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ABSTRACT

Kenya began to experience rapid fertility decline in the late 1980s. However, this decline in fertility stalled in the late 1990s. This study examined factors influencing transition to third and fourth births in Kenya for the period between 2003 and 2008/9, in order to provide a better understanding of the current fertility transition in Kenya with respect to birth spacing. Data was obtained from the Kenya Demographic and Health Surveys (KDHS) of 2003 and 2008/9. Logistic regression model was the main method of data analysis. The dependent variable was whether or not a woman had made a transition from second to third birth and from third to fourth birth in the five years preceding each survey. The main independent variables were: education level, place of residence (urban-rural), region of the country, wealth index, marital status, religion, ever-use of contraception, child mortality, and mother's age at the start of the birth interval.

The results showed that for the five-year period before KDHS 2008/9 the odds of transition to a third birth were lower for women with some education compared with women with no education. Odds were lower for women in Central, Eastern, and North Eastern provinces compared with women in Western province, but higher for women of the Protestant religion compared with Catholic women. The odds of transition to a third birth were lower for women from middle, richer, and richest households compared with women from poorest households, and lower for women who had ever used a modern method of contraception compared with women who had never used contraception.

For the five year-period before KDHS 2008/9, the odds of transition from third to a fourth birth were significantly influenced by education level, wealth index, age at the start of the interval, ever-use of contraception, and desire for an additional child. The results for the five year-period before KDHS 2003 showed that transition to fourth birth was significantly associated with region, wealth index, age at the start of the interval, ever-use of contraception, and desire for another child.

This paper has two main policy implications. First, there is a need to improve family planning services across the country, which would address the issues of unwanted fertility and unmet need for family planning and hence lead to a decline in fertility. Second, there is also a

need to improve the socioeconomic conditions in the country. Higher levels of wealth and education are strongly associated with lower fertility.

INTRODUCTION AND BACKGROUND

Prior to the 1970s, fertility in Kenya had been rising steadily. But since the mid-1980s, Kenya has experienced perhaps one of the most remarkable fertility transitions in history, contrary to earlier expert predictions (Blacker 2002, Brass and Jolly 1993, Population Council 1998, Robinson 1992). The total fertility rate (TFR) declined from 8.1 children per woman in 1977/78 to 6.7 in 1989 and 5.4 in 1993. The TFR further declined to 4.7 children per woman in 1998.

Results from the 2003 Kenya Demographic and Health Survey (KDHS), however, showed that infant and child mortality indicators continued to worsen in the 1990s, while women's preferences for lower fertility stalled, and contraceptive prevalence also stagnated (CBS et al. 2004). In 2008/9, the TFR was 4.6 children per woman, nearly the same as in 1998.

Three perspectives have emerged as dominant explanations for the observed fertility declines in Kenya. These were changes in proximate determinants of fertility and specifically increases in contraceptive prevalence (Blacker 2002, Brass and Jolly 1993, Cross et al. 1991, Ekisa and Hinde 2005, Ezeh and Dodo 2001, Njogu and Martín 1991, Population Council 1998, Sibanda 1999), changes in attitudes regarding large family size due to high costs associated with raising many children (Robinson 1992), and changes in cultural norms supporting high fertility due to modernization (Watkins 2000).

A study by Westoff and Cross (2006) attributed the reversal of fertility decline in Kenya to a stall in contraceptive prevalence and also to an increase in the number of women desiring more children. The desire for more children was seen as a response to increased child mortality arising from the HIV/AIDS pandemic. This finding was corroborated in a study by Magadi and Agwanda (2010), who found that HIV/AIDS could have been responsible for the increased desire for more children, as women sought to replace children who had died.

This study examined dynamics of fertility transition in Kenya between 2003 and 2008/9 from the perspective of birth intervals. A parity-specific approach to studying fertility is useful for analyzing the family-building process. This is because when people think about having children, they think in terms of whether or not and when to have a first or a subsequent birth. This approach indicates changes in fertility due to changes in timing of reproduction, spacing of

births, or in the changing reproductive patterns at low or high parities. Few studies have examined the dynamics of the Kenyan fertility transition using the birth-interval approach.

The study contributes knowledge on fertility transition in Kenya by identifying factors influencing transition from second to third birth and from third to fourth birth in Kenya between 2003 and 2008/9. These transitions were selected because they may be indicative of change in family size preferences in Kenya. The two time periods are also significant in Kenya's fertility transition. The five-year period before the 2003 KDHS witnessed a period of fertility stall, while the five-year period before the 2008/9 KDHS witnessed a slight decline in fertility.

Knowledge gained in study will also be useful for policymakers, programme managers, and researchers, and for developing appropriate programmes to enhance socioeconomic development in the country. Information will help enable the government to manage population growth better and to match population growth with development goals, including family planning and maternal and child health programmes.

This study sought to answer the following questions:

i) What role have socioeconomic, cultural, and demographic factors played in influencing transition from second to third births and from third to fourth births?

ii) Has child mortality played any role in these transitions?

LITERATURE REVIEW

The literature shows strong associations between fertility declines and socioeconomic factors. Research has shown a close association between women's education and fertility (Bledsoe et al. 1999). Education influences fertility through enabling women to acquire new ideas and values at variance with their traditional roles of childbearing. It also opens new opportunities for women to participate in the labour force and wage employment (Caldwell and Caldwell 1987) and to play roles other than those associated with reproduction and child care (United Nations 1995). Dixon-Mueller (1993) also has argued that women's education influences attitudes and knowledge and hence contraceptive behavior.

Studies have also shown that fertility for women in urban areas is lower compared with women in rural areas (Cohen 1993, Ekisa and Hinde 2005, Westoff 1994, Woldemicael 2005). Women in urban areas not only are more educated than rural women, on average, and have more access to job opportunities and better health care but are also better able to embrace new values and ideas regarding childbearing and rearing (Diamond et al. 1999, Montgomery and Lloyd 1999, Oheneba-Sakyi and Takyi 1997). It has been observed that high costs associated with urban living are not supportive of large family sizes. Mlewa (2001) established that men in urban areas were more likely to desire smaller families compared with their rural counterparts.

Region of residence has also been observed to exert a strong influence on the number of children desired, reflecting differences in language, ethnic origin, and religion as well as economic development (Westoff 1994). In a study on fertility preferences in Mathare Valley, Nairobi, Alila (1990) found that people whose places of origin were areas of high fertility maintained their high fertility even after relocating to urban areas. In a study of fertility transition in Eritrea, Woldemicael (2005) noted that fertility decline was already underway in Eritrea and had occurred in urban and rural areas and in every region of the country. Ekisa and Hinde (2005) noted that in Kenya there were substantial and persistent regional differences in fertility. Fertility was generally lower in Central province and higher in Coastal and Western areas.

Researchers have also established a strong association between fertility and women's work status (Blacker 2002, Hirschman and Young 1998, Wasao 2002, Woldemicael 2005, Zhang 1994). Women who participate in modern wage employment are more likely to use contraception and hence have lower fertility compared with women who do not work for wages (Shapiro and

Tambashe 1997, United Nations 1991). In a study of fertility decline in the Southeast Asian counties of Thailand, Malaysia, Indonesia, and the Philippines, Hirschman and Young (1998) attributed the observed decline in fertility to a change in the status of women. The authors noted that women's status was enhanced through more participation in wage employment, providing opportunities other than childbearing. Another study by Rodriguez and Cleland (1981) found that women's work status had a large and significant impact on fertility. While employment in the modern sector may conflict with childbearing and encourage low fertility, work on the farm may be more compatible with high fertility (Abdalla 1988, Moustafa 1988, United Nations 1995).

Blacker (2002) attributed the substantial differentials in fertility observed in Kenya by place of residence, region of residence, and educational levels to differences in socioeconomic development. He observed that Central province, with better development indicators such as under-five mortality, nutrition, education, and housing amenities, experienced substantial fertility declines between 1989 and 1998. He also attributed fertility decline in the 1990s to worsening socioeconomic conditions reflected in indicators such as infant and child mortality, school enrolment ratios, or GDP per capita. He noted that ideal family size, which is an indicator of changing attitudes toward fertility, declined between 1984 and 1998. He was of the view that fertility in Kenya was not going to fall below an average of three births per woman because of the stabilization of ideal family sizes, the stall in contraceptive prevalence, the trend of fertility observed in Central region, and also the fertility rate for women with at least a secondary level of education (Blacker 2002).

Other studies have linked rapid fertility declines experienced in Kenya to increased use of modern contraception (Blacker et al. 2005, Brass and Jolly 1993, Cross et al. 1991, Ekisa and Hinde 2005, Robinson 1992, Wasao 2002). In a comparative study of fertility transition in Kenya and Uganda, Blacker and colleagues (2005) found that over a period of 20 years, fertility declined more rapidly in Kenya than in Uganda. The rapid decline of fertility observed in Kenya was attributed to an increase in contraceptive prevalence, while the slower decline of fertility observed in Uganda was attributed to a decrease in pathological sterility. The study also found that women in Kenya desired fewer children than women in Uganda and that women in Uganda also had higher levels of unmet need for family planning. These differences perhaps could be explained by the aggressive family planning programme in Kenya and the differences in socioeconomic development between the two countries.

