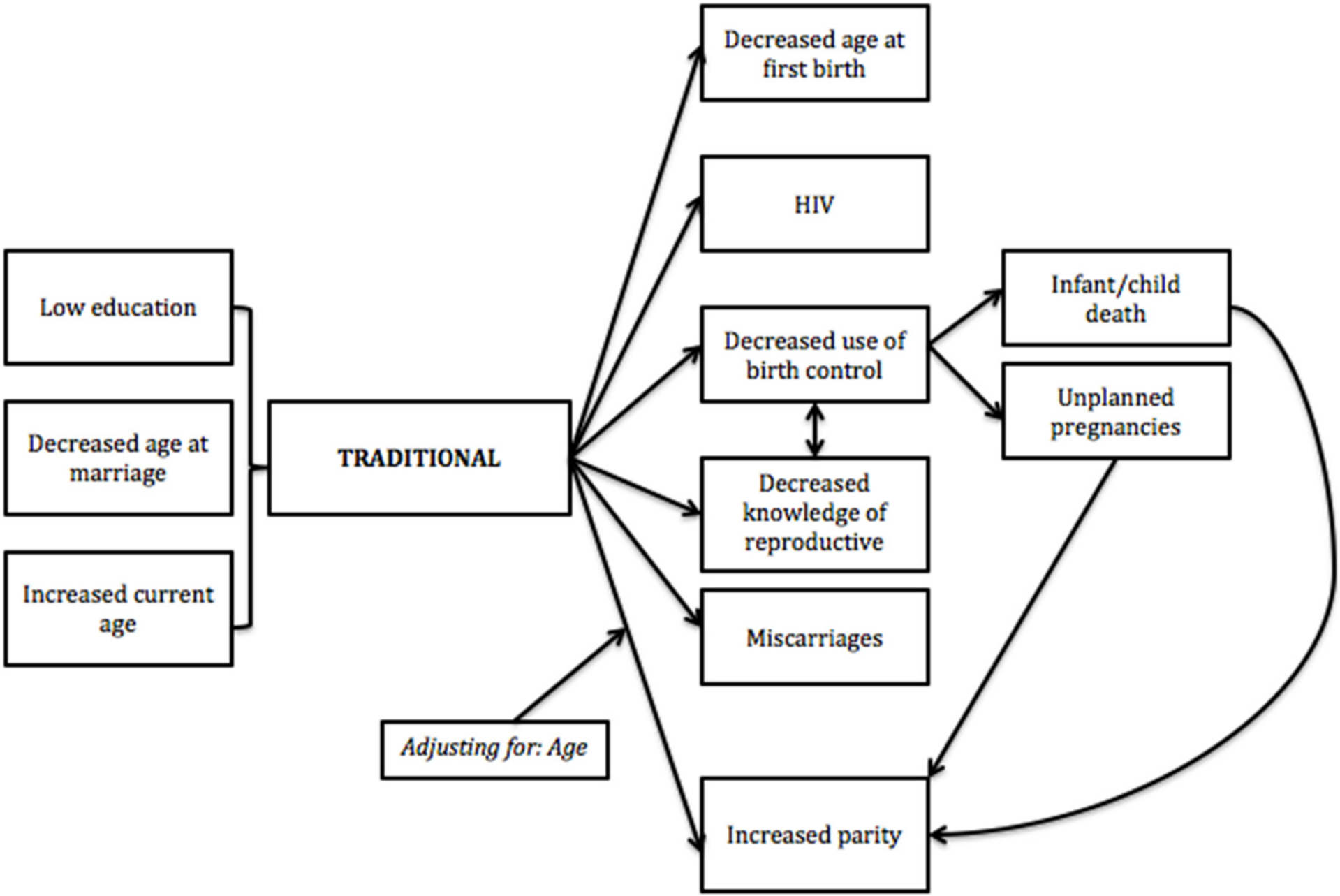
   Null Hypothesis

   Age, education, and age at marriage are not associated with increased parity, more unplanned pregnancies, and more child death.

b. Traditional women are more likely than modern women to have increased parity, more unplanned pregnancies and more child death.

   Null Hypothesis

   Traditional are no more likely than modern women to have increased parity, more unplanned pregnancies and more child death.


Low education
Decreased age at marriage
Increased current age
TRADITIONAL
Decreased age at first birth
HIV
Decreased use of birth control
Decreased knowledge of reproductive
Miscarriages
Infant/child death
Unplanned pregnancies
Increased parity
Adjusting for: Age

CHAPTER FOUR

Methods

Study Type

This cross-sectional study used a questionnaire developed by investigators Lisa Baker MD PhD and Shannon Wood MSc based on prior surveys conducted by the WHO, Kenya DHS and a survey conducted in May 2010 in the community of interest: the Nyakach Plateau in the Nyanza Province of Western Kenya (Wood 2011). The survey, found in Appendix A, was administered to a convenience sample of 112 women over a two-week period in May 2011.

The data collected in 2010 was intended to determine baseline assessments within the community of interest that can later serve as pretest data in long-term community interventions and studies. The 2011 survey used in this study was mainly comprised of questions intended to quantify prevalence of various indicators for domestic and gender-based violence on the Nyakach Plateau. However, the questionnaire also included several questions on family planning method use, preferences as well as perceptions of community use and preference among interviewees. The demographic, general health and reproductive health knowledge sections in the survey are also useful in studying contraceptive method choice in this area.

One-on-one interviews were conducted to collect the data. In lower-income communities, such as the community of interest, in which reading levels, health literacy,

and familiarity with written questionnaires are low, face-to-face interview study methods are more likely to elicit representative data than a printed questionnaire.

The questionnaire developed is comprised of 4 sections with a total of 81 questions.

The questionnaire sections include:

1. Demographics
2. General Health
3. Reproductive Health Knowledge
4. Family Planning and Gender-Based Violence

Study Site

Baylor University faculty member Dr. Lisa Baker has established a partnership with a Luo community on the Nyakach Plateau in the Nyanza province of Western Kenya. In these villages on the plateau overlooking Lake Victoria, the majority of people practice subsistence farming as their main means of income. The prevalence of HIV and other diseases is high in the area, and access to healthcare is low. A comprehensive development project called Straw to Bread is a non-profit organization that has been created to provide tools and resources to enable this community to meet its goals in the areas of education, health care, sustainable agriculture, clean water, and small business development. At the root of many of the problems being addressed is the issue of reproductive health and family planning. It is in this context that surveys were done as a tool for gathering baseline information and assessing needs.

Subjects

The interviews were conducted by Baylor University students with Luo interpreters. These interpreters were chosen by Habil Ogola, the local leader of the overall project, based on their knowledge of English, performance in secondary school and standing in the community. Interpreters were trained by village representatives in interviewee recruitment and in data collection methods for this study.

Student interviewers and Luo translators traveled to six local villages (Naki, Soko, Ramogi, Kadero, Katieno and Komoro) to conduct interviews. Recruitment of interviewees occurred through announcements at community events, by word of mouth at women's meetings, and through door-to-door visits by local project volunteers.

Data Analysis

All survey data were coded and double-entered into Microsoft Excel (Redmond, Washington) and then imported into SAS (Carey, North Carolina) statistical software version 9.3 for Windows Vista. All variables were checked for errors and corrected if necessary. Univariate, bivariate, and multivariate analyses were performed using SAS. Alpha (α) was set at 0.05.

CHAPTER FIVE

Results

Organization of Results

Results of this study are grouped into sections, beginning with demographic information, birth outcomes and measures of traditionalism among the women in the study. The final section summarizes the study results as they address the five original hypotheses.

Demographic Characteristics

A total of 112 women, aged 18 to 80 years, were interviewed between May 19 and May 27, 2011. All participants were Kenyan and of the Luo tribe. The average age was 35.53 years (SD=13.37). 81.82% of participants were of reproductive age (15-49 years). Over 90% of the sample was either currently married (74.11%) or was widowed (16.07%). Other than one divorced woman, the other women were single (see Table V.1).

Marital Status

Marital Status	**Frequency**	**Percent**
Single	10	8.93%
Married	83	74.11%
Divorced	1	0.89%
Widowed	18	16.07%
	112	100%

Table V.1

Education

Over 10% (11.61%) of the women in the sample had never been to school, and over half of the women had had only a primary school education. Almost 30% had secondary or technical training, and 4.46% had been to university or trade school.

Highest Level of School Completed

Highest level of school completed	**Frequency**	**Percent**
Never been to school	13	11.61%
Primary/Elementary	62	55.35%
Technical Training	1	0.89%
Secondary	31	27.68%
University/Trade School	5	4.46%
	112	100%

Table V.2

Education Completed Comparison to Kenya DHS

	No education	Completed Primary	Completed Secondary	More than secondary	Median Years completed
KDHS 2008-2009	2.1%	64.8%	26.8%	6.4%	7.3
Our Survey	11.61%	55.4%	27.7%	4.5%	-

Table V.3

Compared to Nyanza province as a whole, the women in our sample were less educated, as is further shown in Figure V.1 below.

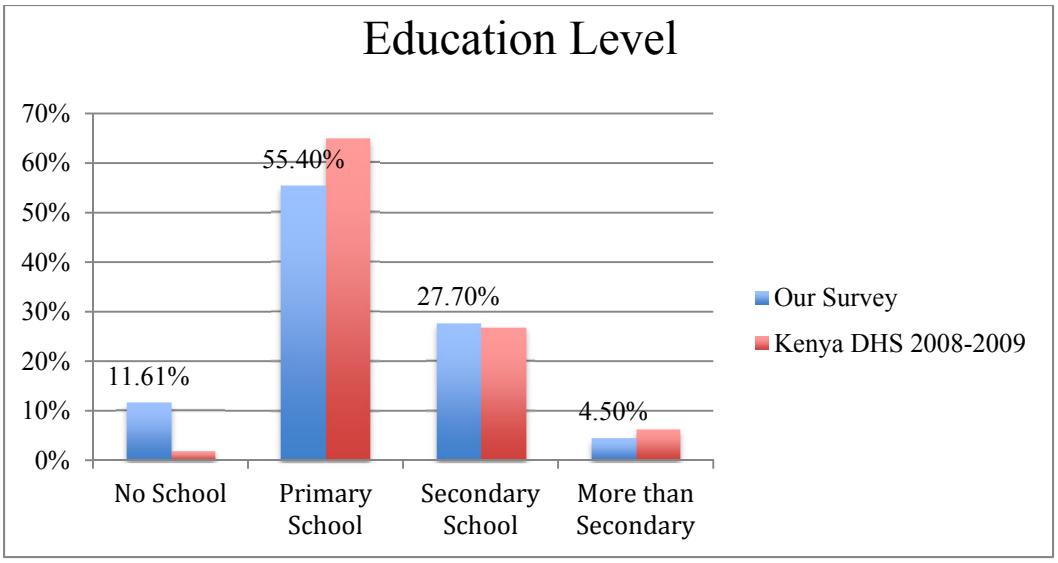


Figure V.1

** Note** The KDHS included female household populations over the age of six years, while our survey population only included females eighteen years or older.

The relationship between education and age

Those who had not had any schooling were, at a statically significant level, an average of at least 12 years older at the time of the survey than those who had completed primary or secondary school (p=0.0028).

Those who had completed secondary education or higher got married later (p=0.0334) and had children later (p=0.0078) than those who had less education, but their average age was just twenty years old for both events.

Education Analysis of Variance for Demographics						
Variable	No School	Primary School	Secondary or Higher		P	F Value
Current Age	46.07 n=13 SD=13.85	34.29 n=59 SD=13.85	32.59 n=37 SD=9.41		0.0028	6.22
Age at Marriage	19.15 n=13 SD=5.67	18.24 n=59 SD=3.78	20.17 n=29 SD=2.5		0.0334	3.52
Age at First Birth	20.09 n=11 SD=3.53	18.71 n=55 SD=2.54	20.56 n=32 SD=2.65		0.0078	5.11

Table V.4

Age at Marriage

Median age at first marriage was 18.0 years (SD = 3.28 years) with a range of 12-35 (see Figure V.2), which is almost one year younger than the median age for the rest of the province according to the KDHS (18.9 years old). By age 16, 21.57% were married and more than 90% were married by age 23. The most common ages for marriage were 15 years (11.76%) and 18 years (25.49%). These numbers become even more interesting when age at first birth, shown in Figure V.3, is taken into account. The two trends are compared in Figure V.4.

