Fertility Transition and its Determinants in Kenya: Evidence from 1993 and 2003 KDHS

By

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DECLARATION

This PhD thesis is my original work and has not been presented for an award of a degree in this or any other university.

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DEDICATION

To my parents:

Thank you for your support, steadfast belief in my abilities and unfailing love.

ABSTRACT

Kenya began to experience rapid fertility decline in the late 1980s but, this decline in fertility stalled in the late 1990s. Despite the existence of abundant literature on fertility transition in Kenya, there are still unanswered questions. This study sought to establish the determinants of fertility transition in Kenya between 1993 and 2003. These two time periods were characterized by rapid fertility decline and stall in fertility. This thesis examined four objectives. The first objective was to determine trends in fertility levels in Kenya between 1993-2003. Secondly, the study sought to establish the socio-economic, cultural, and demographic determinants of the observed fertility trends in Kenya between 1993-2003. The third objectives was to establish the effect of changing fertility intensions on fertility transition in Kenya between 1993-2003 and the fourth objective was to determine the effect of infant mortality on fertility transition in Kenya between 1993-2003. The study utilized Kenya Demographic and Health Surveys (KDHS) of 1993 and 2003. Parity Progression Ratios (PRRs) and Cox Proportional Hazard model were the main methods of data analysis. The dependent variable was the duration of progression from say a second birth to a third birth, from a third to a fourth birth and so on. The independent variables included socio-economic, socio-cultural, demographic and proximate determinants according to the conceptual framework.

A descriptive analysis of the trends of fertility in Kenya, confirmed that the country indeed experienced rapid fertility decline and stall in fertility in the five year periods before KDHS of 1993 and 2003. The decline in fertility observed in 1993 was attributed to rapid decline in the proportions of women experiencing births of orders 3, 4, 5 and 6 and above. On the other hand, the evidence of a stall in fertility observed in the five-year period before 2003 KDHS

was attributed to a stall in the proportions of women having births of orders 3, 4, 5 and 6 and above. The multivariate analysis of the determinants of birth transitions showed that, when factors were controlled for, the determinants of parity transitions were parity specific and cannot be generalized. For instance, there were no differences in movement from parities 4 and 5 for most of the socio-economic factors particularly educational attainment and place of residence. For example, the effect of educational attainment and place of residence was experienced at both at parity 2-3 or parity 6 and above. For region of residence the effect was felt at parities 2-3, 3-4, 6 and above. For age cohort, the effect was felt across all parities considered except parity 6 and above for women in 2003 while for age at the start of the interval, the effect was felt across all the parities. For women currently in union the effect was felt across all parities, while for infant mortality the effect was felt across all parities considered but for women in 2003 only. The results imply that infant mortality may have played an important role in the stall in fertility experienced in the five year period before KDHS 2003 through its effect on fertility preferences. The main policy implications, which can be drawn from the findings is that infant and child survival programmes should be integrated as part of an overall strategy to lower fertility in Kenya. There is also need to improve the socio-economic conditions in the country by increasing GDP per capita and increasing the proportion of women with secondary and above level of education. Higher education is strongly associated with lower fertility and an improved GDP per capita will provide more opportunities for employment, better health care and alternative investments besides children. Future research should also focus on the parental perception of child survival risks and how these perceptions relate to behavioural decisions in reproduction.

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CHAPTER ONE

GENERAL INTRODUCTION

1.1 Introduction

The population of Kenya has increased tremendously over the years since the first count was done in 1897 when the population was estimated at 2.5 million. Census reports show that the population rose to 5.4 million by 1948. During the first post-independence census in 1969, the population was estimated at 10.9 million, and had increased to 15.3 million in 1979. It was estimated at 21.4 million in 1999 and 38.6 million by the time of the 2009 census. The annual growth rate was 3 percent in 1962 and this increased to 3.3 percent in 1969. The annual rate of growth increased to 3.8 percent in 1979 before stabilising to around 3 percent for the 1999 and 2009 censuses (KNBS, 2010). The current population growth rate is fairly high for the country's size and level of socio-economic development, a fact which will continue to present challenges against sustainable socio-economic development (KNBS, 2010). High fertility experienced in Kenya in the 1970s had been attributed to low age at first marriage, high age-specific fertility rates, residence in rural areas, low levels of education, low contraceptive use, high infant mortality rates, cultural norms and practices that valued children, and improvements in socio-economic development (CBS, 1984). The World Fertility Survey (WFS) 1977/78 put total fertility rate (TFR) in Kenya at 8.1 and this was the highest in the world at that time.