Socio-cultural factors have also played an important role in fertility decline in many communities (Ahehu 1998, Njogu and Martín 1991, Wasao, 2002). Njogu and Martín (1991) noted that fertility declined among the Christians and Muslims in Kenya, but increased among traditional religions. Ayehu (1998) found that a woman with no religious affiliation was about 1.5 times more likely to desire more children compared with a woman of the Catholic faith. Religion shapes women's values, norms, and beliefs concerning reproduction and thus affects their fertility behaviour (Benefo 1995). In some societies, religious schooling provides messages and teaching about traditional values that are inconsistent with practicing family planning. Traditional worshippers often preach prolific childbearing as unequivocal evidence of spiritual and ancestral benevolence. Islam endorses pronatalistic practices, while Christians are more flexible with regard to reproductive choices, including the use of contraception. Thus, Muslims and traditionalists exhibit higher fertility compared with Christians (Adegbola 1988).

Polygamous marriages in Africa have generally been associated with high fertility. Women in areas of widespread practice of polygyny tend to start having sexual intercourse at an early age and to have high fertility goals (Ezeh 1997). This has often led to short birth intervals. Women in polygamous unions also tend to have lower socioeconomic status than those in monogamous unions and are likely to be less educated (Muinde and Mukras 1979). In such forms of social organization, it is claimed that children are the only tool a woman can use in laying claim to spousal property and inheritance (Cohen 1993).

Other studies have linked fertility decline to a rise in age at first marriage and first birth (Blacker 2002, Ekisa and Hinde 2005, Vavrus 2000, Woldemicael 2005, Zhang 1994). A study by Woldemicael (2005) in Eritrea found that fertility decline was evident across all reproductive ages and birth orders but was stronger among older mothers and for higher-order births. This decline in fertility was attributed to prolonged spacing of births, cessation of further childbearing, and delayed age at marriage. Blacker (2002) attributed fertility decline in Kenya to increased age at first marriage. Obiero (1999) observed that in fertility decline in the 1980s in Kenya, women over age 34 contributed to the greatest decline in fertility, even though the decline occurred across women of all ages. In the early 1990s, however, the rapid decline of fertility was due to rapid decline in fertility among younger women and a stall in fertility among women age 35 and above (Obiero 1999).

The crucial role played by mortality decline in the fertility transition is well documented (Gyimah 2002, Hirschman and Young 1998, Mason 1997). Recent theories explaining fertility transition need to acknowledge that even classical demographic transition theory held that mortality decline was a prerequisite for fertility decline. Researchers have attributed the failure by many countries in sub-Saharan Africa to achieve real fertility transition to the inherently high levels of child mortality in the region. Gyimah (2002) found that women with prior infant deaths had more subsequent births than those without experience of infant mortality, suggesting both a physiological and behavioural response. Hirschman and Young (1998) observed that when mortality is low the costs of raising many children may lead parents to have fewer children. A related study by Lloyd and Ivanov (1988) observed that child survival, family planning, and fertility could be linked through a number of steps in a mortality transition. The study noted that the stages in this linkage would involve family formation by fate, and family formation by design, insurance, and replacement. It argued that the evolution of family formation strategies and mortality declines over time depend on the prevailing socio-cultural environment.

Causes of Stalling Fertility Transitions

According to the classical demographic transition theory, once fertility decline is underway, it continues until replacement level fertility is attained. This pattern has been interrupted in a number of developing countries, where fertility seemed to have stalled at levels above replacement in the late 1990s and early 2000s. Researchers have offered possible explanations why fertility may stall above replacement level. However, it is not yet clear why fertility varies or remains constant over the course of time.

Stalling fertility declines have been attributed to slowing of socioeconomic development, high levels of infant and child mortality, short birth intervals, declines in contraceptive prevalence, and the impact of HIV/AIDS (Bongaarts 2006, Garenne 2007, Shapiro and Gebreselassie 2008, Westoff and Cross 2006). Using DHS data from 24 countries with multiple surveys, Shapiro and Gebreselassie (2008) examined the current status of fertility transition in sub-Saharan Africa and the extent to which fertility had stalled. They attributed stalling fertility in some of the countries to faltering in the pace of socioeconomic development, as reflected in the lagged infant and child mortality rates and lagged growth in GDP per capita. However, in

some of the countries slower declines in fertility were associated with higher growth in GDP per capita, which was contrary to expectations. According to the findings, modern contraceptive use or ideal family size norms were not significantly related to any changes in fertility. Fertility transition was also found to be more pronounced in urban areas compared with rural areas. Moreover, the findings identified education, infant and child mortality, modern contraceptive use, the percentage of women in union, and place of residence as significantly related to fertility levels.

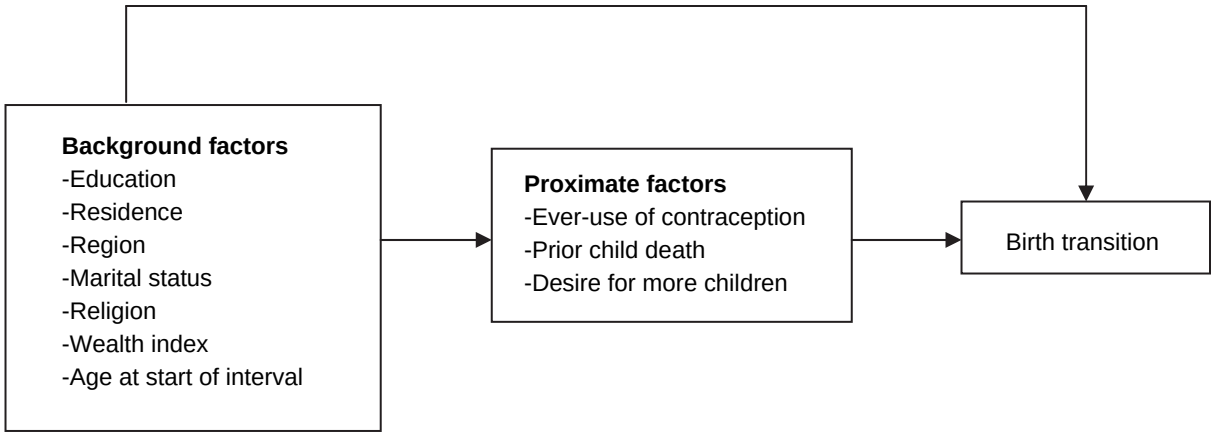
A study by Garenne (2007) attributed stalling fertility transitions at the national level to changes in age at birth, contraceptive use, and socioeconomic conditions. In a related study, Ojakaa (2008) observed that the patterns and determinants of fertility transition in Kenya could be explained by increase in age at first marriage and use of contraception. A reversal in the trend of fertility decline in the five-year period before the 2003 KDHS could be attributed to a rapid increase in infant and child mortality in the 1990s. He noted that in the timing of transition from second to third births in Kenya, regional differentials existed and these could be attributable to varying levels of socioeconomic development and conservative cultural practices with respect to reproduction. The study found that rural women were more likely to experience second births compared with their rural counterparts and that transition from first to second and from second to third births increased with an increase in age at first birth.

Westoff and Cross (2006) in a study of stalled fertility transition in Kenya observed that fertility stalled throughout the country but the stall was more pronounced among women with no education. A stall in contraceptive prevalence occurred among women in the young age groups and those with little education, but contraceptive use increased for women who had been sexually active in the four weeks prior to the survey. This pattern was also observed in other countries in Southern and Eastern Africa and was possibly attributed to the high incidence of HIV/AIDS in those countries. The stall in contraceptive prevalence could perhaps also be attributed to the observed decline in the proportion of women who want no more children. This was a marked departure from the steady increase in the proportion of women wanting no more children since 1997. The findings imply that HIV/AIDS may have played a role in this reversal of reproductive preferences in Kenya through an increase in child mortality.

Bongaarts (2006) studied the causes of stalling fertility transitions in developing countries. He noted that evidence in the late 1990s showed that fertility had stalled in mid-transition in five countries, including Bangladesh, Dominican Republic, Ghana, Kenya, and Turkey. He observed that the level of stalling varied from 4.7 births per woman in Kenya to 2.5 births per woman in Turkey. The findings attributed stalling fertility to a plateauing in contraceptive prevalence and demand for contraception and also a stall in women's desired number of children. The findings did not reveal any particular pattern in the socioeconomic determinants of fertility during period of fertility stall. For instance, in Kenya and Ghana fertility was found to have stalled, while development indicators had not changed. But in Turkey, Peru, and Columbia socioeconomic development was noted to have continued. He concluded that stalling fertility was therefore attributed to the stagnant levels of socioeconomic development in Kenya and Ghana.