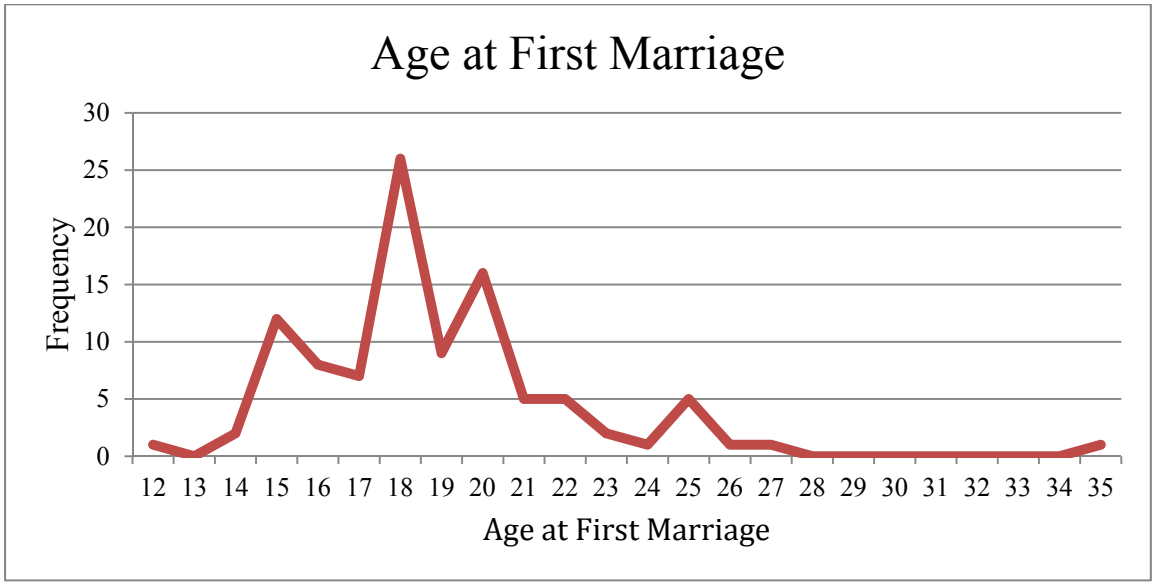


Figure V.2

Age at First Birth:

The mean age at first birth was 19.0 years (SD = 2.81 years) with a range of 12-28 years of age (see Table V.3), which is the same as the larger population of the Nyanza province. In addition to the one person who was a12-year old child when she delivered a baby (probably pregnant at 11), teen pregnancy is the norm in this sample. Almost three-

quarters (72.73%) of the mothers had given birth by age 20. Of these teenaged girls, 12.12% had given birth by the time they had reached their sixteenth birthday, meaning that most of those had gotten pregnant while they were 15. The age at first birth spiked at 16 years and 18 years, plateaued from 19 to 21 years and then steadily declined (see Figure V.3). Only 10% delivered for the first time after age 23.

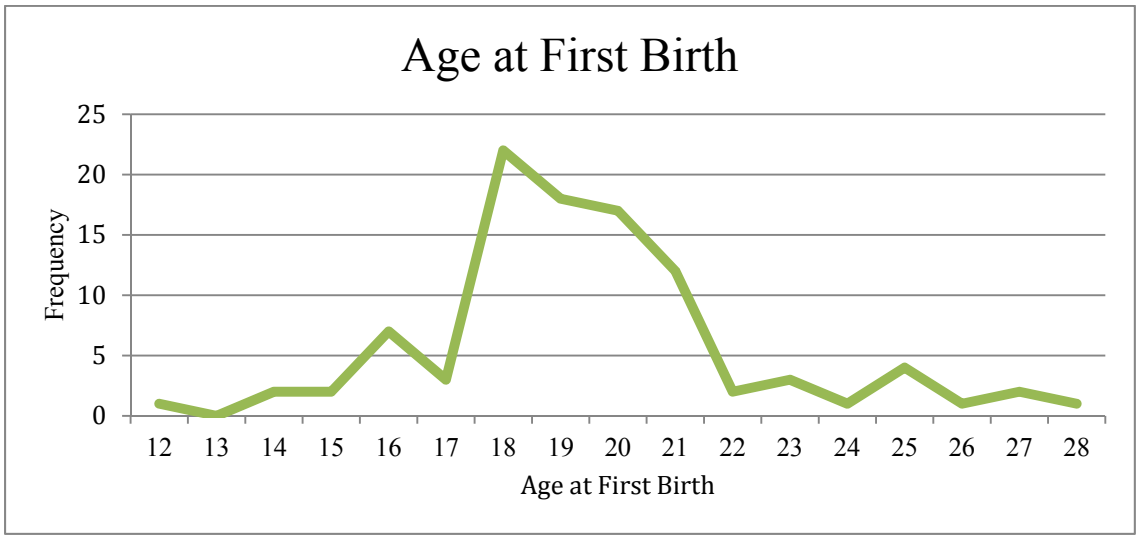


Figure V.3

Age at First Birth

Age at first birth	Percent	Cumulative Percent
12	1.01	1.01
14	2.02	3.03
15	2.02	5.05
16	7.07	12.12
17	3.03	15.15
18	22.22	37.37
19	18.18	55.56
20	17.17	72.73
21	12.12	84.85
22	2.02	86.87
23	3.03	89.90
24	1.01	90.91
25	4.04	94.95
26	1.01	95.96
27	2.02	97.98
28	1.01	98.99
Doesn't know	1.01	100.00

Table V.5

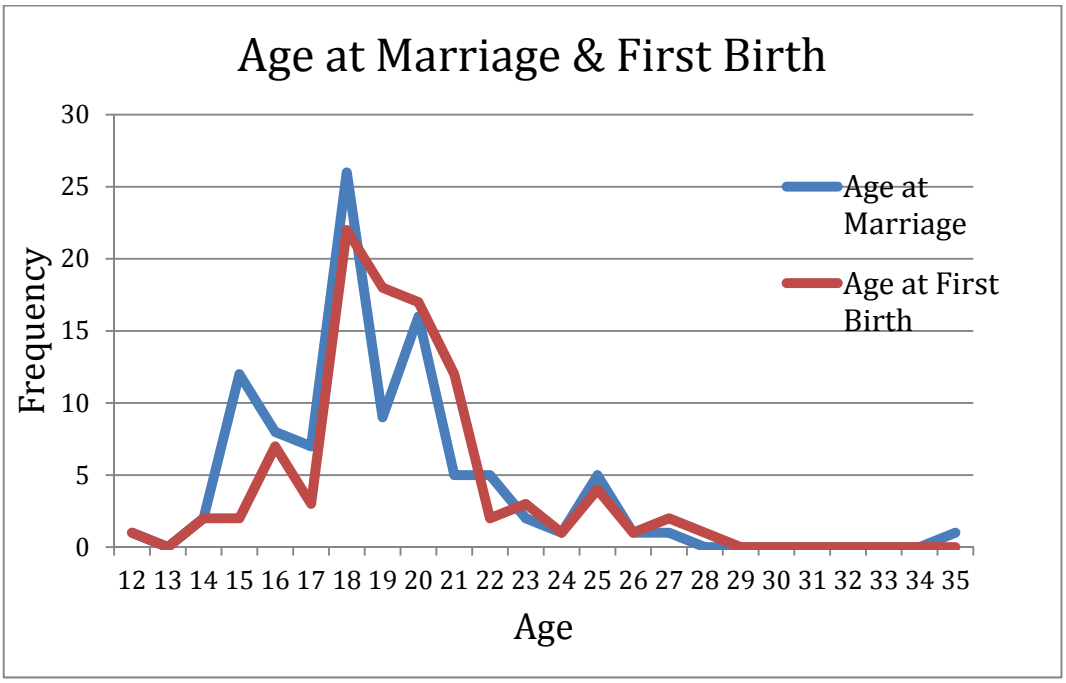


Figure V.4

As is illustrated in Graph V.4, the age at first birth closely follows the age at marriage. It appears that most women in the sample got pregnant soon after marriage (or perhaps got married soon after becoming pregnant) and gave birth during the first year of marriage.

Age at Last Birth:

The majority of participants (81.82%) were of reproductive age (15-49 years). While age at first birth is normally considered the biggest problem among developing world populations, age at last birth is also concerning. Not only are women beginning to have children earlier, they are also having children at ages when the risk for mother and baby significantly increases. Women who were at least 35 when they last delivered a child were 16.47% of the sample. There is no indication from the data that their latest birth would be their last for all but the oldest women. Because many women were younger than 35 years at the time of the survey (mean age of participants = 35.53 years (SD=13.37)), it is likely that birth at advanced maternal age is a larger problem than is illustrated here. Furthermore, these women are at increased risk for adverse birth outcomes not only due to advanced maternal age at the time of birth, but also because these women also have higher parity at the time of last birth.

The median age at last birth was 28.0 years (SD = 6.08, range = 23 to 43 years).

Age at Last Birth

Age at last birth	Percent	Cumulative Percent
16	1.18	1.18
18	1.18	2.35
19	1.18	3.53
20	2.35	5.88
21	4.71	10.59
22	2.35	12.94
23	5.88	18.82
24	5.88	24.71
25	2.35	27.06
26	7.06	34.12
27	8.24	42.35
28	10.59	52.94
29	3.53	56.47
30	8.24	64.71
31	2.35	67.06
32	2.35	69.41
33	3.53	72.94
34	4.71	77.65
35	5.88	83.53
36	3.53	87.06
37	1.18	88.24
38	4.71	92.94
39	1.18	94.12
40	2.35	96.47
42	2.35	98.82
43	1.18	100.00

Table V.6

Comparison to the Kenya DHS

Median age at first marriage for the KDHS was 18.9 years. In our survey, median age at marriage was 18.0 years. Median age at first birth for the KDHS was 19.0 years. In our survey, median age at first birth was 19.0 years.

The average number of children a woman would produce if she went through her entire reproductive period (TFR) in Nyanza is 5.4 children. In our survey, the mean number of children was 4.51. TFR for this population is, therefore, likely to be much

higher than the average number of children in this sample, 4.51 children per woman, since the women in the sample have an average of 13.47 years left of childbearing age ([49 years]-[35.53 years (mean age in sample)] = 13.47 years left of childbearing age).

Birth Outcomes

Number of children:

In the sample, 95.45% of women were mothers. The average number of children was 4.51 (SD=2.72, range= 0 to 12 children) (see Figure V.5).

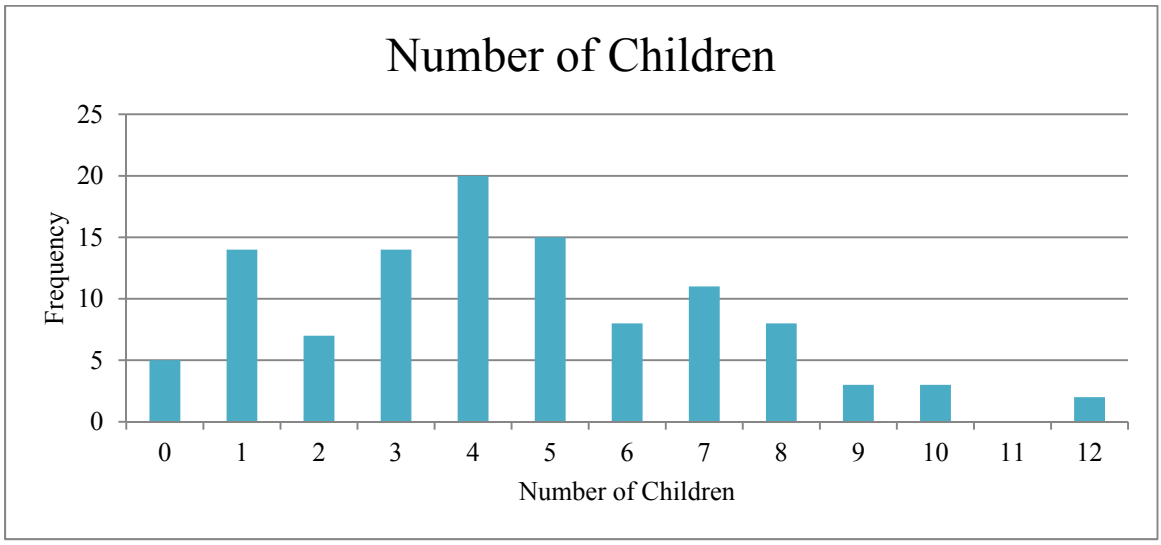


Figure V.5

Over half of the women in the sample had at least four children. It is important to emphasize, however, that over 80% of women in the sample were still of childbearing age and will likely have more children, so this data does not serve as a surrogate for Total Fertility Rate (TFR), which is defined as "the average number of children a woman would have if she went through her entire reproductive period, from 15 to 49 years, reproducing at the prevailing ASFRs (Age-specific fertility rates)" (Kenya DHS 2008-2009). TFR for this population is, therefore, much higher than the average number of

children in this sample, 4.51 children per woman, since the women in the sample have an average of 13.47 years left of childbearing age (49 years - 35.53 years (mean age in sample)] = 13.47 years left of childbearing age).

TFR in Nyanza is approximately 5.4 per woman. TFR in our sample likely exceeds this measurement (Kenya DHS 2008-2009).

Number of Children

Number of children	Frequency	Percent	Cumulative Percent
0	5	4.55%	4.55%
1	14	12.73%	17.27%
2	7	6.36%	23.64%
3	14	12.73%	36.36%
4	20	18.18%	54.55%
5	15	13.64%	68.18%
6	8	7.27%	75.45%
7	11	10.00%	85.45%
8	8	7.27%	92.73%
9	3	2.73%	95.45%
10	3	2.73%	98.18%
11	0	0%	98.18%
12	2	1.82%	100.00%
	110		

Table V.7

Child Death

Table V.8 shows that more than 1 out of 3 women in this study had a child die after birth.

Child Death

Have you ever had a child die after birth?	Frequency	Percent
No	67	63.81%
Yes	38	36.19%
	105 (Frequency missing= 7)	100%

Table V.8

Infant mortality is defined as the death of a child at one year of age or younger, which, in this sample, was 59.46% of the first child deaths. Child mortality is defined as the death of a child between the ages of one year and five years. In this study, another 20% (18.92 %) of the first child deaths occurred in this one to five-year-old group.

Of study participants who had two or more children die (18 of the 112 women), two-thirds of the second child deaths were when the child was one year of age or younger. Of study participants who had three or more children die (10 of the 112 women), 40% of the third child deaths were at one year of age or younger.