Rapid fertility decline began to be experienced in Kenya in the mid-1980s, with TFR dropping from 8.1 births in the mid-1980s to 6.7 births in 1989. Subsequently, fertility

declined to 5.4 in 1993, 4.7 in 1998 and increased slightly to 4.9 in 2003. The rapid decline in fertility was attributed to greater use of contraception; changing patterns of marriage; timing and spacing of births; declines in desired family sizes; attitudinal and behavioural changes that resulted from balancing the costs and benefits of high fertility amidst socio-economic and reproductive culture changes, socio-economic progress of the 1960s and 1970s; economic hardships of the 1980s; increase in numbers of educated women and in their labour force participation (Blacker, 2002; Population Council, 1998; Brass and Jolly, 1993; Robinson 1992; Watkins, 2000). However, the stall in fertility experienced in mid-transition in the late-1990s has been a source of concern for both researchers and policy makers (CBS et al., 2004).

The government of Kenya realized the challenges of a rapid population growth during the early years of independence. Consequently, it became the first country in Sub-Saharan Africa to establish a National Family Planning Programme in 1967. The government established the National Council for Population and Development (NCPD) in 1982, to guide population policy and to coordinate all research activities on population and development in the country.

Following a review of the family planning programme, the government issued its Population Policy Guidelines in the form of Sessional Paper No. 4 of 1984, to guide the implementation of an expanded population programme. After the 1994 International Conference on Population and Development (ICPD) held in Cairo, the 1984 Population Policy Guidelines were reviewed to integrate the ICPD Program of Action. This

culminated in the development of the National Population Policy for Sustainable Development in Sessional Paper No.1 of 2000, which guided the country's population programme up to the year 2010. The government has recently developed Sessional Paper No.3 of 2012 on Population Policy for National Development as the new population policy to guide the implementation of population programmes between 2012 and 2030. It takes into account continuing and emerging international and national population concerns, and is designed to contribute to the realization of the Kenya's Vision 2030, which aims to uplift the quality of life for all Kenyans through the management of population growth vis-à-vis available resources.

Despite the existence of population policies and programmes in the country, debates and counter debates on why fertility changes, have persisted. One hypothesis on the fertility-demand posits that fertility will decline as a country and /society advances in socio-economic development and couples are motivated to have fewer children due to the opportunity costs involved. Others supporting the supply-side hypothesis argue that development is not a necessary and sufficient condition for fertility decline. According to this school of thought, fertility will decline when access to fertility control is assured (Casterline and Sinding, 2000; Feyisetan and Casterline, 2000). The stall experienced in fertility in the country in 2003 has thus been a source of concern to researchers and policy makers (CBS et al., 2004).

This study focuses on fertility transition in Kenya. It seeks to establish the determinants of fertility transition during two critical periods in Kenya's fertility transition. The five

year period before 1993 KDHS was characterized by rapid fertility decline while the five-year period before 2003 KDHS was characterized by a stall in fertility.

1.2 Problem statement

Since, mid-1980s, Kenya has experienced perhaps one of the most remarkable fertility transitions in human history. The Total Fertility Rate (TFR) of 8-births per woman was rated the highest in the world in 1978. However, total fertility rate declined by about 33 percent from 8-births per woman in 1977 to 5.4 births per woman in 1993. This transition was attributed to greater availability of family planning services, socio-economic progress of the 1960s and 1970s, economic hardships of the 1980s, changes in reproductive attitudes, increased number of women with primary and secondary education and also increased number of women in labour force participation (Blacker, 2002; Watkins, 2000; Population council, 1998; Brass and Jolly, 1993; Robinson 1992).