In summary, findings on the causes of fertility transitions and apparent stalling remain inconsistent and controversial. The role of socioeconomic factors in explaining fertility transition remains inconclusive. Fertility has been observed to decline even in countries with little socioeconomic development, such as Bangladesh, and stalled in countries with poorer indicators of socioeconomic development, such Kenya and Ghana. In other countries no relationship was established between increase in contraceptive use and fertility decline. Moreover, other countries have experienced a stall in fertility with no significant changes in unmet need and unwanted fertility.

Figure 1. Conceptual Framework to explain fertility transition in Kenya



Source: Bongaarts (1978)

Objective of the Study

The study seeks to explore the pathways through which background and proximate factors may influence transition from second to third birth and from third to fourth birth (see Conceptual Framework, Figure 1). There could be two such pathways: the first seeks to establish whether background factors affect transition from second to third birth and from third to fourth birth, independent of proximate factors. The background factors considered in this study are women's education, urban-rural residence, region of the country, marital status, religion, wealth index, and age at the start of the interval. These are a proxy measure for the socioeconomic conditions. The assumption is that socioeconomic development is a major cause of fertility decline over time. This is because the high costs and benefits associated with children motivate parents to have fewer children, while declines in mortality raise survival chances of children, and that means that parents do not need to have as many births to achieve their desired family size. This scenario creates demand for family planning as parents seek to maintain their desired fertility. Consequently, as a society advances in socioeconomic development, the social costs of birth control are also reduced.

The second pathway examines whether background factors act through proximate factors to influence transition from second to third birth and from third to fourth birth. The two proximate factors included in this study are ever-use of contraception and a prior child death.

This stems from the assumption that a woman's background characteristics determine her socioeconomic status and hence her knowledge of and access to health services. Therefore, women with more education and those living in urban areas are more likely to access and use modern contraceptive methods, and this is likely to influence whether or not they transition from second to third birth and from third to fourth birth.

Thus we hypothesise that more educated women, women living in urban areas, women from Central province, currently married women, and women from wealthier households are less likely to transition from second to third births and from third to fourth births. We also hypothesise that women who have ever used a modern contraceptive method, women who have never experienced a prior child death, and women who desire another child are less likely to transition from second to third births and from third to fourth births.

DATA AND METHODS

Sources of Data

The data for this study are from the Kenya Demographic and Health Surveys (KDHS) conducted in 2003 and 2008/9. These were nationally representative surveys of 8,195 and 8,444 women age 15-49, respectively. They collected information on fertility, marriage, sexual activity, awareness and use of family planning methods, fertility preferences, and breastfeeding. Additional information was also collected on malaria and use of mosquito nets, domestic violence, and HIV testing of adults.

The implementation of the survey was successfully undertaken (CBS et al. 2004, KNBS et al. 2010). For KDHS 2008/9 a total of 9,936 households were selected in the sample and 9,057 households were successfully interviewed, yielding a response rate of 98%. A total of 8,767 women were found to be eligible for interview and 8,444 were interviewed, for a response rate of 96%. In KDHS 2003, 8,561 of the eligible 8,889 households were successfully interviewed, yielding a response rate of 96%. In the interviewed households, 8,717 eligible women age 15-49 were identified and 8,195 were successively interviewed, for a response rate of 94%.

We examined the transition to a third birth among women who experienced a second birth, and the transition to a fourth birth among women who had a third birth. For KDHS 2003 a total of 689 women had experienced a second birth and 531women transitioned to a third birth, while 421 experienced a fourth birth. For KDHS 2008/9 a total of 789 women had a second birth and 593 women transitioned to a third birth, while 477 transitioned to a fourth birth.

A complete birth history covering all live births of each woman interviewed was obtained. For such births, the survival status was ascertained and also the age at death for those infants /children who had died. Thus it was possible to determine the spacing between any two live births and also the intervals at which the infant/child deaths occurred. In addition, the survey obtained respondents' background and demographic characteristics. Information on sexual behaviour and family planning practice was also collected.

Variables and Their Measurement

Dependent Variable for the Study

The dependent variable in this study is whether or not a woman made the transition from second to third birth and from third to fourth birth for the five-year period before the survey, for KDHS 2003 and KDHS 2008/9.

Key Independent Variables for the Study

Socioeconomic and Cultural Factors

Education: Women's education is highly correlated with fertility. Education increases the chances of participating in labour force (or employment) for women. More educated women may reduce their completed fertility because of competing demands of their time by either limiting the number of births or by having longer birth intervals (spacing births). This study classified levels of education into three categories: no education, primary education, and secondary and above level of education. Educational level refers to the number of years of formal schooling and does not include education obtained in adult education programmes.

Urban-rural residence: This category refers to where the respondent was living at the time of the survey, classified as either urban or rural. In the analysis, urban area is used as the reference category.

Region of residence: Kenya has eight administrative provinces, including Nairobi, the capital city. Seven dummy variables representing each of these regions are created and Western province is chosen as the reference category.

Marital status: This variable is included to capture the differential exposure status to sexual intercourse (differences in coital frequency). This variable is classified into: never-married, currently married (or cohabiting, as married), and formerly married.

Religion: Respondents' religious affiliation is recoded into: Catholics, Protestants/other Christians, Muslims, and other religions. This variable is included to capture some of socio-cultural issues related childbearing.

Demographic factors: The only demographic factor included in this study is the age of the woman at the start of the birth interval.

Age at birth of child: The age of the woman at the birth of the child opening the interval is a proxy for fecundity-related differences in childbearing, since the onset of secondary sterility rises with age. This is a continuous variable and is measured in completed years.

Proximate Factors

Ever-use of contraception: Contraceptive use represents a deliberate effort by a woman to avoid conception, either using natural or modern methods. This factor is categorized into: never used, used traditional, and used modern methods.

Survival status of the preceding child (prior child death): This factor is coded as equal to 1 if a woman ever experienced a death of any prior child and equal to 0 if it didn't occur.

Desire for more children: This variable is included to capture future fertility intentions. It is coded as: want no more children, want a child within two years, and want a child after two years.

Methods of data analysis: The study used descriptive statistics and logistic regression model as the main methods of data analysis. Descriptive statistics were used at level one to describe the distribution of births in the five-year period before the 2003 KDHS and the five-year period before the 2008/9 KDHS. They were also used to describe the distribution of births by various key background characteristics and also to estimate parity progressions for the five-year period before each of the two surveys.

Logistic regression was used to identify the socioeconomic, cultural, demographic, child mortality, and proximate factors associated with transition from second to third births and from third to fourths birth in Kenya between 2003 and 2008/9. This regression model was appropriate because the dependent variable was dichotomous or binary. In this study, the dependent variable was whether or not a woman made the transition from second to third birth and from third to fourth birth in Kenya for the period 2003 and 2008/9. The impact of predictor variables is usually explained in terms of odds ratios. Logistic regression applies maximum likelihood estimation method to estimate parameters. Eight logistic regression models were fitted. These

included; four logistic regression models for transition from second to third birth in the period between 2003 and 2008/9 and four regression models were fitted for transition from third to fourth birth for the period 2003 and 2008/9.

For each time period, two models were fitted incorporating only the background variables for the transition from second to third births and from third to fourth births. These models thus examined the first pathway in our conceptual framework. Moreover, two other models were fitted for each time period incorporating both the background and proximate variables for the transition from second to third births and from third to fourth births. These models were used to examine the second pathway in our conceptual framework. All analyses were done using STATA 11.

These transitions are critical because they may be indicative of changing family size preferences. This is important if the goal of reducing fertility from the current average of 4.6 children per women to replacement level is to be realized by the government.

DESCRIPTIVE RESULTS

Table 1 shows the distribution of births in the five-year period prior to each of the surveys. The results show that the distribution of births by various parities for the two time periods does not indicate significant differences. The results show that there was a decline in the proportion of first births of 3 percentage points between 2003 and 2008/9. A slight increase in the proportion of births of parities 2 and 3 was observed for women in 2008/9, while a similar proportion was noted for births of parity 4 for both time periods. The results also show that the mean birth order for the two time periods was more or less the same.

Table 1. Distribution of births in the five-year period before KDHS 2003 and before KDHS 2008/9

	Birth order					
Period	**1**	**2**	**3**	**4**	**5+**	**N**
1999-2003	24.80	19.63	16.05	11.59	28.65	**6,102**
2003-2008/9	22.38	21.37	16.65	12.04	27.57	**5,852**
Mean birth order for 1999-2003				3.5		
Mean birth order for 2008/9				3.4		

Table 2 shows the distribution of births by key background characteristics. There was an increase in the proportion of births of parities 2 to 4 between 2003 and 2008/9 for women with no education. The proportion of births of orders 3 to 5 was slightly higher for women with a primary education in 2008/9 than in 2003, while the proportion of births of order 2 was higher for women with secondary and above education in 2008/9. There was a marked increase in the proportion of births of order 2 to women living in urban areas between 2003 and 2008/9. There was also a decline in the proportion of births of orders 4 and 5 and above between the surveys. The results do not indicate significant changes in the proportions of births of various orders occurring to women living in rural areas between the two surveys.