Total Number of Children Died:

While 36.19% of women had lost at least one child, this figure does not include miscarriages and children at any age at time of death. Most women who had lost children had lost only one (17.13%). However, a shocking number, 11.54% and 7.69%, had lost two and three children, respectively. The number of children died includes babies that died before birth.

Number of Children Died

Number of children died	Frequency	Percent	Cumulative Percent
0	60	57.69	57.69
1	18	17.31	75.00
2	12	11.54	86.54
3	8	7.69	94.23
4	1	0.96	95.19
5	2	1.92	97.12
6	2	1.92	99.04
9	1	0.96	100.00

Table V.9

Infant and Child Mortality: Comparison to the Kenya DHS

	Neonatal mortality	Infant mortality	Child mortality	Under-five mortality
KDHS 2008-2009	39	95	60	149
Our Survey	20	63	26	91

Table V.10

** These rates are for the 10-year period preceding the 2008-2009 Kenya DHS

Miscarriage:

In the survey questionnaire, we asked, "Have you ever had a baby die before birth?"

"Miscarriage" is typically defined as "spontaneous pregnancy loss before the 20th week of gestation" (Heffner 2004). In the case of our survey, however, we are defining "miscarriage" as the death of a fetus before birth.

Miscarriage

Miscarriage	**Frequency**	**Percent**
No	90	84.91%
Yes	16	15.09%
	106 (Frequency missing= 6)	100%

Table V.11

Rates of miscarriage in this population were very high. Even more shocking than the 15.09% of women who had experienced a miscarriage is the fact that these women may have experienced more than one, so the miscarriage rate in this population is likely higher than the 15.09% calculated.

HIV Prevalence and Testing

HIV workers from the Kenyan government visit the area every few years to offer HIV tests. In May 2011, the workers visited the area. Therefore, many people in the survey knew their HIV status that may not have known it before two weeks prior to this survey. Almost 90% (89.29%) of the women in the sample had been tested for HIV, and 56% had been tested during the calendar year of the survey (2011). Another 29% had received their last HIV test in the previous calendar year (2010). Of the 100 women who had been tested, 83 had tested negative for HIV, 15 had tested positive, and 2 responses were missing.

Over half of the women (51.71%) said they did not know if their husband had ever tested positive for HIV. One third (36.06%) said their husband had never tested positive, while (12.23%) said that they knew their husband had tested positive for HIV. Thus, the remaining 51.71% of women were unsure of their husband's HIV status (Frequency missing = 8).

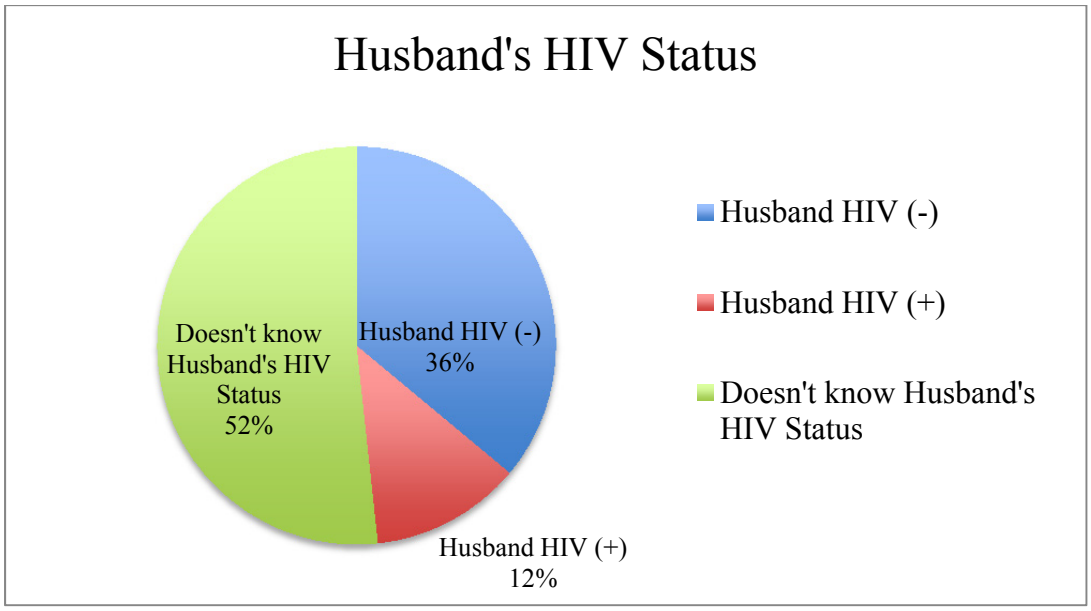


Figure V.6

Comparing HIV Data to the Kenya DHS for Nyanza

According to DHS data on the trends in national HIV prevalence in Kenya by age, women have a higher prevalence of HIV than men in every age group except 35-39 years of age.

When the HIV prevalence data is controlled for province, HIV prevalence in the Nyanza province is 13.9%, nearly double that of the Nairobi province, where HIV prevalence is second-highest nationally.

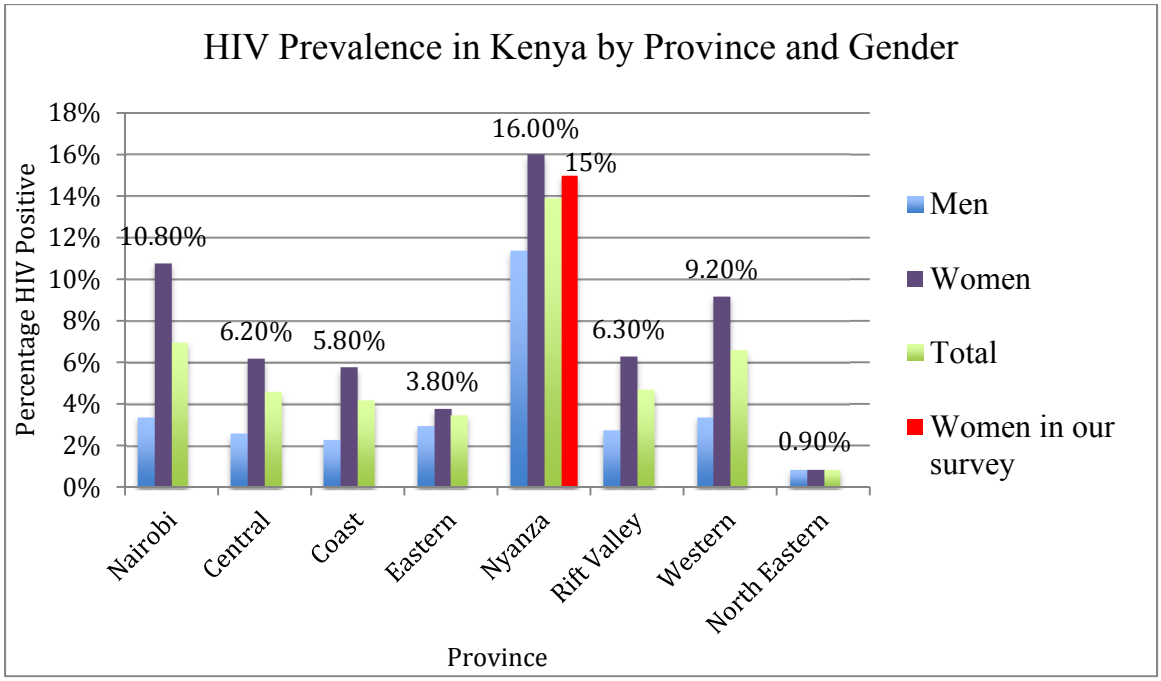


Figure V.7

Furthermore, among the Luo people, adult HIV prevalence is 20.2%, nearly triple that of the second-highest ethnic group, the Luhya (prevalence = 7.0%). Among Luo women, HIV prevalence is even higher than that of men: 22.8% and 17.1%, respectively (Kenya DHS 2008-2009). Therefore, our sample is from the province with the highest HIV prevalence and the tribe with the highest HIV prevalence within that province. It

can be extrapolated, then, that these women are among the most high-risk for HIV infection in all of Kenya.

Among the participants in this study who had been tested for HIV, 15 (15%) had tested positive. However, 10.7% of study participants had never been tested for HIV, so the HIV prevalence among the group may be underestimated. The 10 women and 2 missing responses comprise 12% of the sample. If we extrapolate from other frequencies of Luo women, we would presume 22.8% of those are positive and add 2.8% to the known 15% for a total of 17.8% HIV rate. This figure may be higher, but is unlikely to be lower, especially in light of the fact that it had been at least one year or longer since over one-third of study participants had been tested for HIV and 12.23% had husbands who were known to be HIV positive. Furthermore, 33.04% of women did not know their husband's HIV status.

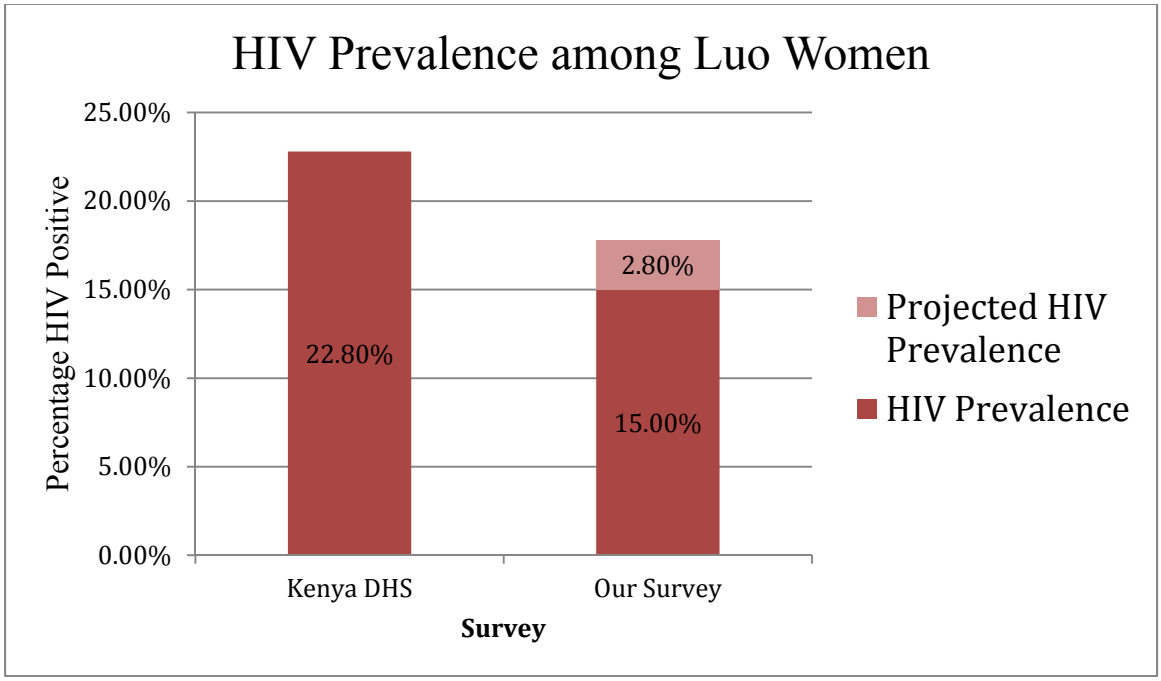


Figure V.8

Unplanned Pregnancies and Family Planning Use

"Have you ever had an unplanned pregnancy?"

Unplanned pregnancies	Frequency	Percent
No	50	46.73
Yes	57	53.27
	107 (Frequency missing= 5)	

Table V.12

"How many unplanned pregnancies have you had?"

# Unplanned Pregnancies	Frequency	Percent
0	50	46.73
1	41	38.32
2	9	8.41
3	2	1.87
4	2	1.87
6	2	1.87
8	1	0.93
	107 (Frequency missing= 5)	

Table V.13

Over half of the women in the sample had experienced at least one unplanned pregnancy (53.27%). Most women who had experienced an unplanned pregnancy had experienced only one, but 25% of the sample had experienced multiple unplanned pregnancies. The fact that almost half of the women say that they have not experienced unplanned pregnancies and about the same proportion say that they have used birth control would seem to indicate that their family planning has been very effective. It is a stunning finding in light of the low use of current birth control (26.92%) and the large number of children. The implications of this complexity will be discussed further in the following chapter.

"Have you ever used birth control?"

Ever used birth control?	Frequency	Percent
No	49	45.37
Yes	59	54.63

Table V.14

Of the 59 women who had ever used birth control, 26 (59%) of birth control ever-users had used the pill; 41 (69.5%) had used the shot; 18 (30.05%) had used condoms (Frequency missing = 5).

"Are you currently using birth control?"

Current BC Use	Frequency	Percent
No	76	73.08%
Yes	28	26.92%
	104	100%

Table V.15

Of the 26.92% of women who were using birth control at the time of the survey, the frequencies of the various methods is shown in Figure V.9. The three main methods used were, in order of frequency: shot (44.44%), condoms (29.63%), and the pill (25.93%).