The TFR further declined to 4.7 children per woman in 1998. Results of 2003 KDHS indicate that, TFR that was hitherto expected to continue declining rose to 4.9 children per woman. These results were corroborated by the results of 1999 census that put the TFR at 5.0 children per woman. The results further indicate the desire for fewer children had also stagnated and infant and child mortality was on the increase since the 1990s. These results indicate that TFR stalled in the late 1990s. This surprising development has important implications for future population growth that is sensitive to minor variations in fertility levels (Bongaarts, 2006). Substantive literature exists on the causes of fertility transition in Kenya (Westoff and Cross, 2006; Bongaarts, 2005; Blacker, 2002; Ezeh and

Dodoo, 2001; Sibanda, 1999; APPRC, 1998; NCPD, 1989, 1994, 1999; Robinson, 1992; Brass and Jolly, 1993; Dow et al., 1994; Robinson 1992; Njogu, 1991) but stall in fertility remains largely an unexplored phenomena.

Studies that examined the evidence for fertility transition in Kenya which started in the late 1970s and 1980s observed that three perspectives were responsible for the decline in fertility. These were changes in proximate determinants of fertility and specifically increases in contraceptive prevalence in Kenya(Ekisa and Hinde, 2005; Blacker, 2002; Ezeh and Dodo, 2001; Sibanda, 1999; Population council, 1998; Dow et al., 1994; Brass and Jolly, 1993; Cross et al.,1991; Njogu, 1991) ,attitudinal and behavioural changes that resulted from balancing the costs and benefits of high fertility in the face of socio-economic changes experienced in the country (Robinson 1992) and changes in the reproductive culture within the Kenyan society (Watkins, 2000).

However, despite decades of research on the role of socio-economic factors in fertility transition there is still no consensus on how and under what conditions social and economic conditions affect changes in reproductive behaviour. In some countries fertility transition has been noted to occur at widely differing levels of development. For instance, in Bangladesh fertility transition has been underway despite lack of socioeconomic progress while in France, fertility fell below replacement level in the 1930s despite opposition from both the government and the church on family planning (Blacker et al., 2005). It has also been noted that despite the high correlation between development

indicators and fertility, the onset of transition and the pace of decline in the early phases of transition are poorly predicted by these indicators (Bongaarts, 2006).

Moreover, as Bongaarts, 2002 noted, the classical and diffusion perspectives are important in explaining fertility trends in developing countries but their roles change over the course of the transition. He concluded that "…. Diffusion/social interactions are important in the early phases of the transition. Once this process has largely run its course, fertility rate in the transition becomes more closely tied to the level of socioeconomic development."

Other recent studies have focused on the stall in the fertility transition in Kenya. Evidence from countries that have completed their fertility transitions indicate that once a fertility decline is underway, it tends to continue without interruption until replacement level fertility of about two births per woman is achieved. This historical pattern is observed in both developed and developing countries with low fertility (Bongaarts, 2006). The interruption in this pattern in Kenya has necessitated a search for explanations as to why fertility varies and/or remains constant over the course of time. Studies that have analyzed factors associated with change in fertility at individual level have indicated that rising infant and child mortality may be associated with this unexpected interruption in the fertility transition in Kenya (Westoff and Cross, 2006). The search for explanations on why fertility has stalled in Kenya continues with no comprehensive explanation so far provided.

The current demographic scenario has raised several questions:

i) Was the observed fertility as measured by TFR due to flaws in the distortion of TFR from changes in the timing of childbearing?

ii) Are the changes as a result of the changes in the onset of reproduction, spacing of births or proportion of women reaching higher parities?

iii) Are these changes as a result of changes in the proximate determinants of fertility?

iv) Or is it as a result of changes in fertility preferences?

The answers to these questions cannot be obtained by mere examination of summary measures such as total fertility rate (TFR). TFR is a hypothetical measure that can be distorted by changes in timing of childbearing, spacing of births or in the changing reproductive patterns at low or high parities. Moreover, TFR is used to measure current fertility but it does not provide an understanding of fertility trends. This study used parity progression ratios to understand fertility trends. The study examined fertility trends and differentials from a birth order perspective. This involved disaggregating the family building process into a series of stages beginning with marriage and followed by first, second, third and successive births. This was to assist in determining whether fertility transition in Kenya can be attributed to changes in shifts in starting, timing and/or stopping patterns of childbearing. The study adopted this dynamic approach to examine fertility transition in Kenya between 1993 and 2003.