There was a slight increase in the proportions of births of orders 1, 4, and 5 and above between 2003 and 2008/9 for women living in Western province. In Nairobi the proportion of births of order 2 increased by seven percentage points between the surveys, and by five and three percentage points, respectively, for birth orders 4 and 5 and above. Central province registered a

decline in the proportions of births of orders 1 and 2, but a marginal increase for births of order 4. Interesting patterns were observed for Coast province, where a decline of two percentage points was noted for births of order 4, but the proportion of births of all other orders remained the same. For Eastern province, there was also a decline for births of order 1 and a marginal increase in births of order 3. Nyanza province registered an increase in the proportion of births of orders 1 to 4 and a reduction of seven percentage points for births of orders 5 and above. Rift Valley province registered a marginal increase in the proportion of births of orders 2 to 4 and a decline for births of order 1. North Eastern province registered a substantial increase in the proportion of births of orders 2 and 3, but the province also recorded dramatic declines in the proportion of births of orders 5 and above, from 51% in 2003 to 38% in 2008/9.

The proportion of births of orders 2 to 5 and above increased for women age 15-24, while for women age 25-34 the proportion of births of order 2 increased slightly but declined marginally for other birth orders between 2003 and 2008/9. For women age 35 and above, the proportion of births of order 5 declined but increased for births of orders 2 and 3. The proportion of births occurring to currently married women increased by one percentage point for birth orders 2 and 3 and declined by the same margin for birth orders 1 and 5 and above. The proportion of births to formerly married women increased for birth order 2 but the proportion remained the same for birth orders 4 and 5 and above. A decline of seven percentage points in the proportion of births of order 1 was observed for never-married women and a corresponding increase in the proportion of births of order 2 between 2003 and 2008/9.

Table 2. Distribution of births by key background characteristics for KDHS 2003 and KDHS 2008/9

	Birth order					
Variable	**1**	**2**	**3**	**4**	**5+**	**N**
Education level						
No education						
KDHS 2008/9	12.77	16.67	15.14	12.53	42.89	763
KDHS 2003	14.44	12.03	13.40	10.45	49.68	938
Primary education						
KDHS 2008/9	20.14	20.10	17.26	12.68	29.82	3,713
KDHS 2003	23.45	20.46	16.08	11.91	28.10	3,901
Secondary plus						
KDHS 2008/9	33.77	27.39	15.85	10.02	12.96	1,375
KDHS 2003	33.13	22.17	17.93	11.43	14.75	1,263
Residence						
Urban						
KDHS 2008/9	34.97	30.71	15.32	8.66	10.34	1,074
KDHS 2003	34.22	22.89	16.09	11.06	15.75	1,143
Rural						
KDHS 2008/9	19.55	19.26	16.95	12.80	31.44	4,777
KDHS 2003	21.74	18.88	16.04	11.711	31.63	4,959
Region of residence						
Western						
KDHS 2008/9	19.40	20.04	16.05	11.50	33.01	703
KDHS 2003	21.11	20.09	15.91	11.12	31.76	776
Nairobi						
KDHS 2008/9	40.02	29.27	14.54	8.68	7.49	334
KDHS 2003	39.29	22.09	16.00	12.37	10.25	398
Central						
KDHS 2008/9	27.40	26.63	17.65	11.69	16.63	466
KDHS 2003	30.88	22.46	17.75	10.94	17.97	652
Coast						
KDHS 2008/9	23.56	19.92	16.12	13.50	26.90	495
KDHS 2003	24.34	20.19	16.32	12.47	26.68	510
Eastern						
KDHS 2008/9	19.28	20.85	19.85	12.20	27.83	890
KDHS 2003	22.64	19.53	17.21	12.68	27.95	946
Nyanza						
KDHS 2008/9	24.43	19.67	15.49	12.73	27.68	1,144
KDHS 2003	21.28	18.39	13.91	10.95	35.46	1000
Rift Valley						
KDHS 2008/9	19.45	21.14	16.20	11.96	31.26	1,641
KDHS 2003	22.74	19.30	16.29	11.33	30.35	1,639
North Eastern						
KDHS 2008/9	14.05	17.61	17.41	12.80	38.13	178
KDHS 2003	13.10	10.87	13.47	11.89	50.67	181

Cont'd..

Table 2. Cont'd

	Birth order					
Variable	**1**	**2**	**3**	**4**	**5+**	**N**
Age cohort						
15-24 years						
KDHS 2008/9	51.95	29.45	12.48	4.43	1.70	1,943
KDHS 2003	55.29	30.15	11.56	2.52	0.48	2,077
25-34 years						
KDHS 2008/9	10.29	22.17	22.37	17.87	27.31	2,845
KDHS 2003	10.95	19.37	23.17	18.95	27.56	2, 861
35+ years						
KDHS 2008/9	0.69	4.43	8.97	10.35	75.56	1,063
KDHS 2003	0.66	1.50	6.57	9.67	81.60	1,163
Marital status						
Currently married						
KDHS 2008/9	18.52	21.43	17.67	12.98	29.41	4,933
KDHS 2003	20.11	20.33	16.95	12.22	30.40	5,230
Formerly married						
KDHS 2008/9	20.71	21.79	15.83	11.51	30.16	497
KDHS 2003	26.11	16.99	15.16	11.76	29.98	504
Never married						
KDHS 2008/9	69.55	20.13	5.68	1.65	2.99	421
KDHS 2003	77.66	13.37	4.55	2.33	2.09	368
Religion						
Catholic						
KDHS 2008/9	23.16	23.42	16.48	12.20	24.74	1,170
KDHS 2003	25.41	20.81	16.49	11.23	26.06	1.431
Protestant						
KDHS 2008/9	22.98	20.96	16.59	12.05	27.42	3,126
KDHS 2003	24.27	19.88	15.74	11.42	28.70	3,925
Muslim						
KDHS 2008/9	19.88	19.38	17.53	11.76	31.45	516
KDHS 2003	19.83	15.81	16.76	13.49	34.11	554
Other						
KDHS 2008/9	14.21	22.16	16.57	11.64	35.42	239
KDHS 2003	22.43	16.87	17.15	12.21	31.34	192

Source: Primary analysis of KDHS, 2003 and KDHS, 2008/9

Parity Progressions for Kenya, 2003 – 2008/9

Table 3 shows parity progressions for Kenya between 2003 and 2008/9. The results show that the patterns of parity progressions did not change significantly between the two surveys. Between 2003 and 2008/9 the proportions of women experiencing births of parities 2 to 5 increased by one percentage point. The proportion of women experiencing a tenth birth increased from 40% to 57% between 2003 and 2008/9.

Table 3. Parity progression in the five-year periods before the surveys, KDHS 2003 and KDHS 2008/9.

	Parity									
	0-1	**1-2**	**2-3**	**3-4**	**4-5**	**5-6**	**6-7**	**7-8**	**8-9**	**10**
Parity progression for KDHS 2003	0.706	0.706	0.691	0.714	0.712	0.674	0.679	0.607	0.589	0.403
Parity progression for KDHS 2008/9	0.749	0.724	0.679	0.700	0.701	0.628	0.625	0.605	0.580	0.569

Multivariate Results

Factors Influencing Transition from Second to Third Birth, KDHS 2008/9

Table 4 for model 1 shows factors influencing transition from second to third birth, for all background factors. (See the Appendix to this paper for Tables 4 to 11.) The results show that the odds of transition to a third birth were 0.5 times lower for women with a primary education compared with women with no education. However, the transition to a third birth was 0.3 times lower for women with secondary and above education compared with women with no education. Region of residence was significantly related to the odds of transition to a third birth. A woman in Central province was 65% less likely to experience a third birth compared with a woman in Western province. The odds of transition to a third birth was higher for women in Nairobi and Nyanza provinces compared with women in Western province, and lower for women in Eastern, Coast, Rift Valley, and North Eastern provinces than for women in Western province. These results were not statistically significant.

Women of the Protestant faith were 50% more likely to experience a third birth compared with women of the Catholic faith. The odds of transition to a third birth for Muslim and other women were higher compared with Catholic women, although these results were not statistically significant. Wealth index was significantly associated with the odds of transition to a third birth. Women from middle households were 0.5 times less likely to experience a third birth compared with women from poorest households. The odds of transition to a third birth were lowest for women from richest households. Women from richest households were 0.3 times less likely to transition to a third birth compared with women from poorest households.

The results showed that the odds of transition to a third birth were higher for women in rural areas than for women in urban areas. They were also higher for currently and formerly married women compared with never-married women. However, the results were not statistically significant. Age at the start of the interval was associated with reduced odds of transition to a third birth.