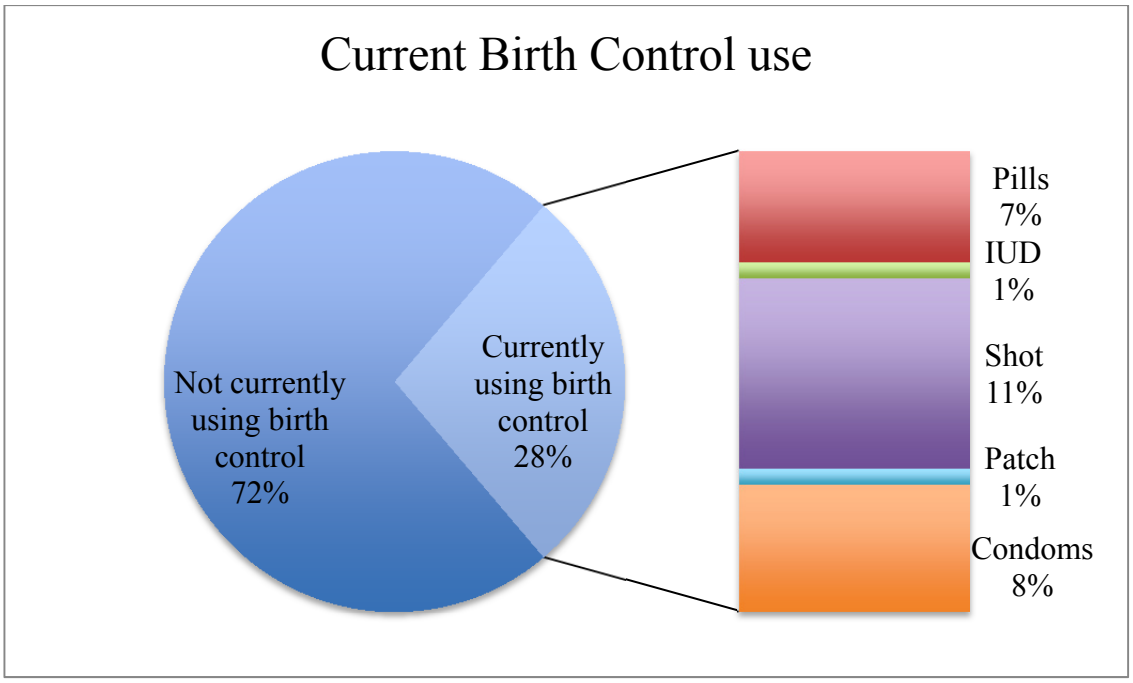


Figure V.9

(Cumulative frequency of methods may exceed 100% since all current method. Combinations were taken into account, i.e. some participants may be using injectable contraception condoms for reasons of contraception and STI protection simultaneously.)

Comparing birth control use to the Kenya DHS. The KDHS measures "ever use", but does not control for region. In our survey, 59 women (54.63%) had used birth control at some point in their lives. Of the 59 women, 26 (59%) of birth control ever-users had used the pill; 41 (69.5%) had used the shot; 18 (30.05%) had used condoms (Frequency missing = 5).

Current use of Birth Control in our study vs. Kenya DHS (2008-2009)

	Any modern method	Female sterilization	Pill	IUD	Injectable (shot)	Male Condom	Patch	Other modern methods: (Implants & LAM)
KDHS 2008-2009	39.9%	5.7%	3.1 %	0.4 %	18.0%	3.9%	-	2.1%
Our survey	26.92%	0%	6.73 %	0.9 %	11.54%	7.41%	0.9%	-

Table V.16

** Our cumulative percent of all methods exceeds the 26.92% stated because study participants were permitted to choose more than one current method.

Measures of traditionalism among village women. In addition to their actual behavior, questions were asked about women's views, values, and knowledge about family planning. Traditional women were defined as those who said that they did not know any women who had more babies than she wanted or were unsure if they knew anyone who had more babies than she wanted. The proportion of people answering "yes", "no", or "I don't know" is listed below.

Perceptions of Family Planning in the Village

"Do you know anyone who has more babies than she wanted?"

Do you know anyone who had more babies than she wanted?	**Frequency**	**Percent**
No	45	40.54
Yes	48	43.24
Doesn't know	18	16.22

Table V.17

We reasoned that women who said that they knew another woman in the community who had more children than she wanted had adopted ideas about limiting family size. These were interpreted to be more "modern" women, while their counterparts, who knew no woman who had more children than she wanted, would be

considered more "traditional". Because of dense social networks among women in the Nyanza province, family planning ideas and trends are disseminated well through social groups and word-of-mouth, but there is still an almost even split between those who do or do not conceive of themselves or other women as ever *wanting* to limit their fertility.

One interpretation of these data is that family planning is so successful that it has never failed for these women. However, family size is large, and birth control is not the norm. It is not likely that the 40.54% who said they knew no one who had more children than she wanted, plus the 16.22% who said that they did not know, represent modern women who are satisfied with the success of the community's use of scientific birth control. Instead, the 43.24% who said that they did know someone who had more children than she wanted most likely reflects the spectacular unmet need for effective family planning.

That 16.22% of women said they did not know may illustrate that this concept is not as openly discussed as had been presumed. For purposes of analysis, it seemed more consistent to group together as "traditional" the women who answered "no" and "I don't know" to the question "Do you know any one who had more babies than she wanted?".

"Do women plan the number of babies they have?"

Do women plan?	**Frequency**	**Percent**
No	35	31.53%
Yes	54	48.65%
Doesn't know	22	19.82%
	111 (Frequency missing = 1)	

Table V.18

Slightly less than half (48.65%) of women in the study said that women in their village plan the number of babies they have. This should be compared to the 53.27% of

women in Table V.12 who, themselves, had experienced at least one unplanned pregnancy. Also, similar to Table V.17, 19.82% of women said that they did not know if women in the village plan the number of babies they have. This could indicate that these topics are not openly discussed.

"Who helps women decide the number of babies she will have?"

Who helps women decide?	Frequency	Percent
Husband	66	65.35%
Mother-in-law	2	1.98%
Mother	19	18.81%
Doctor or nurse	5	4.95%
Midwife	1	0.99%
Doesn't know	8	7.92%
	101 (Frequency missing= 11)	

Table V.19

To the degree that women do think about deciding how many babies to have, the majority of women (65.35%) state that husbands are the ones who help decide.

Number of Babies Village Women Have:

In contrast to the actual number of babies these women have, they were asked about the norm in their community. On average, they stated that women had 6.88 babies (SD=1.83). Total Fertility Rate (TFR) in Nyanza is approximately 5.4 births per woman. If these women's perceptions are an accurate estimate of parity, TFR in our sample likely exceeds that in other parts of their district (Kenya DHS 2008-2009). It is notable that about 10% of the sample said that women in their village generally had 10 babies.

"How many babies do women in the village normally have?"

Perceived number of babies village women have	Frequency	Percent	Cumulative Frequency	Cumulative Percent
3	3	3.37	3	3.37
4	3	3.37	6	6.74
5	17	19.10	23	25.84
6	14	15.73	37	41.57
7	19	21.35	56	62.92
8	20	22.47	76	85.39
9	3	3.37	79	88.76
10	9	10.11	88	98.88
12	1	1.12	89	100.00

Table V.20

"Do you think the women in your village know enough about family planning?"

The answer to whether women had enough knowledge about family planning was striking in that two-thirds of the sample said "*yes*". In order to see the significance of this majority point of view, one must interpret this finding in light of the data (see Figure V.10), which shows that a large portion of women in the sample had very little knowledge of reproductive health.

"Do you think the women in your village know enough about family planning?"

Do you think the women in your village know enough about family planning?	Frequency	Percent
No	23	21.30%
Yes	73	67.59%
Don't know	12	11.11%
	108 (Frequency missing= 4)	

Table V.21

Reproductive Health Knowledge

A total of nine individual questions regarding basic reproductive health were asked in order to quantify the level of reproductive knowledge among study participants. One woman answered all nine questions correctly, while none of the women gave all incorrect answers. Frequencies of correct answers for each question are listed in Table V.22.

The compiled knowledge score, or number of reproductive health questions each woman answered correctly, ranged from 1 to 9. The mean score was 4.49 (SD= 1.56). The frequencies of women who received each score are shown in Figure V.10.

Reproductive Health Questions	Correct (%)	Incorrect (%)
How many times per month does a woman normally get her (menstrual) period?	92.86	7.14
Can a woman get pregnant during her period?	27.68	72.32
Can a woman get pregnant the first time she has sex?	62.50	37.50
During which part of a woman's menstrual cycle is she most fertile (more likely to get pregnant)?	11.61	88.39
How long does a normal pregnancy usually last?	87.50	12.50
Is it bad for the baby if a pregnant woman drinks alcohol during pregnancy?	66.96	33.04
Is it bad for the baby if a pregnant woman smokes during pregnancy?	74.11	25.89
Name some ways that people can get HIV/AIDS.	17.86	82.14
Name some ways that people can protect themselves from getting HIV/AIDS.	8.04	91.96

Table V.22

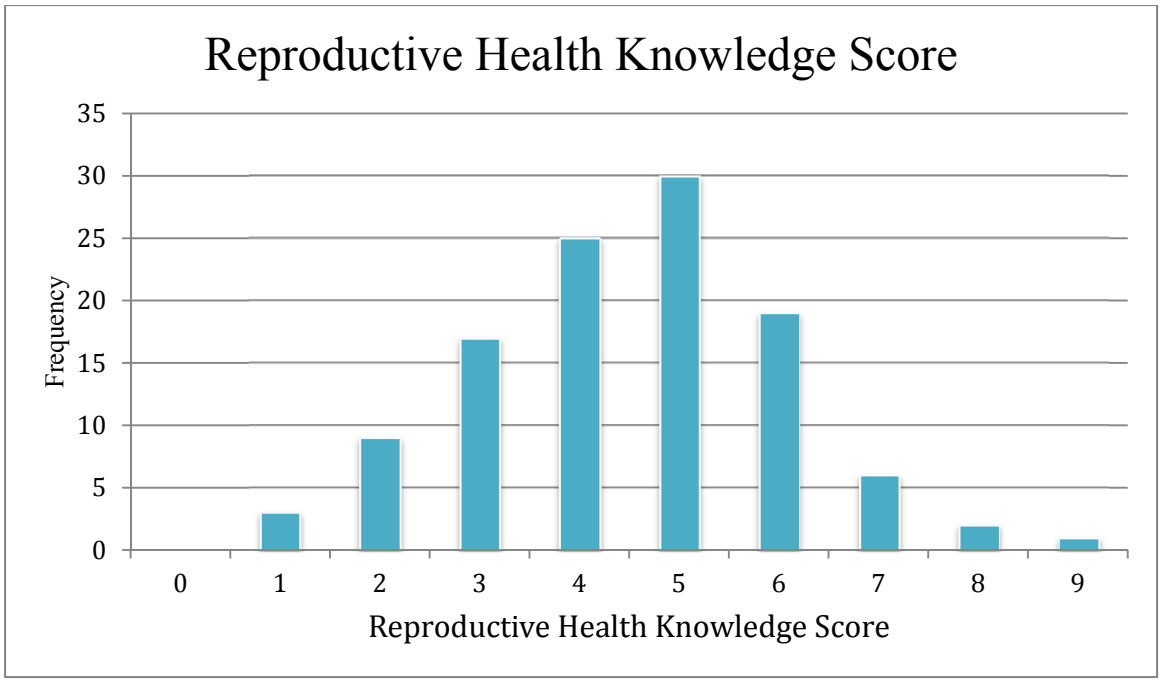


Figure V.10

During the next step of analyzing the relationship between the knowledge of reproductive health and adverse birth outcomes, extreme scores of 1, 8, and 9 were excluded because there were so few people with these scores. With a small sample size, we did not want to overinterpret results that were based on responses of just one or two people in a category. When these outliers were excluded, the mean reproductive health knowledge score was 4.80 (SD=1.22).

Hypothesis Testing

As described above, when analyzing determinants for the "traditional/modern" variable, women who answered "Do you know any one who had more babies than she wanted?" with "no" and those who answered "I don't know" were combined into one category.

In this study, it was hypothesized that characteristics of these traditional women would include: low education, decreased age at marriage and increased current age at

time of the study. As a result of these characteristics, these traditional women were also hypothesized to be more likely to have a decreased age at first birth, higher HIV prevalence, decreased use of birth control, decreased knowledge of reproductive health and increased parity. Expected outcomes among this group of traditional women were increased number of unplanned pregnancies, infant deaths and child deaths.

Hypothesis 1:

Traditional women are more likely than modern women to be older, less educated, younger when married, and younger at first birth.

Null Hypothesis

There is no difference between traditional and modern women in current age, education, and age at marriage and first birth.

The results showed that, while women who answered "no" to our question did tend to be older, the relationship was not statistically significant ($p=0.1359$). Age at marriage and age at first birth were not significantly related to traditional values. Therefore, we are not able to reject the null hypothesis. Since 90% of the women in this sample are married and having children by age 23, this finding indicates that the cultural and gender norms in this community are more powerful than ideas that would challenge that behavior. The fact that women with modern ideas about fertility are on average at least 12 years younger than the traditional women suggests that there may be a generational effect, but it has not translated into behavior.

	"Do you know someone who has had more babies than she wanted?"			
Variable	**No (Traditional)**	**Yes (Modern)**	**P**	**F Value**
Age	36.72 n= 60 SD=12.86	33.02 n=48 SD=12.49	0.1359	2.26
Age at Marriage	18.84 n=57 SD=3.63	19.20 n=43 SD=2.83	0.7873	0.07
Age at First Birth	19.49 n=53 SD=2.73	19.44 n=45 SD=2.93	0.9359	0.01

Table V.23

Education Level as a Predictor of Traditionalism

We hypothesized that women who answered "no" to the question "Do you know someone who has had more babies than she wanted?" would be less educated than women who answered "yes".