1.3 Objectives of the study

The general objective of the study was to establish the determinants of fertility transition in Kenya. The study addressed the following specific objectives:

i) To determine trends in fertility levels in Kenya between 1993-2003.

ii) To determine socio-economic, cultural and demographic determinants of the observed fertility trends in Kenya between 1993-2003.

iii) To establish the effect of changing fertility intensions on fertility transition in Kenya between 1993-2003

iv) To determine the effect of infant mortality on fertility transition in Kenya between 1993-2003.

1.4 Justification of the study

This study makes a contribution in two ways. First it contributes to existing knowledge on fertility transition in Kenya. It contributes to a better understanding of the factors behind the recent stalling of fertility in Kenya. Substantive literature exists on the causes of fertility transition in Kenya as already noted (Westoff and Cross, 2006; Bongaarts, 2005; Blacker, 2002; Ezeh and Dodoo, 2001; Sibanda, 1999; APPRC, 1998; NCPD, 1994; NCPD, 1989; NCPD, 1999; Brass and Jolly, 1993; Dow et al., 1994; Robinson 1992; Njogu, 1991) but stall in fertility remains largely an unexplored phenomena. The reasons behind Kenya's unique fertility transition have not been conclusively established. The stall in fertility in Kenya has become a source of concern for government, researchers and other stakeholders (CBS et al., 2004). It is apparent that fertility has stalled at relatively high levels (4.8 births per woman) and this is likely to jeopardize government's plan of managing population growth. According to KNBS (2010), the

current population growth rate is fairly high for the country's size and level of socio-economic development, a fact which will continue to present challenges for sustainable socio-economic development. The knowledge from this study will be useful to researchers, policy makers and programme managers in designing better policies and programmes to address the challenges of a rapidly growing population. It will also help policy makers come up with appropriate programs to enhance socio-economic development in the country. Secondly, the study contributes methodologically to the study of fertility by examining fertility estimation from a parity progression ratio approach. This approach enables a better understanding of fertility levels and trends. Most studies on fertility use aggregate measure of fertility such as TFR. It is well known that TFR is a hypothetical measure that can be distorted by changes in timing of childbearing, spacing of births or in the changing reproductive patterns at low or high parities (Bongaarts, 1999). Moreover, TFR is used to measure current fertility but it does not provide an understanding of fertility trends. The Parity Progression Ratio (PPR) approach used by this study enables the disaggregation of the family building process into a series of stages beginning with marriage and followed by first, second, third and successive births and thus overcomes the limitations associated with the use of aggregate measures of fertility measurement.

1.5 Scope and limitations of the study

This study focuses on determinants of fertility transition in Kenya. The study utilized data from Kenya Demographic and Health Surveys (KDHS) of 1993 and 2003. North Eastern province was excluded from the analysis since it was only covered in 2003. This was to enable easy comparability of results across the survey years. This study considered births of all women of childbearing age, 15-49. Demographic and Health Survey (DHS) data have been noted to have some limitations. Some of these are explained in chapter three (section 3.5 on data quality). The fertility estimates of the study are affected by maternity history data of the DHS which suffers from misreporting. This results to misplacement of births. However, scholars have observed that the limitations of KDHS data are not serious and hence are not likely to affect study findings based on these data sets (Macrae et al., 2001; Cohen, 1993; Brass and Jolly, 1993). The possible errors arising from the data distortions have been overshadowed by use of data from two time periods i.e. 1993 and 2003 and study findings are consistent with those of other studies as shown in Chapters 4 and 5.

The restrictions imposed on the data to be utilized for analysis was due to a number of methodological considerations. The study faced the problem of selection especially for birth interval data. The use of birth intervals has a number of biases. Such data demands that we include a number of incomplete intervals in the analysis, the experience of each woman being truncated at different points in time. For example, women who had not experienced say a third birth or fourth birth and so on were considered to be censored cases. The problem of censoring was handled through the use life table analysis. The

other limitation pertains to the use of the variable on desire for additional children in the proportional hazard model. Measures of fertility preferences such as desire for additional children suffer from biases when used as proxies for wanted fertility (Pritchett, 1994; Bongaarts, 1990). The inclusion of such variables into regression models thus, tends to bias the estimates of the parameter coefficients. These imply that the regression results will also be biased and inconsistent (Kennedy, 2003; Kmenta, 1997). The variable on desire for additional children was thus only included for exploration during the bivariate Cox Proportional hazard regression analysis and the results should be interpreted in that context.