In model 2, when other control variables were introduced, education level remained a significant predictor of the odds of transition to a third birth. Table 5 shows that women with primary and secondary and above level of education were 0.5 and 0.3 times, respectively, less likely to transition to a third birth compared with women with no education. As in model 1, region of residence was an important factor influencing transition to a third birth. Women in Central province were 0.3 times less likely to experience a third birth compared with women in Western province. Women in Eastern and North Eastern province were 0.5 and 0.4 times, respectively, less likely to experience a third birth compared with women in Western province. The odds of transition to a third birth were higher for women in Nairobi and Nyanza provinces and lower for women in Coast and Rift Valley provinces compared with women in Western province. These results were not statistically significant.

In the presence of other control variables, women of the Protestant faith were 59% more likely to experience a third birth compared with women of the Catholic faith. The odds of transition to a third birth were also higher for women of Muslim and other faiths, although these results were not statistically significant. In model 2 wealth index remained a significant predictor of transition to a third birth. Women from middle, richer, and richest households were 0.6, 0.5 and 0.4 times, respectively, less likely to experience a third birth compared with women from

poorest households. Women who had ever used a modern contraceptive method were 40% less likely to experience a third birth compared with women who had never used any contraceptive method. Age at the start of the interval was significantly related to the odds of transition to a third birth. A one-year increase in age at the start of the interval reduced the odds of transition to a third birth by 10%. Furthermore, women who desired another child within two years and women who desired another child after two years were both associated with reduced odds of experiencing a third birth compared with women who did not want another child. The study did not establish a significant association between prior child death and transition to a third birth.

Factors Influencing Transition from Third to Fourth Birth, KDHS 2008/9

Table 6 for model 1 gives results for factors influencing transition from third to fourth birth, for all background factors. The results show that education level was a significant predictor of transition to a fourth birth. Women with secondary and above level of education were 57% less likely to transition to a fourth birth compared with women with no education. The odds were also lower for women with primary education, although these results were not statistically significant. Region of residence was an important factor influencing the odds of transition to a fourth birth. Women living in Eastern provinces were 0.5 times less likely to experience a fourth birth compared with women in Western province. This association was weakly significant at the 10% level. The odds of experiencing a fourth birth were lower for women in Central, Nairobi, Coast, Nyanza, and North Eastern provinces compared with women in Western province, although these associations were not statistically significant.

Wealth index was also an important predictor of the odds of experiencing a fourth birth. Women from middle and richer households were 0.5 and 0.4 times, respectively, less likely to experience a fourth birth compared with women from poorest households, while women from richest households were 0.3 times less likely to experience a transition to a fourth birth compared with women from poorest households. The odds of transition to a fourth birth were higher among women living in rural areas, currently married women, and women of the Protestant and Muslim faiths. These results were not statistically significant. Age at the start of the interval was significantly associated with reduced odds of transition to a fourth birth.

Table 7 shows results of model 2, including all variables. Women with primary and secondary and above level of education had lower odds of transition to a fourth birth compared with women with no education. Wealth index was a significant predictor of the odds of transition to a fourth birth. Women from richer households were 0.5 times less likely to experience a fourth birth and women from the richest households were 0.3 times less likely compared with women from the poorest households. Age at the start of the interval was also significantly related to transition to a fourth birth. A one-year increase in age at the start of the interval was associated with a lower transition to a fourth birth. Moreover, the odds of transition to a fourth birth were lower for women who had ever used a modern contraceptive method compared with women who had never used any method. The odds of transition to a fourth birth were 0.3 and 0.5 times higher, respectively, for women who wanted another child within two years and women who wanted another child after two years compared with women who wanted no more children. The odds of transition to a fourth birth were higher for women living in rural areas compared with women in urban areas and were also higher for currently married women compared with never-married women, although these results were not statistically significant.

Factors Influencing Transition from Second to Third Birth, KDHS 2003

Table 8 for model 1 shows factors influencing transition from second to third birth, for all background factors. Region of residence was an important factor influencing transition to a third birth. Women in Central and Nyanza provinces were 0.3 and 0.4 times, respectively, less likely to experience a third birth compared with women in Western province. The odds of transition to a third birth was lower for women in Nairobi, Coast, Eastern, and Rift valley provinces compared with women in Western province. These associations were not statistically significant, however. Currently and formerly married women were nine and seven times, respectively, more likely to experience a third birth compared with never-married women. Women of the Muslim faith were three times more likely to transition to a third birth compared with women of the Catholic faith. The odds of transition to a third birth were higher for women of Protestant and other faiths compared with Catholic women, although the results were not statistically significant. Women from poorer, middle, richer, and richest households were 0.2, 0.3, 0.2, and 0.1 times, respectively, less likely to transition to a third birth compared with women from the

poorest households. Age at the start of the interval was also significantly associated with reduced odds of transition to a third birth.

Table 9 for model 2 presents results including both background and proximate variables. Women in Nyanza province were 0.3 times less likely to experience a third birth compared with women in Western province. The odds of transition to a third birth were lower for women living in Nairobi, Central, Coast, Eastern, Rift Valley, and North Eastern provinces, although the results were not statistically significant. Currently and formerly married women were also associated with educed odds of transition to a third birth compared with never-married women. Women from poorer, middle, richer, and richest households were 0.3, 0.3, 0.2, and 0.1 times, respectively, less likely to experience a third birth compared with women from poorest households. Age at the start of the interval was also associated with reduced odds of transition to a third birth.

Furthermore, women who had ever used a modern contraceptive method were 0.4 times less likely to transition to a third birth compared with women who had never used any method. Women who wanted another child within two years were 0.3 times less likely to transition to a third birth compared with women who did not want another child. The odds of transition to a third birth were higher among women with primary and secondary and above education, among women in rural areas, and among women of Protestant, Muslim, and other religions, and were lower for women who experienced a prior child death. However, these associations were not statistically significant.

Factors Influencing Transition from Third to Fourth Birth, KDHS 2003

Table 10 for model 1 shows results for factors influencing transition from third to fourth birth, for all background factors. Women in Central province were 0.4 times less likely to experience a transition to a fourth birth compared with women living in Western province. The odds of transition to a fourth birth were higher for women in Nairobi and Nyanza provinces, although the results were not statistically significant. With respect to wealth index, the results show that women from poorer, middle, richer, and richest households were 0.4, 0.3, 0.4 and 0.3 times, respectively, less likely to experience a fourth birth compared with women from the poorest households. Age at the start of the interval was also significantly associated with reduced

odds of transition to a fourth birth. The risk of transition to a fourth birth was higher for women with primary level of education, women in rural areas, women of the Muslim and other faiths, and currently and formerly married women, and were lower for women with secondary and above level of education. However, these results were not statistically significant.

Table 11 shows results of model 2, which includes both background and proximate variables. Women in Central province were 0.4 times less likely to experience a fourth birth compared with women in Western province. Generally, except for women in Nairobi, the odds of transition to a fourth birth were lower for women in other provinces. These results were not statistically significant. Women from poorer, middle, and richer households were 0.4 times less likely to experience a fourth birth, while women from richest households were 0.3 times less likely to transition to a fourth birth compared with women from the poorest households. Age at the start of the interval was significantly associated transition to a fourth birth.

A one-year increase in age at the start of the interval was associated with 0.9 times lower odds of transition to a fourth birth. Women who had ever used a modern contraceptive method were associated with reduced odds of transition to a fourth birth compared with women who had never used any method. Women who wanted another child within two years were 0.4 times less likely to transition to a third birth compared with women who did not want another child at all. The results also indicate that the odds of transition to a fourth birth were higher for women with primary and secondary and above education, for women in rural areas, currently married women, women of Muslim and other faiths, and women who experienced a prior child death. However, these results were not statistically significant.

DISCUSSION

This paper tested a number of hypotheses regarding factors influencing transition from second to third births and from third to fourth births for Kenya between 1999-2003 and 2003-2008/9. We hypothesised that more educated women, women living in urban areas, women from Central province, currently married women, and women from wealthier households were less likely to transition from second to third births and from third to fourth births. We also hypothesised that women who had ever used a modern method of contraception and those who had never experienced a prior child death were less likely to transition from second to third births and from third to fourth births.

For each of the two surveys studied, KDHS 2003 and KDHS 2008/9, two models were fitted. The first model included only background variables—education level, urban-rural residence, region of residence, wealth index, marital status, religion, and age at the start of the interval. The second model included both background variables and proximate variables. The results for model 1 for the five-year period before KDHS 2008/9 for transition from second to third births showed that education level, region of residence, wealth index, religion, and age at the start of the interval were significantly associated with the odds of transition to a third birth. Primary and secondary and above levels of education were associated with lower odds of transition to a third birth. Residence in Central province was also associated with lower odds of transition to a third birth. The odds of transition to a third birth were higher for women of the Protestant faith and lower for women from middle, richer, and richest households.