While the difference between the two groups was not statistically significant (p=0.3053), it should be noted that the trend in the association supports the hypothesis: almost 70% of women with no schooling were traditional, almost 60% of women with primary school education were traditional, and almost 50% of women with secondary education were traditional.

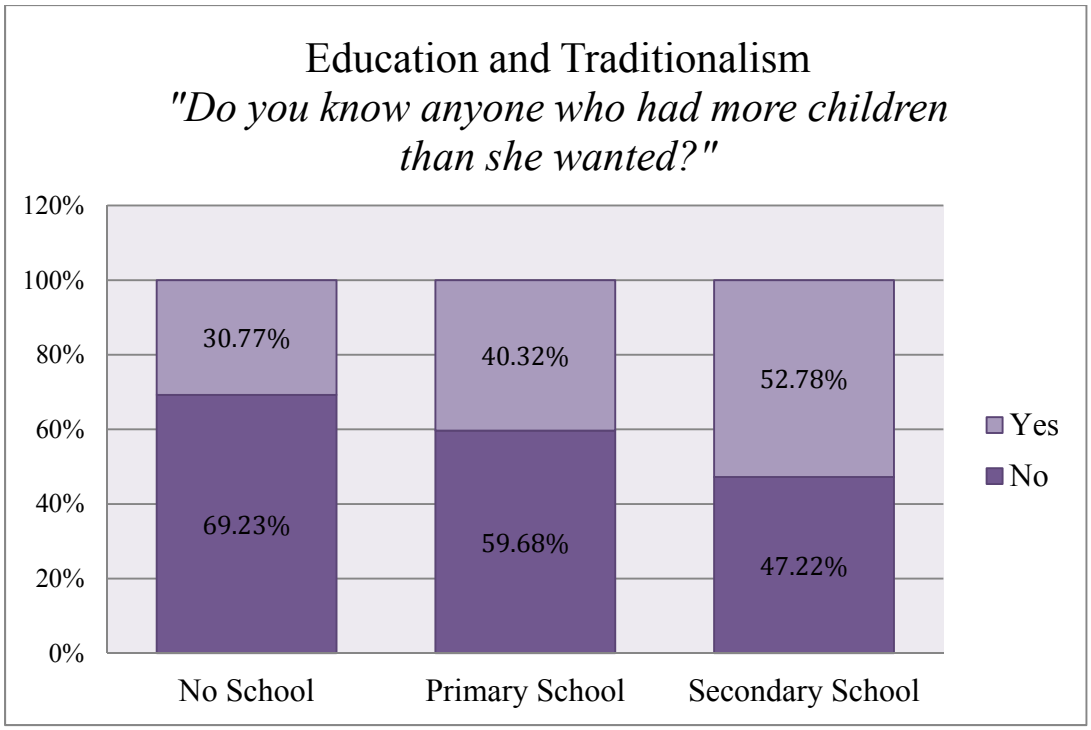


Figure V.11

Education and Traditionalism			
	"Do you know someone who has had more babies than she wanted?"		
Highest Level of Education Completed	No	Yes	Total
No School	n=9 8.11% 69.23% 14.29%	n=4 3.60% 30.77% 8.33%	n=13 11.71%
Primary School	n=37 33.33% 59.68% 58.73%	n=25 22.52% 40.32% 52.08%	n=62 55.86%
Secondary School	n=17 15.32% 47.22% 26.98%	n=19 17.12% 52.78% 39.58%	n=36 32.43%
Total	n=63 56.76%	n=48 43.24%	n=111 100.00
Frequency missing = 1 DF= 2; X^2 = 0.3053; p= 0.3053			

Table V.24

Regression Analysis:

When combining these demographic variables in a logistic regression analysis to predict women's answer to the question indicating traditional values, none of these measures were statistically significant.

Regression Analysis for Traditional/Modern

	Estimate	Standard Error	Chi-Square	Pr>ChiSq
Level Education Completed	0.3139	0.3583	0.7674	0.3810
Current Age	-0.0156	0.0186	0.6999	0.4028
Age Married	0.0334	0.0771	0.1872	0.6652
Age at First Birth	-0.0290	0.0955	0.0925	0.7611

Table V.25

Hypothesis 2

Older women with less education and younger age at first marriage and older current age are less likely to use birth control than their younger, more educated counterparts who are older when they marry.

Null Hypothesis

Age, education, and age at marriage are not associated with utilization of birth control.

Birth Control Use and Education

As predicted, those with no education used birth control less than those who had completed primary or secondary education ($X^2 = 6.5144$, $p = 0.0385$). Of those with secondary education or higher, 69.44% had used birth control at some point, while only

50.85% of those who had completed primary and 30.77% of those who had never been to school had ever used birth control.

Among those who had completed no school, roughly one-third had ever used birth control. Among those who had completed primary, this number rose to roughly one-half. Lastly, among those who had completed secondary school or higher, this number rose to over two-thirds.

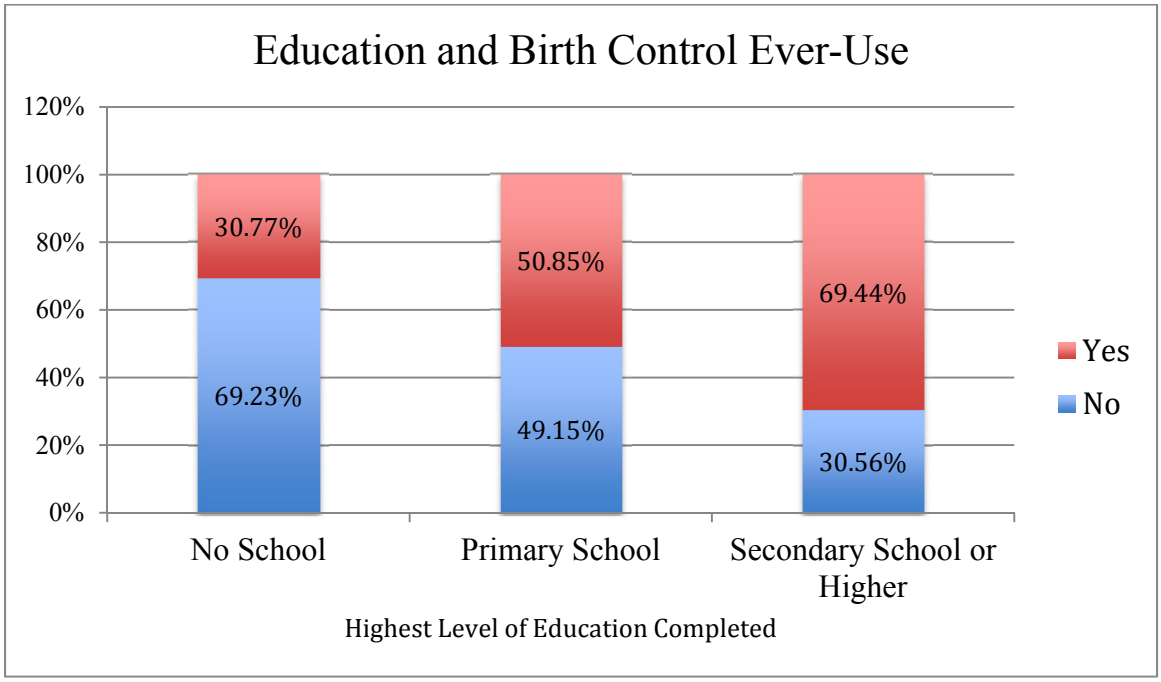


Figure V.12

Birth Control Ever-Use and Education

	Birth Control Ever Use		
Highest Level of Education Completed	No	Yes	Total
No School	n=9 8.33% 69.23% 18.37%	n=4 3.70% 30.77% 6.78%	n=13 12.04%
Primary School	n=29 26.85% 49.15 59.18	n=30 27.78 50.85 50.85	n=59 54.63%
Secondary School	n=11 10.19% 30.56% 22.45%	n=25 23.15% 69.44% 42.37%	n=36 33.33%
Total	n=49 45.37%	n=59 54.63%	n=108 100.00%
Frequency missing = 4 DF= 2; $X^2 = 6.5144$; p= 0.0385			

Table V.26

Birth Control Use and Age Variables

We hypothesized that women who were older at the time of the survey and younger at first marriage and first birth were less likely to have ever used birth control.

In analyzing all three age variables, there was no statistically significant difference in those who had used birth control and those who had not.

Birth Control Ever-Use and Age Variables

	Birth Control Ever Use				
Variable	**No**	**Yes**		**P**	**F Value**
Age	34.64 n=47 SD=14.23	35.47 n=59 SD=11.48		0.7383	0.11
Age at Marriage	18.73 n=42 SD=4.10	18.96 n=56 SD=2.39		0.7324	0.12
Age at First Birth	19.54 n=41 SD=3.36	19.42 n=57 SD=2.36		0.8419	0.04

Table V.27

Birth Control Use and Adverse Birth Outcomes

Two trends that almost reached significance suggested that those who had ever used birth control actually tended to have more children than those who had never used birth control (p=0.0716) but fewer of those children died (p=0.0717).

Ironically, a highly statistically significant finding (p=0.0095) was that those who used birth control were twice as likely to have an unplanned pregnancy than those who had never used birth control. These unexpected results could be explained by improper use of birth control or a discrepancy in the definition of "unplanned pregnancy" within the sample.

Birth Control Ever Use and Birth Outcome Variables

	Birth Control Ever Use			
Birth Outcome Variable	**No**	**Yes**	**P**	**F Value**
Number of Children	3.98 n=47 SD=2.84	4.93 n=59 SD=2.54	0.0716	3.31
Number of Children Lost	1.15 n=45 SD=1.48	0.66 n=56 SD=1.25	0.0717	3.31
Number of Unplanned Pregnancies	0.50 n=46 SD=0.84	1.07 n=58 SD=1.25	0.0095	6.99

Table V. 28

Birth Control Ever Use Among Traditional and Modern Women

The hypothesis that traditional women were less likely to have used birth control was supported by the data (p=0.0385). Of those who did not know anyone who had more children than she wanted, only one-third (33.33%) had used birth control, while, of those who did know someone who had more children than she wanted, two-thirds (66.67%) had used birth control.

Traditional/Modern and Birth Control Ever-Use

	"Do you know someone who has had more babies than she wanted?		
Birth Control Ever Use	No	Yes	Total
No	n=33 30.56% 55.00% 67.35%	n=16 14.81% 33.33% 32.65%	n=49 45.37%
Yes	n=27 25.00% 45.00% 45.76%	n=32 29.63% 66.67% 54.24%	n=59 54.63%
Total	n=60 55.56%	n=48 44.44%	n=108 100.00%
			Frequency missing = 4 DF= 2; X^2 = 6.5144; p= 0.0385

Table V.29

Birth Control Use and Reproductive Health Knowledge

At a statistically significant level, women who had a higher knowledge of reproductive health where more likely to use birth control (p=0.0461).

Knowledge Score and Birth Control Ever Use

Birth Control Ever Use	Mean Reproductive Health Knowledge Score
No	4.19 n=48 SD=1.36
Yes	4.72 n=54 SD=1.31
	F Value = 4.08 p=0.0461

Table V.30

Regression Analysis

Predictors of birth control ever-use. Birth control use (ever) was regressed on the three age variables, education, traditional vs. modern, and reproductive health knowledge. In the overall model, only education was a statistically significant determinant of birth control use, with those who were more educated more likely to have ever used birth control (p=0.0233).

Regression Analysis of Birth Control Use Determinants (a)

Parameter	Estimate	Standard Error	Chi-square	Pr>Chisq
Age	0.0234	0.0199	1.3844	0.2394
Age Married	0.0202	0.0828	0.0592	0.8077
Age at First Birth	-0.1295	0.1045	1.5345	0.2154
Level of Education Completed	0.9489	0.4182	5.1478	0.0233
Traditional/Modern	0.5981	0.4878	1.5036	0.2201
Reproductive Health Knowledge Score	0.1909	0.2009	0.9032	0.3419

Table V.31

After the weakest determinants of birth control use were removed from the logistic regression analysis in Table V.31, education became even a more significant driver of birth control use (p=0.0177). The measure of Traditional/Modern came close to statistical significance (0.0819): those who did know someone who had more children than she wanted were more likely to have used birth control (p=0.0819). Age at first birth, however, remained statistically nonsignificant (p=0.5718).

Regression Analysis of Birth Control Use Determinants (b)

Parameter	Estimate	Standard Error	Chi-square	Pr>Chisq
Age at First Birth	-0.0448	0.0792	0.3198	0.5718
Traditional/Modern	0.7603	0.4371	3.0263	0.0819
Level of Education Completed	0.8658	0.3649	5.6297	0.0177

Table V.32

Hypothesis 3:

Traditional women have higher HIV rates than modern women.

Null Hypothesis

There is no relationship between traditional values about fertility and HIV rates.

HIV Status and Education

We hypothesized that those with lower levels of education would have higher rates of HIV infection. There was a statistically significant difference in HIV prevalence among the three education groups (p=0.0132). Of those who had no education, 40% were HIV positive. Of those who had completed primary school, 17.86% were HIV positive. Of those who had completed secondary education or higher, only 3.13% (n=1) were HIV positive. Thus, HIV infection appears to be a dose response with education: more educated women tend to have lower rates of HIV infection.

It is notable that over one quarter (26.76%) of the HIV positive participants were in the "no school group", while the "no school" group only represented 10.20% of the sample.