1.6 Organization of thesis

This thesis is organized into six chapters. Chapter one presents the general introduction to the study, the statement of the problem and study objectives. The justification of the study and scope and limitations of the study are presented in the last sections of this chapter. Chapter two presents literature review and conceptual framework on fertility transition for the study. The first section focuses on theories of fertility transition. These include: the classical demographic transition theory and its socio-structural, ideational, micro-economic and socio-psychological variants. Section two focuses on a general review of dynamics of fertility transition in various countries in Africa. These include North Africa, West Africa, Southern and Eastern Africa. Sections 3 and 4 focus on the determinants of fertility transitions and causes of stalling fertility transitions in Kenya and the rest of the world. The last section of this chapter provides a summary of the empirical

review of literature on fertility transition, highlighting research gaps in the Kenyan context.

Chapter three presents data and methods utilized for data analysis in this study. The first section describes the sources of data for the study. The Parity Progression Ratio approach used to measure fertility is described in section two of this chapter. These include; the rationale of the approach and how it is utilized for the calculation of the Total Fertility Rate (TFR). The last section of this chapter describes the Cox Proportional Hazard model that was utilized to assess the impact of the various covariates of the intensity of transition to the various parities.

Chapter four presents results of the analysis on fertility levels and trends in Kenya for the five year periods before Kenya Demographic and Health Surveys of 1993 and 2003. The first section provides a description of the background characteristics of the study sample. This is followed by a presentation of the estimates of parity progression ratios and TFR for both 1993 and 2003. The last section of this chapter presents fertility levels by single years for each of the five year periods before KDHS of 1993 and 2003. Chapter five focuses on the determinants of fertility transition in Kenya. Section one and two presents a description of variables and distribution of births of key parities by background characteristics respectively. Section three presents results of the bivariate Cox Proportional hazards models for covariates responsible for transition to parities 3, 4,5 and 6 and above while section 4 presents the multivariate results of the Cox Proportional hazards model for transition to the same parities as the bivariate analysis.

Chapter six, the last chapter of this thesis presents a summary of main findings, conclusions and recommendations. Recommendations for policy and further research are presented in the last sections of this chapter.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Introduction

This chapter reviews literature on studies which have been undertaken on fertility transition in order to provide a basis for the study. Fertility is affected by different factors either directly or indirectly. Section 2.2 presents theories of fertility transition. These include the classical demographic transition theory and its socio-structural, ideational, micro-economic and socio-psychological variants. Section 2.4 presents literature on fertility transition. It begins by presenting literature on fertility transition in Sub-Saharan Africa before focusing on Kenya. Section 2.7 presents literature on causes of stalling fertility transitions. Finally, section 2.8 provides a summary of issues arising from both the review of theories of fertility decline and literature on fertility transition.

2.2 Theories of Fertility Decline

2.2.1 Classical Demographic Transition Theory

This theory was based on the experiences of fertility transition in Europe between the 19th and 20th centuries. The theory identified three stages of the transition. The first stage referred to as the pre-transition stage is characterized by both high fertility and high mortality. In this stage there was no motivation to control fertility. The second was the transition stage which was characterized by declining mortality and a high population growth rate, while the third stage was marked by low and/ or further declining mortality and fertility and almost near zero rates of natural increase. This stage was characterized

by high levels of industrialization and urbanization and consequently birth rates were expected to fall further leading to a population decline (Notestein, 1945). According to this theory, population growth resulted from improvements in food supplies and personal living standards resulting from improvements in medicine. The theory posits that fertility decline resulted from industrialization and modernization which resulted in changes in economic and social structure of society. Thus, pressures of urban life led to preferences for smaller family sizes. The availability of family planning enables couples to meet their contraceptive needs for fertility regulation. The advances in medicine and urbanization also led to decrease in infant and child mortality and thus parents no longer desired large family sizes. One of the criticisms of this theory has been that it focused on specific historical events and is thus unsuitable for long-term explanations (Caldwell and Schindlmayr, 2003; Caldwell, 2004). It has also been argued that lack of industrialization and high mortality especially in Sub-Saharan Africa cast doubt on the applicability of this theory in the region. It has been argued that the increasing costs associated with child rearing and enhanced survival for the children weaken the motivation to have many children and this in turn increases the motivation for fertility control. Coale (1973) correctly observed that modernization brought about decline in fertility through change in attitudes and also a change in the balance between the merits and demerits of having large families.