For the full model 2 for 2008/9, the results showed that the odds of transition to a third birth were lower for women with primary and secondary and above level of education compared with women with no education, and also lower for women in Central and North Eastern provinces compared with women in Western province. Odds were higher for women of the Protestant faith compared with Catholic women. The odds of transition to a third birth were lower for women from middle, richer, and richest households compared with those from poorest households. The odds of transition to a third birth were also lower for women who had ever used a modern contraceptive method compared with women who had never used any method. Age at the start of the interval and desire for another birth within at least two years were associated with reduced odds of transition to a third birth.

Concerning transition from second to third birth, the results of model 1 for the five-year period before KDHS 2003 showed that region of residence, marital status, religion, wealth index, and age at the start of the interval were significantly associated with the odds of transition to a third birth. Women in Central province and women in Eastern province had lower odds of transition to a third birth compared with women in Western province. Currently and formerly married women had increased odds of transition to a third birth compared with never-married women, as did women of the Muslim faith compared with women of the Catholic faith. Women from poorer, middle, richer, and richest households had lower odds of transition to a third birth compared with women from poorest households.

Model 2 for KDHS 2003, which included both background and proximate variables, showed that region of residence, marital status, wealth index, age at the start of the interval, ever-use of contraception, and desire for more children were significant predictors of transition to a third birth. Residence in Nyanza province was associated with lower odds of transition to a third birth compared with residence in Western province. Currently and formerly married women had significantly lower odds of transition to a third birth compared with never-married women. Women from poorer, middle, richer, and richest households had lower odds of transition to a third birth compared with women from poorest households, as did women who had ever used a contraceptive method compared with women who had never used a method. The odds of experiencing a third birth were lower for women who wanted another child within two years compared with those who did not want another child at all.

For the five-year period before KDHS 2008/9, the odds of transition from third to a fourth birth in model 1 were strongly associated with women's education level, wealth index, and age at the start of the interval. The odds of transition to a fourth birth were lower for women with secondary and above education compared with women with no education, and were significantly lower for women from middle, richer, and richest households compared with women from poorest households. Odds also decreased with an increase in age at the start of the interval.

The results for model 1 for the five-year period before KDHS 2003 showed that only region of residence, wealth index, and age at the start of the interval were significantly associated with the odds of transition to a fourth birth. Women in Central province were associated with

lower odds of transition to a fourth birth compared with women from Western province. The odds of transition to a fourth birth were lower for women from poorer, middle, richer, and richest households compared with women from poorest households. Model 2, which included background and proximate variables, showed that region of residence, wealth index, age at the start of the interval, ever-use of contraception, and desire for another child were significant predictors of transition to a fourth birth. Women in Central province were associated with lower odds of transition to a fourth birth compared with women in Western province. This same pattern was observed for women from poorer, middle, richer, and richest households compared with poorest households, women those who had ever used a method of contraception compared with women who had never used a method, and women who wanted another child within two years compared with women who wanted no more children. Age at the start of the interval was also associated with reduced odds of transition to a fourth birth.

Conclusions and Policy Implications

A major conclusion of this analysis is that transitions from second to third births and from third to fourth births in Kenya were strongly influenced by socioeconomic, cultural, and proximate factors. This observation supports the view that socioeconomic conditions and diffusion hypotheses are important in explaining fertility transition in Kenya. Consequently, at the policy level there is a need to improve family planning services across the country. This will go a long way in addressing the issues of unmet need for family planning and unwanted fertility and hence lead to a decline in total fertility. The government has already instituted measures to reposition family planning in the country. There is also a need to improve the socioeconomic conditions in the country, recognizing that relative wealth and more education for women are strongly associated with lower fertility. This means that more efforts should be directed toward increasing GDP per capita and increasing the proportion of women with secondary and above education. Education plays a key role in changing reproductive attitudes and behaviour. An improved GDP per capita will provide more opportunities for employment, better health care, and alternative investments for families besides having children. These improvements will ultimately have an impact on desired family size and lead to a decline in fertility rates.

REFERENCES

Abdalla, A.A.M. 1988. "Work Experience of Married Women and Desired Fertility in Egypt and Ghana." In *Studies in African and Asian Demography*: CDC Annual Seminar 1987, CDC Research Monograph Series No. 17, 293-315. Cairo, Egypt: Cairo Demographic Centre.

Adegbola, O. 1988. "Religion and Reproduction in Sub-Saharan Africa." Paper presented at African Population Conference, Dakar, Senegal, November 7-12.

Alila, D.D. 1990. "Determinants of Family Size Preferences in Urban Population: A Case Study of Mathare Valley-4B, Nairobi." MA Thesis. University of Nairobi, Kenya.

Ayehu, T.H. 1998. "Correlates of Fertility Preference of Kenyan Women: Evidence from the 1993 KDHS." MS Thesis. University of Nairobi, Kenya.

Benefo, K. 1995. "The Determinants of the Duration of Postpartum Sexual Abstinence in West Africa: A Multilevel Analysis." *Demography* 32(2): 139-59.

Blacker, J. 2002. "Kenya's Fertility Transition: How Low Will It Go?" Unpublished Manuscript.

Blacker, J., C. Opiyo, M. Jasseh, A. Sloggett, and J. Ssematte-Ssebuliba. 2005. "Fertility in Kenya and Uganda: A Comparative Study of Trends and Determinants." *Population Studies* 59(3): 355-73.

Bledsoe, C.H., J.B. Casterline, J.A. Johnson-Kuhn, and J.G. Haaga, eds. 1999. *Critical Perspectives on Schooling and Fertility in the Developing World.* Washington D.C., USA: National Academic Press.

Bongaarts, J. 2006. "The Causes of Stalling Fertility Transitions." *Studies in Family Planning* 37(1): 1-16.

Bongaarts, J. 1978. "A Framework for Analyzing the Proximate Determinants of Fertility." *Population and Development Review* 4(1): 105-32.

Brass, W., and C.L. Jolly, eds. 1993. *Population Dynamics of Kenya*. Washington D.C., USA: National Academic Press.

Caldwell, J.C., and P. Caldwell. 1987. "The Cultural Context of High Fertility in Sub-Saharan Africa." *Population and Development Review* 13(3): 409-37.

Central Bureau of Statistics (CBS) [Kenya], Ministry of Health (MOH) [Kenya], and ORC Macro. 2004. *Kenya Demographic and Health Survey 2003*. Calverton, MD, USA: CBS, MOH and ORC Macro.

Cohen, B. 1993. "Fertility Levels, Differentials and Trends." In *Demographic Change in Sub-Saharan Africa,* edited by K.A. Foote, K.H. Hill, and L.G. Martin, 8-67. Washington D.C., USA: National Academic Press.

Cross, A.R., W. Obungu, and P. Kizito. 1991. "Evidence of a Transition to Lower Fertility in Kenya." *International Family Planning Perspectives* 17(1): 4-7.

Diamond, I., M. Newby, and S. Varle. 1999. "Female Education and Fertility: Examining the Links." In *Critical Perspectives on Schooling and Fertility in the Developing World*, edited by C.H. Bledsoe, J.B. Casterline, J.A. Johnson-Kuhn, and J.G. Haaga, 23-48. Washington D.C., USA: National Academic Press.

Dixon-Mueller, R. 1993. *Population Policy and Women's Rights: Transforming Reproductive Choice*. Westport, CT, USA: Praeger.

Ekisa, L.A., and A. Hinde. 2005. *Fertility Transition in Kenya: A Regional Analysis of Proximate Determinants*. Applications and Policy Working Paper A06/03. Southampton, UK: Southampton Statistical Sciences Research Institute.

Ezeh, A.C. 1997. "Polygyny and Reproductive Behaviour in Sub-Saharan Africa: A Contextual Analysis." *Demography* 34(2): 209-43.

Ezeh, A.C., and F.N. Dodoo. 2001. "Institutional Change and African Fertility Transition: The Case of Kenya." Genus LVII(3-4): 135-64.

Garenne, M. 2007. Situations of Fertility Stall in Sub-Saharan Africa. Paper presented at the Fifth African Population Conference, Arusha, Tanzania, December 10-14.

Gyimah, S.O. 2002. Fertility Response to Childhood Mortality in Sub-Saharan Africa with Emphasis on Ghana and Kenya. PSC Discussion Papers Series Vol. 16: Iss. 2, Article 1. London, Canada: Population Studies Centre, University of Western Ontario.

Hirschman, C., and Y. Young. 1998. *The Decline of Fertility in Thailand, Malaysia and the Philippines: 1968-70 to 1988-90.* Paper presented at the Conference on Economic

Aspects of Demographic Transitions: The Experience of Asian Pacific Countries, Taipei, Taiwan, June 19-20.

Kenya National Bureau of Statistics (KNBS) [Kenya], and ICF Macro. 2010. *Kenya Demographic and Health Survey 2008-09.* Calverton, MD, USA: KNBS and ICF Macro.