HIV Status and Education Completed

	HIV Status		
Highest Level of Education Completed	HIV (-)	HIV (+)	Total
No School	n=6 6.12% 60.00% 7.23%	n=4 4.08% 40.00% 26.67%	n=10 10.20%
Primary School	n=46 46.94% 82.14% 55.42%	n=10 10.20% 17.86% 66.67%	n=56 57.14%
Secondary School	n=31 31.63% 96.88% 37.35%	n=1 1.02% 3.13% 6.67%	n=32 32.65%
Total	n=83 84.69%	n=15 15.31%	n=98 100.00%
Frequency missing = 14 $X^2 = 8.6478$ p=0.0132			

Table V.33

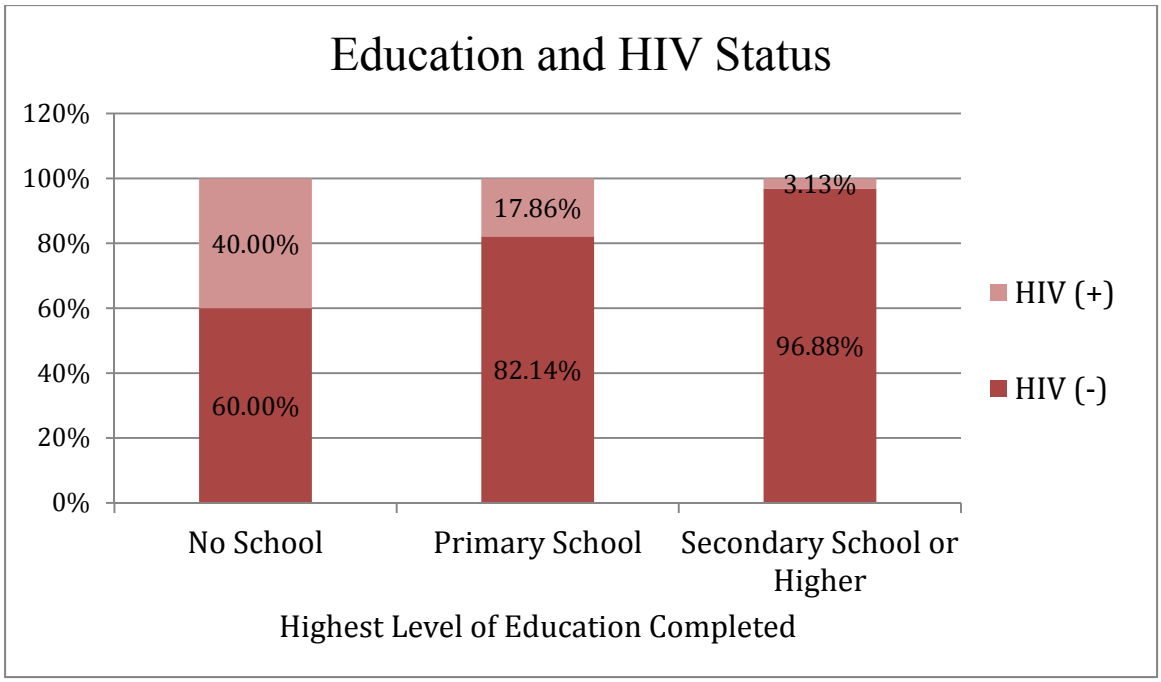


Figure V.13

HIV Status and Age Variables

We hypothesized that older women who had been married and given birth at a younger age would be more likely to be HIV positive, based on the idea that older women are more likely to be HIV positive because they tend to have less education and have a longer exposure period to the virus.

While none of these measurements were statistically significant, the average age of an HIV positive woman was approximately 3 years older than an HIV negative woman. The much clearer association of the education variable with HIV status indicates that it is lack of education instead of age that puts a woman at higher risk in this sample. Whether lack of education represents a surrogate measure for socioeconomic status or some other behavioral protective factor is not known.

HIV Status and Age Variables

	HIV Status			
Variable	**HIV (-)**	**HIV (+)**	**P**	**F Value**
Age	34.65 n=83 SD=13.48	37.50 n=14 SD=11.04	0.3444	0.90
Age at Marriage	19.04 n=75 SD=3.32	18.33 n=15 SD=2.55	0.4388	0.60
Age at First Birth	19.54 n=78 SD=2.81	19.63 n=11 SD=3.70	0.8638	0.03

Table V.34

Reproductive Health Knowledge among Traditional vs. Modern Women:

Hypothesis 4:

Traditional women have lower knowledge of reproductive health than modern women.

Null Hypothesis

There is no relationship between traditional values about fertility and knowledge of reproductive health.

The average knowledge score overall was 4.49, but traditional women knew significantly less than their more modern counterparts (p= 0.0320). The average knowledge score for traditional women was 4.08 while the average knowledge score for modern women was 5.02.

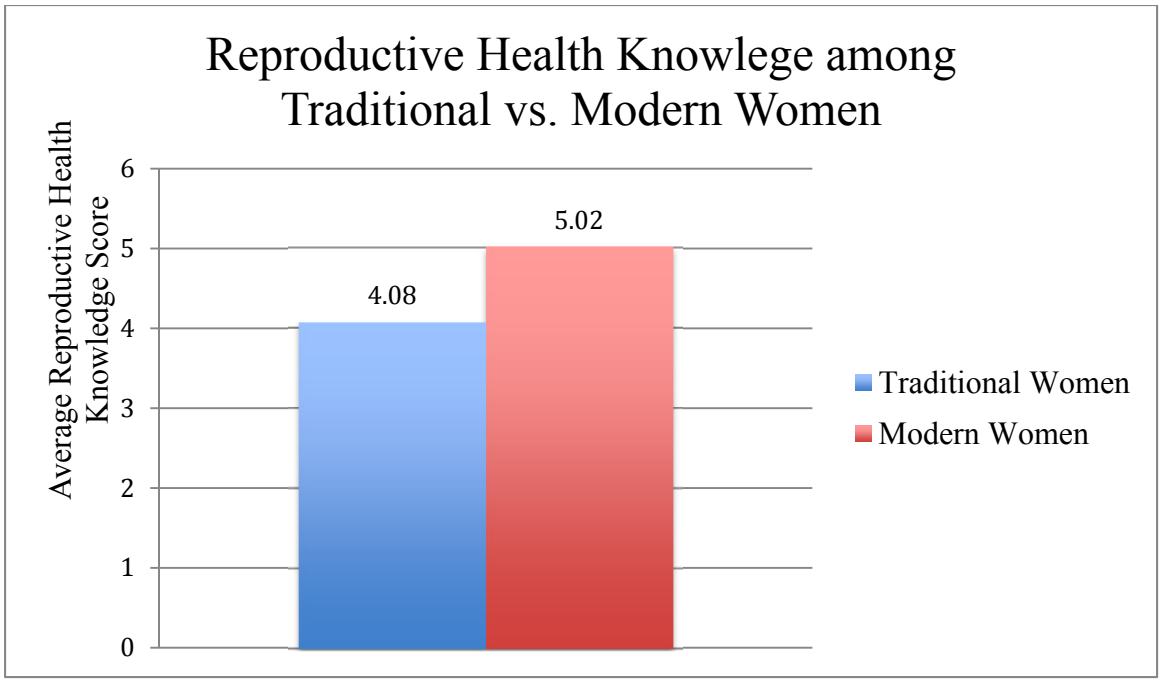


Figure V.14

Almost 60% of the traditional women scored correctly on less than half of the knowledge items. In contrast, almost 90% of the modern women got at least two-thirds of the items correct.

Reproductive Health Knowledge Scores for Traditional Women

Traditional Women			
Knowledge Score Value	Frequency	Percent	Cumulative Percent
0	0	0	0
1	3	4.8	4.8
2	7	11.1	15.9
3	13	20.6	36.5
4	14	22.2	58.7
5	14	22.2	81.0
6	9	14.3	95.2
7	3	4.8	100.0
8	0	0	100.0
9	0	0	100.0

Table V.35

Reproductive Health Knowledge Scores for Modern Women

Modern Women			
Knowledge Score Value	Frequency	Percent	Cumulative Percent
0	0	0	0
1	0	0	0
2	2	4.2	4.2
3	4	8.3	12.5
4	11	22.9	35.4
5	15	31.3	66.7
6	10	20.8	87.5
7	3	6.3	93.8
8	2	4.2	97.9
9	1	2.1	100.0

Table V.36

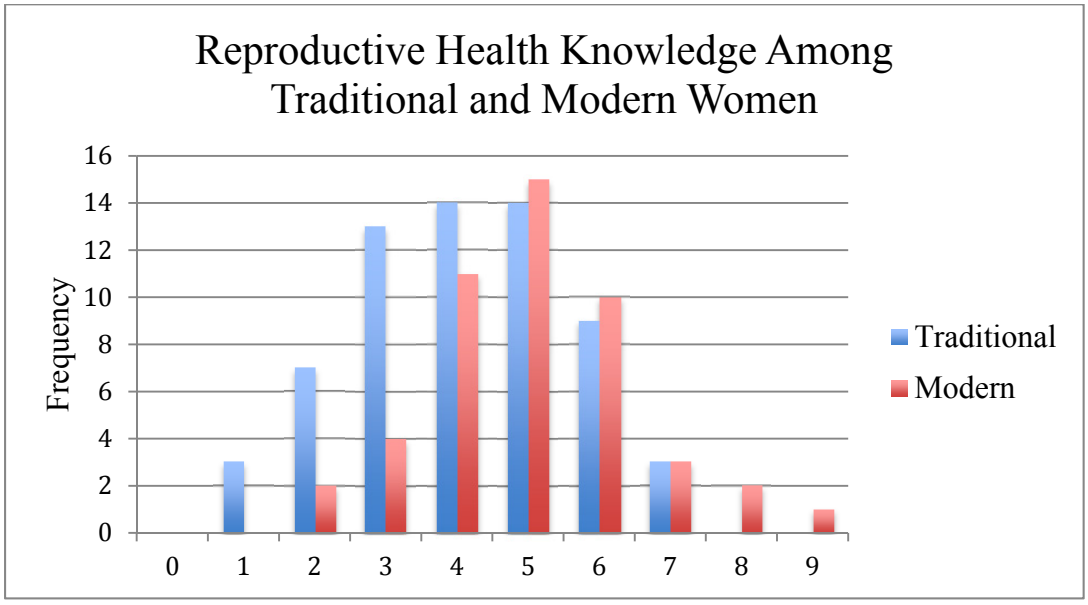


Figure V.15

Hypothesis 5:

Traditional women are more likely than modern women to have increased parity, more unplanned pregnancies and more child death.

Null Hypothesis

Traditional are no more likely than modern women to have increased parity, more unplanned pregnancies and more child death.

Education Level with Birth Outcomes

Number of children decreased as education increased in a dose-response manner, with those who had never been to school having an average of 5.54 children while those who had been to secondary or higher having an average of 3.51 children (p=0.0173).

The number of children lost, like total number of children, decreased as mother's education level increased. In this study, women with no education lost 2.81 times as many children as those who had completed primary education and 7.46 times as many children as those with a secondary education or higher (p<0.0001).

The highest number of unplanned pregnancies occurred among those who had only completed primary school. Those who had completed secondary school or higher actually had more unplanned pregnancies than those who had not been to school at all. This could be due to a discrepancy in the definition of "planned pregnancy" between the two groups (see discussion).

Education Analysis of Variance for Birth Outcomes

Birth Outcome Variable	No School	Primary School	Secondary or Higher		P	F Value
Number of Children	5.54 n=13 SD=3.18	4.88 n=60 SD=2.73	3.51 n=37 SD=2.28		0.0173	4.22
Number of Children Lost	2.61 n=13 SD=2.14	0.93 n=60 SD=1.56	0.35 n=31 SD=0.66		<0.0001	11.20
Number of unplanned Pregnancies	0.23 n=13 SD=0.44	1.11 n=62 SD=1.59	0.65 n=32 SD=0.70		0.0466	3.16

Table V.37

Adverse birth outcomes among traditional vs. modern women

We hypothesized that traditional women would have more children, lose more children, and have more unplanned pregnancies. Conversely, modern women would have fewer children, have fewer die and, overall, have fewer unplanned pregnancies.

There was no statistically significant difference in number of children, number of children lost and number of unplanned pregnancies between the two groups. However, it should be noted that traditional women lost 1.57 times as many children as modern women. Furthermore, modern women actually had an average of 0.19 more unplanned pregnancies than traditional women.

Analysis of Variance for Measures of Traditionalism and Birth Outcomes					
	"Do you know someone who has had more babies than she wanted?				
Outcome	**No (Traditional)**	**Yes (Modern)**		**P**	**F Value**
Number of children	4.64 n=61 SD=2.73	4.35 n=48 SD=2.74		0.5902	0.29
Number of children lost	1.15 n=59 SD=1.70	0.73 n=45 SD=1.40		0.1829	1.80
Number of unplanned pregnancies	0.78 n=61 SD=1.31	0.97 n=46 SD=1.32		0.4573	0.56

Table V.38

Regression analysis

Predictors of number of children. Regressing number of children on the potential determinants produced the regression coefficients presented in Table V.39. The best model for determining the number of children included the following variables: current age, level of education completed and birth control ever-use.