One of the main shortcomings of the classical demographic transition theory has been lack of consistent empirical findings to support its propositions. It has been argued that detailed empirical work had not succeeded in establishing combinations of development

variables which are directly related to historical declines in fertility in Europe (Cleland and Wilson, 1987; Knodel and Van de Walle, 1979). For instance, it has been noted that some countries experienced fertility declines before industrialization had taken root (e.g. France). The fact that fertility decline occurred in both poorer settings and industrialized ones led some researchers to conclude that demographic transition theory had relevant ideas but was incomplete. Hence, it has not been easy to establish the threshold of modernization that will identify a population in which fertility is ready to fall (Coale, 1977; Van de Walle, 1977).

2.2.2. The Effect of Infant and Child Mortality on Fertility Transition

Mortality has been documented to having played a crucial role in the fertility transition (Montgomery, 2000; Montgomery and Cohen, 1998; Mason, 1997). These studies concur that recent theories of fertility transition seem to have forgotten that the classical demographic transition theory was about the balance between birth and death rates and that without a decline in mortality, a decline in fertility is equally unlikely to take place. It has been posited that for instance, the high levels of child mortality in Sub-Saharan Africa may be a significant factor contributing to the delay in fertility transition in the region.

A number of studies have examined the effect of infant and adult mortality on fertility. Lloyd and Ivanov (1988) examined linkages between child survival, family planning and fertility. They observed that this relationship is a process that evolves through a number of distinct stages of the mortality transition. The stages were noted to range from family

building by fate to family building by design and from insurance to replacement. Consequently, they observed that the rate at which family building strategies evolve from one stage to another while child survival improves depending on the pattern of mortality decline and the social-cultural environment.

2.2.3 Social-Structural theory

This theory views the social context which is characterized by beliefs, values, taboos, roles and opportunity structures as influencing the value and cost of children and hence fertility. Consequently, population growth in most non-industrialized societies is "regulated" by social and institutional mechanisms (Wilson and Airey, 1999; Wood, 1998). High fertility in these societies is sustained by early and universal marriage. Sexual taboos including breastfeeding and post partum amenorrhea ensure appropriate birth intervals in such societies. This context gave the community authority over the individual to make decisions on when to start a family. It is expected that parents will desire fewer children when the costs of rearing them increases and hence fertility will decline. Consequently, an increase in the cost of rearing children will also increase the associated cost of education and create more opportunities for women participation in labour force outside the home.

2.2.4 The "crisis" theory

One of the major shortcomings of the social-structural theory is the fact that in many areas, declines in fertility have been too rapid to be attributed to structural changes (material changes) in the lives of individuals. Some researchers have argued that Kenya is

an example of a country that can fit this scenario (Blacker, 2002; Macrae et al., 2001). This has led them to suggest other possible explanations for the unexpected observed changes in fertility behaviour. According to this approach, structural changes may be influenced by changes in the social and physical environment. Such changes may lead to a crisis such as scarcity of food, money or employment opportunities. This may then weaken the social fabric and change individuals' reproductive preferences and intentions. This approach is similar to the homeostatic model which sees population as being limited by the environment and available resources. Hence, population growth is seen as being influenced by the carrying capacity of the available resource base. Some recent studies have demonstrated that historical changes in population have reflected the homeostatic model in Europe and Asia (Harbison and Robinson, 2002; Wilson and Airey, 1999; Livi-Bacci, 1990; Lee, 1987).