Lloyd, C., and S. Ivanov.1988. "The Effects of Improved Child Survival on Family Planning Practice and Fertility." *Studies in Family Planning* 19(3): 141-161

Magadi, A.K., and A.O. Agwanda. 2010. "Investigating the Association between HIV/AIDS and Recent Fertility Patterns in Kenya." *Journal of Social Science and Medicine* 71: 335-44.

Mason, K.O. 1997. "Explaining Fertility Transitions." *Demography* 34: 443-54.

Mlewa, O.K. 2001. "Fertility Preference among Men in Kenya." MA Thesis. University of Nairobi, Kenya.

Montgomery, M.R., and C.B. Lloyd. 1999. "Excess Fertility, Unintended Births, and Children's Schooling." In *Critical Perspectives on Schooling and Fertility in the Developing World*, edited by C.H. Bledsoe, J.B. Casterline, J.A. Johnson-Kuhn, and J.G. Haaga, 206-266. Washington D.C., USA: National Academic Press.

Moustafa, E.M. 1988. "Factors Related to Supply and Demand for Children, Upper Egypt Region." In *Studies in African and Asian Demography: CDC Annual Seminar 1987*, CDC Research Monograph Series No. 17, 111-46. Cairo, Egypt: Cairo Demographic Centre.

Muinde, J.N., and M.S. Mukras. 1979. *Some Aspects of Determinants of Fertility in Kenya.* Nairobi, Kenya: Population Studies and Research Institute and Economics Department, University of Nairobi.

Njogu, W.E., and C.T. Martín. 1991. "Fertility Decline in Kenya: The Role of Timing and Spacing of Births." In *Proceedings of the Demographic and Health Surveys World Conference Vol. III, 1883-1901*. Columbia, MD, USA: IRD/Macro International.

Obiero, W.O. 1999. "Educational Expansion and Emerging Fertility Transition in Kenya." PhD Thesis, University of Michigan.

Oheneba-Sakyi, Y., and B.K. Takyi. 1997. "Effects of Couple's Characteristics on Contraceptive Use in Sub-Saharan Africa: The Ghanaian Example." Journal of Biosocial Science 29(1): 33-49.

Ojakaa, D. 2008. "The Fertility Transition in Kenya: Patterns and Determinants." PhD Thesis. University of Montreal, Canada.

Population Council. 1998. *Fertility Decline in Kenya: Levels, Trends and Differentials.* Nairobi, Kenya: The African Population Policy Research Centre.

Robinson, W.C. 1992. "Kenya Enters the Fertility Transition." *Population Studies* 46(3): 445-57.

Rodriguez, G., and W. Cleland. 1981. "The Effects of Socioeconomic Characteristics on Fertility in 20 Countries." *International Family Planning Perspectives* 7(3): 93-101.

Shapiro, D., and T. Gebreselassie. 2008. "Fertility Transition in Sub-Saharan Africa: Falling and Stalling." Paper presented at the Population Association of America 2007 Annual Meeting, New York, NY, March 29-31.

Shapiro, D., and B.O. Tambashe. 1997. "Education, Employment and Fertility in Kinshasa and Prospects for Change in Reproductive Behaviour." *Population Research and Policy Review* 16(3): 259-87.

Sibanda, A. 1999. "Reproductive Change in Zimbabwe and Kenya: The Role of Proximate Determinants in Recent Fertility Trends." *Social Biology* 46(1-2): 82-99.

United Nations. 1995. *Women's Education and Fertility Behaviour: Recent Evidence from the DHS.* New York, NY, USA: United Nations.

United Nations. 1991. *Socioeconomic Development and Fertility Decline: An Application of the Easterlin Synthesis Approach to Data from the World Fertility Survey.* New York, NY, USA: United Nations.

Vavrus, F. 2000. *The Relationship between Schooling and Fertility in Tanzania.* Boston, MA, USA: Harvard School of Public Health.

Wasao, S.W. 2002. "A Comparative Analysis of the Socio-Economic Correlates of Fertility in Cameroon and the Central African Republic." In *Prospects for Fertility Decline in High*

Fertility Countries: Population Bulletin of the United Nations 2002, edited by United Nations, 129-146. New York, NY, USA: United Nations.

Watkins, S.C. 2000. "Local and Foreign Models of Reproduction in Nyanza Province, Kenya." *Population and Development Review* 26(4): 725-59.

Westoff, C.F. 1994. "Reproductive Preferences and Future Fertility in Developing Countries." In *the Future Population of the World: What Can We Know Today?* edited by W. Lutz, 83-97. London, UK: Earthscan Publications Ltd.

Westoff, C.F., and A.R. Cross. 2006. *The Stall in the Fertility Transition in Kenya.* DHS Analytical Studies No. 9. Calverton, MD, USA: ORC Macro.

Woldemicael, G. 2005. *Evidence of Recent Fertility Decline in Eritrea: An Analysis of Trends and Determinants.* MPID Working Paper WP-2005-026. Rostock, Germany: Max Planck Institute for Demographic Research.

Zhang, J. 1994. "Socioeconomic Determinants of Fertility in Hebei Province, China: An Application of the Sequential Logit Model." *Economic Development and Cultural Change* 43(1): 67-90.

APPENDIX

Table 4. Logistic regression results for transition from second birth to third birth in the five-year period before the survey: KDHS 2008/9-Model 1: background variables

Variable	Exp. (β)	S.E. (β)	P-value
Educational level			
No education (Ref.)	-	-	-
Primary education	0.521	0.167	0.042
Secondary plus	0.315	0.116	0.002
Residence			
Urban (Ref.)	-	-	-
Rural	1.426	0.412	0.220
Region of residence			
Western (Ref.)	-	-	-
Nairobi	1.432	0.684	0.452
Central	0.349	0.118	0.002
Coast	0.646	0.235	0.229
Eastern	0.565	0.182	0.077
Nyanza	1.036	0.320	0.910
Rift Valley	0.764	0.236	0.384
North Eastern	0.358	0.196	0.060
Marital status			
Never married (Ref.)	-	-	-
Currently married	2.062	1.086	0.170
Widowed/Divorced	1.094	0.618	0.873
Religion			
Catholic (Ref.)	-	-	-
Protestant	1.499	0.310	0.051
Muslim	1.573	0.588	0.225
Other	1.625	0.865	0.362
Wealth index			
Poorest (Ref.)	-	-	-
Poorer	0.772	0.220	0.364
Middle	0.504	0.139	0.013
Richer	0.398	0.112	0.001
Richest	0.345	0.127	0.004
Age at start of interval	0.902	0.019	0.000

Table 5. Logistic regression results for transition from second birth to third birth in the five-year period before the survey: KDHS 2008/9- Model 2: all variables

Variable	Exp. (β)	S.E. (β)	P-value
Educational level			
No education (Ref.)	-	-	-
Primary education	0.486	0.166	0.035
Secondary plus	0.290	0.114	0.002
Residence			
Urban (Ref.)	-	-	-
Rural	1.484	0.435	0.178
Region of residence			
Western (Ref.)	-	-	-
Nairobi	1.406	0.679	0.480
Central	0.326	0.113	0.001
Coast	0.703	0.260	0.341
Eastern	0.514	0.170	0.044
Nyanza	1.076	0.339	0.816
Rift Valley	0.774	0.244	0.417
North Eastern	0.347	0.190	0.054
Marital status			
Never married (Ref.)	-	-	-
Currently married	2.203	1.183	0.141
Widowed/Divorced	1.044	0.600	0.941
Religion			
Catholic (Ref.)	-	-	-
Protestant	1.593	0.338	0.028
Muslim	1.739	0.662	0.146
Other	1.438	0.769	0.497
Wealth index			
Poorest (Ref.)	-	-	-
Poorer	0.852	0.250	0.585
Middle	0.560	0.160	0.146
Richer	0.458	0.135	0.008
Richest	0.407	0.157	0.020
Ever use of contraception			
Never used (Ref.)	-	-	-
Used traditional	1.033	0.498	0.946
Used modern	0.600	0.151	0.042
Prior child death			
Alive (Ref.)	-	-	-
Dead	1.249	0.292	0.341
Age at start of interval	0.890	0.019	0.000
Desire for more children			
Wants no more (Ref.)	-	-	-
Wants within two years	0.539	0.164	0.042
Wants after two years	0.532	0.116	0.004

Table 6. Logistic regression results for transition from third birth to four birth in the five-year period before the survey: KDHS 2008/9-Model 1: background variables