Increased current age was the strongest determinant for increased parity, followed by birth control ever-use and decreased schooling. Thus, statistically speaking, the women who had the most children were older at the time of the survey, had used birth control before and were less educated. Likewise, the women who had the least number of children were younger at the time of the survey, had never used birth control and were more educated. This model explained 45.77%of the variance within the sample (Adjusted $R^2 = 0.4577$).

Regression Analysis of Parity Determinants

	Parameter Estimate	Standard Error	T-Value	Pr>|t|
Current Age	0.13050	0.01603	8.14	<0.0001
Level of Education Completed	-0.58561	0.32433	-1.81	0.0739
Birth Control Ever-use	1.02786	0.40428	2.54	0.0125

Table V.39

F value= 30.53 for the model, $p<0.0001$, Adjusted $R^2= 0.4577$

Predictors of number of unplanned pregnancies. Regressing number of unplanned pregnancies on the potential determinants produced the regression coefficients presented in Table V.40. In this model, the strongest determinants for the number of unplanned pregnancies were the number of children (parity) (p=0.0037) and age at first birth (p=0.0368) (Table V.42). Current age (p=0.1793) and birth control ever-use (p=0.1115) also played a role as a trend. Level of education completed and Traditional/modern measurements were not significant determinants. This model explained 16.67% of the variance within the sample (Adjusted R^2 =0.1667).

Regression Analysis of Number of Unplanned Pregnancy Determinants (a)

	Parameter Estimate	Standard Error	T-Value	Pr>|t|
Level of Education Completed	0.05312	0.18692	0.28	0.7769
Number of Children	0.17347	0.05827	2.98	0.0037
Age at First Birth	-0.08887	0.04193	-2.12	0.0368
Current Age	-0.01644	0.01215	-1.35	0.1793
Birth Control Ever-use	0.37686	0.23448	1.61	0.1115
Traditional/Modern	0.15569	0.21844	0.71	0.4778

Table V.40

F value = 4.23 for the model, p=0.0008, Adjusted R^2=0.1667

After the Traditional/Modern and education variables were removed from the regression analysis, Table V.41 yielded a more significant model for the determining the number of unplanned pregnancies. Parity (p=0.0034) and age at first birth (p=0.0379) remained significant and birth control ever-use nearly became significant (p=0.0538). Furthermore, current age increased in significance. This model explained 17.93% of the variance within the sample (Adjusted R^2= 0.1793).

Regression Analysis of Number of Unplanned Pregnancy Determinants (b)

	Parameter Estimate	Standard Error	T-Value	Pr>|t|
Number of Children	0.17352	0.05778	3.00	0.0034
Age at First Birth	-0.08480	0.04026	-2.11	0.0379
Current Age	-0.01809	0.01172	-1.54	0.1261
Birth Control Ever-use	0.42765	0.21892	1.95	0.0538

Table V.41

F value= 6.30 for the model, p=0.0002, Adjusted R^2=0.1793

After current age and birth control ever-use were removed from the regression analysis, Table V.40 yielded a less significant model for determining the number of unplanned pregnancies. While parity and age at first birth both increased in significance, the overall significance of the model decreased. Furthermore, the model presented in

Table V.42 accounted for only 13.53% of the variance in the sample, while the model presented by Table V.41 accounted for 17.93%. Thus, the model in Table V.41 is the best model for predicting the number of unplanned pregnancies.

Regression Analysis of Number of Unplanned Pregnancy Determinants (c)

	Parameter Estimate	Standard Error	T-Value	Pr>|t|
Number of Children	0.13133	0.04255	3.09	0.0027
Age at First Birth	-0.10919	0.03855	-2.83	0.0056

Table V.42

F value = 8.59 for the model, p=0.0004, Adjusted R^2=0.1353

Predictors of number of children lost. Regressing number of children lost, as a continuous variable, the potential determinants produced the regression presented in Table V.43. In this model, the strongest determinants for increased number of children lost were level of education completed (p=0.0012) and current age (p=0.0040). This model explained 29.23% of the variance within the sample (Adjusted R^2= 0.2923).

Regression Analysis of Determinants of Number of Children Died (a)

	Parameter Estimate	Standard Error	T-Value	Pr>|t|
Level of Education Completed	-0.67922	0.20283	-3.35	0.0012
Traditional/Modern	0.15749	0.23161	0.68	0.4985
Age at First Birth	-0.02795	0.04455	-0.63	0.5322
HIV Status	-0.37174	0.36986	-1.01	0.3179
Number of children	0.02066	0.06426	0.32	0.7486
Current Age	0.04192	0.01414	2.96	0.0040

Table V.43

F value= 6.92 for the model, p<0.0001, Adjusted R^2=0.2923

After the two most unrelated variables, age at first birth and number of children, were removed from the regression model, Table V.44 yielded a more significant model. In this model, level of education completed lost a small amount of significance (p=0.0017), while current age became more significant (p=0.0001). The traditional/modern measurement became even less significant in Table V.44 than it was in Table V.43 while HIV status became a bit stronger. This model explained 37.45% of the variance within the sample.

Regression Analysis of Determinants of Number of Children Died (b)

	Parameter Estimate	Standard Error	T-Value	Pr>|t|
Level of Education Completed	-0.71971	0.22259	-3.23	0.0017
Traditional/Modern	0.05876	0.26131	0.22	0.8226
HIV Status	-0.43085	0.39325	-1.10	0.2763
Current Age	0.06055	0.00988	6.13	,0.0001

Table V.44

F value = 14.32 for the model, $p<0.0001$, Adjusted $R^2= 0.3745$

The best model for determining the number of children lost included the following variables: age, age at first birth and level of education completed.

Increased current age ($p<0.0001$) and level of education ($p=0.0006$) completed were the strongest determinants for number of children lost. Thus, statistically speaking, the women who lost the most children were older at the time of the survey, older at first birth and were less educated. Likewise, those who had lost the least number of children were younger at the time of the survey, younger at first birth and were more educated. This model explained 42.86% of the variance within the sample (Adjusted $R^2=0.4286$).

Regression Analysis of Determinants of Number of Children Died (c)

	Parameter Estimate	Standard Error	T-Value	Pr>|t|
Level of education completed	-0.66681	0.18845	-3.54	0.0006
Age	0.06219	0.00884	7.04	<0.0001

Table V.45

F value = 38.88 for the model, $p<0.0001$, Adjusted $R^2 = = 0.4286$

CHAPTER 6

DISCUSSION

Organization of Discussion

The discussion section will contain conclusions about our data and analysis, recommendations for further research and intervention as well as potential sources of error in this study.

Use of Birth Control in this Population

While roughly half of women in the study had used birth control at some point in their lives, only one-quarter were currently using birth control. Only 8% of women were using condoms, the only available method that protects against pregnancy, HIV and other sexually transmitted infections. In an area with such a high HIV prevalence, it is disturbing that more women are not protecting themselves, especially considering the Kenyan government's extensive campaign for condom usage in these areas. However, condoms require both supply mutual consent in order to be used properly. Thus, even among this 8% of women, it is unlikely that all of them are using a condom during each sexual encounter.

Not surprisingly, the most common method was injectable contraception, "the shot". Roughly 11% of women were currently using this form of contraception. Injectable contraception is ideal for resource-poor settings like this one because it requires going to the clinic only once every ninety days for one shot. Furthermore,

consent of the male is not required. However, supply at clinics is sometimes unavailable and this can present a barrier to clients.

Oral contraceptive pills were the third most common method of contraception. Pills, like condoms, require both supply and constant user compliance. Women relying on oral contraceptives must obtain a new pill pack each month and must remember to take their pills each day. Furthermore, women are less likely to take oral contraceptive pills consistently if their knowledge of reproductive health is low and they, therefore, do not understand how the pill prevents conception.

Knowledge of reproductive health significantly impacted birth control utilization, as is illustrated in Table V.27 ($p=0.0461$). Women who had higher knowledge scores were more likely to utilize contraception. Furthermore, women who did know someone who had more children than she wanted were more likely to use birth control ($p=0.0385$). Lastly, increased education was also significantly associated with birth control ever-use ($p=0.0385$). When these three main determinants of birth control use were put into regression analysis, however, none of the three measurements were significant (Table V.30). When reproductive health knowledge was removed and age at first birth was added, level of education once again became significant and traditional/modern was almost significant. Thus, the most powerful drivers of birth control use are education level and knowing someone who has more children than she wanted.

Effectiveness of Birth Control Use in this Population

Even though some women in this sample are utilizing birth control, what ultimately matters is the outcome of that use. In this study, at an almost statistically significant level ($p=0.0716$), women who had ever used birth control had an average of

nearly one more child than those who had never used birth control (Table V.25). Furthermore, those who had used birth control had 2.14 times as many unplanned pregnancies as those who never used birth control (Table V.25). Thus, it appears that birth control use in this setting is ineffective. A puzzling related finding was that women who used birth control, on average, had about half the number of children die as those who did not use birth control (Table V.25; p=0.0717).

Approaches to Family Planning in this Population

In our hypothesis, we expected that those who knew someone who had more children than she wanted (modern vs. traditional) would be more likely to use birth control because she would, from her community surroundings, perceive limiting family size as a viable option. We found this to be true (Table V.26; p=0.0385). However, this modern vs. traditional view did not determine the number of children a woman would actually have (parity); it would only contribute to her contraceptive behavior practices. Knowing someone who had more children than she wanted was also correlated with higher reproductive health knowledge scores and higher educational attainment, the latter of which contributes to decreased parity.

In our hypothesis, we expected that older women with lower education, low age at first marriage and at first birth would have more unplanned pregnancies. However, the analysis yielded unexpected results: younger women had more unplanned pregnancies (Table V.38); those who had completed primary or secondary education actually had more unplanned pregnancies than those who had never been to school (Table V.35); and age at marriage was not significant. Younger age at first birth, however, was correlated, as expected, with increased number of unplanned pregnancies (p=0.0368).

The more educated, younger women who had used birth control had experienced more unplanned pregnancies. It is more plausible, however, to conclude that the definition of "planned vs. unplanned" pregnancy is different between these groups. More educated women are more likely to use birth control. Furthermore, women with higher education know more about reproductive health and are more likely to know someone who has more children than she wanted. Thus, these younger and more educated women who used birth control are more cognizant of the concept of "planning", whereas their older and less educated counterparts are less likely to view family planning as an option. This idea is reinforced by the data in Table V.18, which illustrates that only half of women in the sample believe that women in their village plan the number of babies they have. 31.53% of women said that women in the village do not plan. 19.82% said that they didn't know. With such a high percentage of women not knowing the answer, it is further plausible to predict that planning pregnancies is not something that is openly discussed or practiced.

In conclusion, women who use birth control may seem to have more unplanned pregnancies, when really it may be that the women who are not using birth control do not have a concept for what a "planned" pregnancy would entail because women typically do not plan the number of babies they have.

The Main Determinants of Infant and Child Death

We predicted that those who lost the most children would be women who were currently older, less educated and younger at first marriage and first birth. Indeed, women who were more educated lost fewer children. Older women lost more children. Age at marriage and age at first birth, however, were not significant.

Furthermore, we expected that more "traditional" women, those who did not know anyone who had more children than she wanted, would likely lose more children than their more "modern" counterparts. There was a trend relationship between these two variables: women who did know someone who had more children than she wanted, on average, lost 37% fewer children than did her traditional counterpart (Table V.38; p=0.1829).

The main determinants of the number of children who had died were increased age of the mother and the education level of the mother. While HIV status and Traditional/Modern were helpful, the regression model only employing education and age explained nearly half of the variance within the sample.

Potential Sources of Error

There were several potential sources of error in this study. The surveys were administered in Dholuo, the local language of the Luo people of the Nyakach Plateau. Although translators were used, translation errors were possible. In addition, it is possible that words and concepts are not equivalent in both languages. To reduce this type of error, translators often clarified misconceptions in the data gathered by helping the researchers administering the surveys to ask more in-depth questions.

The main source of potential systematic error was that the survey from which the data was used was not initially designed to measure the outcomes in this study. The survey, instead, was originally designed to measure determinants of sexual violence in the community. In order to further investigate the roles of traditional fertility values in adverse birth outcomes, more poignant questions should be asked in the future.

Main sources of potential random error were a small sample size (n=112) and the fact that the sample used was a convenience sample from local villages that may not be representative of the community as a whole.

Conclusions about Improving Birth Outcomes in this Population

A shocking finding in this study was that over half of women had more traditional fertility values, meaning that they did not know anyone who had more children than she had wanted. These women were significantly less likely to use contraception than their modern counterparts. This finding has major implications for family planning uptake in this community and others like it. A large portion of women were not using family planning, even in light of the dire consequences of increased parity, including increased maternal and child death, decreased quality of life and perpetuation of the cycle of poverty.

Furthermore, level of education was a significant predictor for a multitude of outcomes in this study, including reduced parity, increased usage of birth control, decreased rate of HIV infection, increased knowledge of reproductive health and decreased incidence of child death. Thus, it is vitally important to increase the number of girls enrolled in school and keep them in school for as long as possible. Increased education fosters health and social benefits not only for the mother, but, as evidenced in this study, for her children.

Finally, because women who are using birth control are not experiencing the predicted outcomes of contraceptive use, further research needs to be conducted to analyze the barriers in practice of contraception.

APPENDICES

APPENDIX A

Interview Guide
Kenya 2011

Interviewer's Introduction
1. Hello, my name is….
2. I am with Baylor University.
3. We want to learn more about your health and the health of the village. We interviewed many women last year and now need to know some more information to be better able to understand your health.
4. May we ask you a few questions?
5. This should only take about 30 minutes of your time.

Informed Consent Form
1. I brought a copy of a form that explains why I am interviewing you today. It is called a "consent form."
2. I am going to read the form to you so that you can ask questions.
3. Then, if you are willing to let me interview you, I will ask you to sign the form.
4. [Cover informed consent form with the participant. Answer questions that arise. Get their signature on the form. Place it in a folder that is separate from the *Interview Chart* you will complete.]
5. Thank you for signing the consent form.

Explain Interview Process
1. I have a form or paper guide (*Interview Chart*) that I will use to ask you questions and record your answers.
2. I will not place your name on this paper. It will only have my name on it and today's date.
3. But I do need to ask you a few questions (for example, your age, the number of people in your household) so that we can understand more about the group of women we are interviewing.
4. Let's begin with those questions.
5. Don't forget that, for any question, you can say "I don't know" or just ask me to skip that question and I will skip it. And, we can stop this interview at any point if you wish to do that.
6. Are you ready? Let's begin.

[Use *Interview Chart* to ask and record answers. When finished, thank participant, and leave. See "*Tips for the Interviewer*" on the next page for useful tips to use during the interview.]

Individual Interview Guide
Tips for the Interviewer

1. *Body language matters!*
    a. Relax. Breathe deeply. (It will help you relax.)
    b. Adopt an "open stance" in body posture
        i. Feet flat on floor, shoulders "relaxed-but-squared," arms to side
        ii. Avoid crossing arms, covering mouth, etc (conveys disagreement).
    c. Make appropriate eye contact. Include the whole group with eyes/stance.
    d. Work on your facial expressions!
        i. Smile and laugh when appropriate. But only laugh when *they* do.
        ii. Convey interest and respect for what is being said.
        iii. Encourage people to speak with appropriate head nods, eye contact, etc. But do not "over-do it." (Nodding your head constantly can make you appear to be insincere.)
        iv. Use open, pleasant, relatively-neutral facial expressions.
            1. Avoid looking surprised or judgmental as they speak.
            2. Breathe! A tense face may *appear* to be disapproving.
            3. Express empathy when appropriate, but avoid *all* strongly emotional expressions. (You can inadvertently influence responses.)

2. *Use an active listening process.*
    a. Ask a question.
    b. Turn toward/look at the person(s) speaking.
    c. Listen first! (No writing yet! Use body language tips.)
    d. Repeat back to them what you just heard *as* you begin to record it.
        i. Example: "So, women in your village….(insert what they said)"
        ii. Conveys that you value what they said and want to get it right. Also enhances data validity!
    e. Record (write down) their response as they confirm it.
    f. Then, ask the next question.

3. *Continually assure the participant(s).*

Treat participants as though they are partnering with you to gather important and interesting information about women in the village.
Insert occasional words of encouragement where they naturally fit throughout the interview. Examples:

i. This is useful/helpful information.
ii. Thank you for bringing that up.
iii. Very interesting! Thank you. This is important information.

INTERVIEW CHART

Date: Interview #:____	Interviewer:	Village:

I-Demographics: I'd like to begin with a few simple questions about you and others who live in your household.

1-**How old are you?** *(Write in)* *Age (years):* _____	2- **Are you married, single…?** *(check one)* ___single/ never married(1) ___married(2) ___divorced/separated(3) ___widowed(4)	3-**Are you currently living with your husband/partner?** *(check)* ___no(0) ___yes(1)
4-**Do you have children?** ___no (0) ___yes(1)→ ↓	5-**How many children do you *have*?** *total number:*_____	6-**How many of your children *live* with you in your household?** *number:*_____
7-**Did you ever study in a school?** ___no (0) ___yes(1)→ ↓	8-**Are you studying in a school now?** ___no(0) ___yes(1)	9-**What is the highest level of schooling you have completed?** ___primary/elementary school(1) ___technical training(2) ___secondary school(3) ___university or trade school(4)

II-General Health: Now, I would like to ask you some questions about your health.

10-**How is your health in general? Would you say it is…***(read choices and check one)* __*very good(5)* ___*bad(2)* __*good(4)* ___*very bad(1)* __*fair(3)*	11-**Have you had any of the following health problems over the past 12 months?** *(Read choices and check all that apply)* __breathing problems(1) ___diarrhea(2) __pain when urinating(3) __typhoid(4) __vaginal discharge(5) ___malaria (6) __worms or amoebas(7) __sickle cell(8)	**12-Have you ever had vaginal discharge?** ___no(0) ___yes(1) __not sure(99) **If so, how long did you have this problem?** Number of days: _____ **If so, how often have you had this problem in the past year?** ___ once (1) ___twice (2) ___three or more times (3)
13- Have you ever had sores in your genital area? ___no(0) ___yes(1) __not sure(99) **If so, how long did you have this problem?** Number of days: _____ **If so, how often have you had this problem in the past year?** ___ once (1) ___twice (2) ___three or more times (3)	**14-Have you ever had warts in your genital area?** ___no(0) ___yes(1) __not sure(99) **If so, how long did you have this problem?** Number of days: _____ **If so, how often have you had this problem in the past year?** ___ once (1) ___twice (2) ___three or more times (3)	**15- Have you ever had pelvic pain while you were pregnant?** ___no(0) ___yes(1) __not sure(99) **If so, how long did you have this problem?** Number of days: _____ **If so, how often have you had this problem in the past year?** ___ once (1) ___twice (2) ___three or more times (3)
16- Have you ever had pelvic pain while you were not pregnant? ___no(0) ___yes(2) __not sure(99) **If so, how long did you have this problem?** Number of days: _____ **If so, how often have you had this problem in the past year?** ___ once (1) ___twice (2) ___three or more times (3)	**17-Have you ever been tested for HIV/AIDS?** ___no(0) ___yes(1) __not sure(99) **Have you ever tested positive for HIV/AIDS?** ___no(0) ___yes(1) __not sure(99) **If you have tested positive, have you ever received treatment?** ___no(0) ___yes(1) __not sure(99)	**18-Has your husband/partner ever tested positive for HIV/AIDS?** ___no(0) ___yes(1) __not sure(99) **If he tested positive, has he received any treatment?** ___no(0) ___yes(1) __not sure(99)
19-In What month and year was your last HIV test? *Write in:*	**20-Have you ever used intravenous drugs?** ___no (0) ___yes(1) __not sure(99)	**21-Have you ever eaten things that weren't food?** ___no (0) ___yes(1) __not sure(99)
22-How many times have you been to the local clinic in the last year? Number:____	**23-Did you go to the church last summer when the group came and set up a clinic with Mama Lisa?** ___no (0) ___yes(2) __not sure(99)	**24- Did you participate in the survey last year about reproductive health?** ___no (0) ___yes(1) __not sure(99)

III-Knowledge: I'd like to learn more about the things you know about health. I'm going to ask you some questions. If you don't know the answer, it is okay to say so. We hope to find ways to help people in the village know more about this information in future. But it is still okay to say "I don't know."		
25-How many times per month does a woman normally get her (menstrual) period? *Write in:*	**26-Can a woman get pregnant during her period?** __no(0) __yes(1) __don't know (99)	**27-Can a woman get pregnant the first time she has sex?** __no (0) __yes(1) __don't know (99)
28-During which part of a woman's menstrual cycle is she most fertile (more likely to get pregnant)? __ during her period (1) __ right before her period (2) __ right after her period (3) __ in the middle of her cycle/ ovulation (4)	**29-How long does a normal pregnancy usually last?** *Number of months:* _____	**30-Is it bad for the baby if a pregnant woman drinks alcohol during pregnancy?** __no(0) __yes(1) __don't know (99)
31-Is it bad for the baby if a pregnant woman smokes during pregnancy? __no(0) __yes(1) __don't know (99)	**32-Name some ways that people can get HIV/AIDS.** *Write in:*	**33-Name some ways that people can protect themselves from getting HIV/AIDS.** *Write in:*
IV-Family Planning: We would like to know more about how women in your village plan their families. If you don't know the answer you can say you don't know. And you can skip the question if you don't want to answer it.		
34-At what age did you marry? *Age :*_____	**35- At what age did you have each of your babies?** Ages:_____	**36- Have you ever wanted to get pregnant but were unable to?** __no(0) __yes(1) __don't know (99)
37-Have you ever had problems with a pregnancy? __no(0) __yes(1) __don't know (99)	**38-If you had any problems during pregnancy, what were they?** *Write in:*	**39-Have you ever had babies die before they were born?** __no(0) __yes(1) __don't know (99)
40-If you have lost any babies (before they were born), what caused their deaths? *Write in:*	**41- Have you ever had any children die after they were born?** __no(0) __yes(1) __don't know (99)	**42- If so, how old were they?** Ages: _____
43-If so, what were the causes of their deaths? *Write in:*	**44-How many total children have you lost?** ***Write in:***	**45-Do women in the village usually plan the number of babies they want to have?** __no(0) __yes(1) __don't know (99)
46-Who usually helps a woman in your village decide how many babies she will have? *(check all that apply)* ___husband(1) ___mother-in-law(2) ___ mother(3) ___doctor/nurse(4) ___ midwife(5) ___don't know(99) __other(*9*)→	**47-How many babies do women in the village usually have?** Write in:_____ ___don't know*(99)*	**48-How often do they have babies?** ___every 1-2 years(1) ___every 3-4 years(2) ___every 5 or more years(3) __don't know(99) __other(*9*)→
49-Do you know someone who has had more babies than she wanted? __no(0) __yes(1) __don't know (99)	**50-Have you had any unplanned pregnancies?** ___no(0) ___yes(1) ___don't know(99)	**51- If so, how many unplanned pregnancies have you had?** Number:_____
52-Have you ever been forced to have sex? __no(0) __yes(1) __don't know (99)	**53- If so, how many times have you been forced to have sex?** Number: _____	**54- How often are you forced to have sex?** ___ daily (1) ____ weekly (2) ____ monthly (3) ____ rarely (4)
55- How many people have forced you to have sex? Number: _____	**56- What is your relationship to the person who is forcing you to have sex?** *(check all that apply)* ___ husband (1) ____father/brother (2) ___ someone you know (3) ___ someone you don't know (4)	**57- How many of your pregnancies have resulted from forced sex?** Number: _____

58- How old were you when you were forced to have sex for the first time? Age: _____	**59: Would you describe the situation in which you were first forced to have sex?** *Write in:*	**60-Have you ever been injured as a result of forced sex?** __no(0) __yes(1) __don't know (99)
61- How common is it for women to have forced sex? __ not common (0) __ very common (1) ___ don't know (99)	**62-Would you like forced sex to end?** __no(0) __yes(1) __don't know (99)	**63-Are there differing opinions about forced sex?** __no(0) __yes(1) __don't know (99)
64- Do you feel it is your husband's right to have sex with you whenever he wants? __no(0) __yes(1) __don't know (99)	**65- Does your husband feel it is his right to have sex with you whenever he wants?** __no(0) __yes(1) __don't know (99)	**66-How many other people do you know who have been forced to have sex?** Number of people: _____
67-Do you know if your mother was ever forced to have sex? __no(0) __yes(1) __don't know (99)	**68-Is there anything you think we can do to help prevent forced sex?** __no(0) __yes(1) __don't know (99)	**69-If so, what?** *Write in:*
70- Do you tell anyone that you have been forced to have sex? __no(0) __yes(1) __don't know (99)	**71- If so, who did you tell?** ___ mother (1) ____ friend (2) ___ sibling (3) ____ adult you trust (4) ___ other (5) Write in :	**72- Have you given or received money or goods in exchange for sex?** __no(0) __yes(1) __don't know (99)
73- Have you ever used a scientific method of birth control? __no(0) __yes(1) __don't know (99)	**74- If so, which methods?***(check all that apply)* ___ pill (1) ___ shot (2) ____ condom (3) ____ patch (4) ____ coil/IUD (5)	**75- Are you currently using birth control?** __no(0) __yes(1) __don't know (99)
76- If so, which method? *(check all that apply)* ___ pill (1) ___ shot (2) ___ condom (3) ____ patch (4) ____ coil/IUD (5)	**77-Do you think women in your village know enough about family planning methods** to be able to take care of themselves? __no(0) __yes(1) __don't know (99)	**78-Is there anything women in the village need to know to be able to better plan their families?** __no(0) __yes(1) __don't know (99)
79- If so, what? *Write in:*	**80- Can you name all the methods you've heard about for preventing pregnancy?** *Write in:*	**81- Of the ones you' named (in #65), which ones would you be most comfortable using? Rank them from most to least comfortable.** *Write in:*
Interviewer Comments		

That's all the questions I have for you. Thank you for answering them.

APPENDIX B

Common Abbreviations

ANC= Antenatal Care

CI= Confidence Interval

CPR= Contraceptive Prevalence Rate

DALY= Disability-Adjusted Life-Years

DHS = Demographic Health Survey

FP= Family Planning

HIV= Human Immunodeficiency Virus

ICPD= International Conference on Population and Development

KAP= Knowledge, Attitudes & Practice

KDHS= Kenyan Demographic Health Survey

LBW= Low Birth Weight

MDG= Millennium Development Goal

MMR= Maternal Mortality Ratio

NCPD= National Council for Population and Development of Kenya

OR= Odds Ratio

PYAR= Person Years at Risk

STI= Sexually Transmitted Infection

TFR= Total Fertility Rate

WHO= World Health Organization

WTFR= Wanted Total Fertility Rate

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