Variable	Exp. (β)	S.E. (β)	P-value
Educational level			
No education (Ref.)	-	-	-
Primary education	0.619	0.201	0.140
Secondary plus	0.434	0.168	0.031
Residence			
Urban (Ref.)	-	-	-
Rural	1.124	0.389	0.735
Region of residence			
Western (Ref.)	-	-	-
Nairobi	0.801	0.459	0.698
Central	0.534	0.210	0.111
Coast	1.033	0.445	0.071
Eastern	0.521	0.188	0.016
Nyanza	0.662	0.227	0.228
Rift Valley	0.893	0.317	0.749
North Eastern	0.766	0.459	0.656
Marital status			
Never married (Ref.)	-	-	-
Currently married	1.728	1.339	0.480
Widowed/Divorced	0.857	0.695	0.849
Religion			
Catholic (Ref.)	-	-	-
Protestant	1.183	0.293	0.498
Muslim	1.267	0.517	0.562
Other	0.701	0.406	0.540
Wealth index			
Poorest (Ref.)	-	-	-
Poorer	0.678	0.209	0.208
Middle	0.448	0.142	0.011
Richer	0.410	0.134	0.007
Richest	0.284	0.121	0.003
Age at start of interval	0.885	0.019	0.000

Table 7. Logistic regression results for transition from third to fourth birth in the five-year period before the survey: KDHS 2008/9- Model 2: all variables

Variable	Exp. (β)	S.E. (β)	P-value
Educational level			
No education (Ref.)	-	-	-
Primary education	0.519	0.184	0.064
Secondary plus	0.365	0.152	0.015
Residence			
Urban (Ref.)	-	-	-
Rural	1.182	0.413	0.632
Region of residence			
Western (Ref.)	-	-	-
Nairobi	0.969	0.564	0.957
Central	0.577	0.231	0.169
Coast	1.145	0.503	0.758
Eastern	0.525	0.196	0.085
Nyanza	0.735	0.259	0.381
Rift Valley	0.909	0.333	0.795
North Eastern	0.870	0.541	0.824
Marital status			
Never married (Ref.)	-	-	-
Currently married	1.855	1.475	0.437
Widowed/Divorced	0.833	0.691	0.826
Religion			
Catholic (Ref.)	-	-	-
Protestant	1.210	0.307	0.452
Muslim	1.394	0.590	0.432
Other	0.714	0.432	0.478
Wealth index			
Poorest (Ref.)	-	-	-
Poorer	0.741	0.234	0.342
Middle	0.529	0.177	0.057
Richer	0.487	0.165	0.034
Richest	0.336	0.146	0.012
Age at start of interval	0.879	0.020	0.000
Ever use of contraception			
Never used (Ref.)	-	-	-
Used traditional	1.036	0.555	0.948
Used modern	0.546	0.156	0.034
Prior child death			
Alive (Ref.)	-	-	-
Dead	1.473	0.356	0.109
Desire for more children			
Wants no more (Ref.)	-	-	-
Wants within two years	0.335	0.122	0.003
Wants after two years	0.514	0.143	0.017

Table 8. Logistic regression results for transition from second birth to third birth in the five-year period before the survey: KDHS 2003-Model 1: background variables

Variable	Exp. (β)	S.E. (β)	P-value
Educational level			
No education (Ref.)	-	-	-
Primary education	1.345	0.454	0.380
Secondary plus	0.851	0.318	0.666
Residence			
Urban (Ref.)	-	-	-
Rural	0.954	0.278	0.872
Region of residence			
Western (Ref.)	-	-	-
Nairobi	0.474	0.205	0.084
Central	0.325	0.121	0.003
Coast	0.513	0.224	0.126
Eastern	0.645	0.260	0.276
Nyanza	0.381	0.145	0.011
Rift Valley	0.585	0.214	0.142
North Eastern	0.641	0.426	0.504
Marital status			
Never married (Ref.)	-	-	-
Currently married	9.317	7.931	0.009
Widowed/Divorced	6.735	5.900	0.029
Religion			
Catholic (Ref.)	-	-	-
Protestant	1.343	0.291	0.173
Muslim	2.511	1.146	0.044
Other	2.182	1.314	0.195
Wealth index			
Poorest (Ref.)	-	-	-
Poorer	0.239	0.088	0.000
Middle	0.311	0.116	0.002
Richer	0.174	0.064	0.000
Richest	0.123	0.053	0.000
Age at start of interval	0.896	0.021	0.000

Table 9. Logistic regression results for transition from second birth to third birth in the five-year period before the survey: KDHS 2003- Model 2: all variables

Variable	Exp. (β)	S.E. (β)	P-value
Educational level			
No education (Ref.)	-	-	-
Primary education	1.671	0.610	0.160
Secondary plus	1.281	0.527	0.548
Residence			
Urban (Ref.)	-	-	-
Rural	0.969	0.288	0.915
Region of residence			
Western (Ref.)	-	-	-
Nairobi	0.444	0.196	0.066
Central	0.315	0.122	0.154
Coast	0.528	0.236	0.256
Eastern	0.655	0.271	0.306
Nyanza	0.343	0.134	0.006
Rift Valley	0.578	0.216	0.143
North Eastern	0.753	0.517	0.679
Marital status			
Never married (Ref.)	-	-	-
Currently married	7.961	6.799	0.015
Widowed/Divorced	4.552	4.012	0.086
Religion			
Catholic (Ref.)	-	-	-
Protestant	1.341	0.297	0.185
Muslim	2.918	1.411	0.027
Other	1.951	1.865	0.272
Wealth index			
Poorest (Ref.)	-	-	-
Poorer	0.259	0.098	0.000
Middle	0.369	0.143	0.010
Richer	0.195	0.074	0.000
Richest	0.143	0.064	0.000
Age at start of interval	0.879	0.021	0.000
Ever use of contraception			
Never used (Ref.)	-	-	-
Used traditional	1.561	0.798	0.383
Used modern	0.403	0.109	0.001
Prior child death			
Alive (Ref.)	-	-	-
Dead	1.056	0.286	0.840
Desire for more children			
Wants no more (Ref.)	-	-	-
Wants within two years	0.269	0.087	0.000
Wants after two years	0.759	0.183	0.253

Table 10. Logistic regression results for transition from third birth to fourth birth in the five-year period before the survey: KDHS 2003- Model 1: background variables

Variable	Exp. (β)	S.E. (β)	P-value
Educational level			
No education (Ref.)	-	-	-
Primary education	1.123	0.365	0.721
Secondary plus	0.837	0.337	0.659
Residence			
Urban (Ref.)	-	-	-
Rural	1.766	0.633	0.113
Region of residence			
Western (Ref.)	-	-	-
Nairobi	1.332	0.762	0.616
Central	0.368	0.141	0.009
Coast	0.532	0.252	0.183
Eastern	0.484	0.193	0.069
Nyanza	1.037	0.429	0.930
Rift Valley	0.893	0.333	0.761
North Eastern	4.003	3.705	0.134
Marital status			
Never married (Ref.)	-	-	-
Currently married	2.610	2.423	0.301
Widowed/Divorced	1.276	1.225	0.799
Religion			
Catholic (Ref.)	-	-	-
Protestant	0.899	0.239	0.689
Muslim	1.485	0.741	0.428
Other	3.044	3.441	0.325
Wealth index			
Poorest (Ref.)	-	-	-
Poorer	0.419	0.152	0.016
Middle	0.319	0.113	0.001
Richer	0.415	0.158	0.021
Richest	0.260	0.123	0.005
Age at start of interval	0.904	0.025	0.000

Table 11. Logistic regression results for transition from third birth to fourth birth in the five-year period before the survey: KDHS 2003- Model 2: all variables

Variable	Exp. (β)	S.E. (β)	P-value
Educational level			
No education (Ref.)	-	-	-
Primary education	1.169	0.406	0.654
Secondary plus	1.015	0.440	0.973
Residence			
Urban (Ref.)	-	-	-
Rural	1.940	0.709	0.070
Region of residence			
Western (Ref.)	-	-	-
Nairobi	1.280	0.752	0.674
Central	0.395	0.153	0.016
Coast	0.468	0.228	0.119
Eastern	0.472	0.191	0.063
Nyanza	0.966	0.408	0.934
Rift Valley	0.882	0.334	0.741
North Eastern	3.890	3.697	0.153
Marital status			
Never married (Ref.)	-	-	-
Currently married	1.864	1.723	0.500
Widowed/Divorced	0.851	0.816	0.866
Religion			
Catholic (Ref.)	-	-	-
Protestant	0.887	0.241	0.659
Muslim	1.349	0.697	0.562
Other	2.076	2.330	0.515
Wealth index			
Poorest (Ref.)	-	-	-
Poorer	0.408	0.153	0.017
Middle	0.351	0.128	0.004
Richer	0.422	0.165	0.027
Richest	0.310	0.150	0.016
Age at start of interval	0.909	0.026	0.001
Ever use of contraception			
Never used (Ref.)	-	-	-
Used traditional method	0.448	0.211	0.088
Used modern method	0.441	0.123	0.003
Prior child death			
Alive (Ref.)	-	-	-
Dead	1.343	0.325	0.223
Desire for more children			
Wants no more (Ref.)	-	-	-
Wants within two years	0.374	0.148	0.013
Wants after two years	1.288	0.404	0.419