2.2.5 Ideational change, interaction and diffusion theories

According to this approach, the timing, onset and pace of fertility transition is attributed to the spread and /or diffusion of new ideas, information and new social norms on the benefits of individual freedom, opportunities for material advancement, availability of means for fertility control through social interactions and influence (Cleland and Wilson, 1987; Watkins, 1987; Cleland, 1985). Social interaction at individual level is influenced by a number of factors including closeness of interacting parties, language and geographical proximity. Interaction is only effective in fertility reduction where there are many acceptors of contraception and rapid declines in fertility may be realized where there is a multiplicity of channels connecting the communities involved (Debroe and

Hinde, 2006; Bongaarts and Watkins, 1996). Fertility transition in the initial stages can be hampered by social influences and lack of information. But, when more people change their fertility preferences and intentions, they also influence the attitudes and behaviour of other individuals to do the same (Kohler et al., 2001; Montgomery and Chung, 1994; Rosero-Bixby and Casterline, 1993, 1994). Nonetheless, it has been observed that ideational change and diffusion theories are incomplete ideas by themselves. One of the major criticisms of this approach has been the fact that the propositions of these theories have not been specified and tested empirically (Kreager, 1993; Guest and Chamratrithirong, 1992, Casterline et al., 1987). Generally, we note that the social interaction enables couples and individuals to assess the relative importance of children to other goods. This perspective is best captured by the micro-economic theories which are discussed in the next section.

2.2.6 Micro-economic theories

Micro-economic theories aim at explaining the variance in completed family size at individual and couple level (Becker, 1960, 1965). This approach assumes that choices among competing alternatives are made within a framework of allocation of limited resources. This approach views children as "consumer goods" providing direct socio-psychological utility to their parents irrespective of the economic benefits and also as "producer goods" providing a litany of expected services. Some of these services include: labour, income, old age security, support for extended family, and a resource in the nuclear family. Becker (1960) and Schultz (1973) observed that couples and individuals fertility choices are influenced by the relative costs of children vis-à-vis other goods and

also by their income and other preferences for children versus competing forms of consumption. According to the new household economics or demand theory of fertility, Becker (1960) the family is a decision making unit which maximizes its utility in consumption as well as allocating time and goods in the production activities of the household. Becker (1965) noted that the household production function takes market goods as inputs, which are combined in the home with time supplied by household members to produce the characteristic that directs the utility function of household members. This implies that the opportunity costs of rearing children will differ from couple to couple depending on the available resource base that they have. The approach therefore, assumes that couples and/or individuals will make a realistic assessment of the inherent costs and benefits associated with rearing children and come up with an optimal solution. It contends that parents who decide to have children must assess rewards derived from bearing and rearing children against rewards from alternative activities which may have been undertaken instead. This means that demand for children competes with demand for other goods (Rosenzweig and Stark, 1997; Easterlin, 1975; Leibenstein, 1975; Schultz, 1974).

Easterlin's (1975) "economic framework of fertility analysis" and Easterlin and Crimmin's (1985) "supply-demand analysis" of fertility attempted to extent the micro-economic theories of fertility by integrating the supply side of fertility with the demand side. They observed that modernization factors such as; advances in public health, schooling, urbanization and the introduction of new goods and family planning influence fertility through the demand, supply and cost of fertility regulation factors which in turn

influence the trend in deliberate fertility control and fertility behaviour. The Easterlin and Crimmin's (1985) model is useful in understanding the forces influencing fertility levels and trends but in general terms. However, the model does not take into variation between couples and/or individuals and issues of excess and inadequate supply and demand for both children and goods occurring in real populations. Schultz (1974) noted that demand theories of fertility were not directly applicable to developing countries. He concluded that much of the studies on the application of the demand theories had been in western, urbanized and industrialized societies and little attempt had to be made to establish their relevance to developing countries. One of the major criticism of this model is its inability to explain why fertility changes. It is highly unlikely that couples adopt from the very onset of marriage a utility maximizing plan for childbearing expenditures of time and money on children and other activities and for labour force participation by the wife. Freedman (1965) noted that more often than not, family size goals stabilize after childbearing has begun. Moreover, the predictive strength of micro-economic theories is weakened by their assumption of near-universal marriage. In summary, the classical demographic transition theory avers that socio-economic development or modernization leads to changes in the demand for children and hence couples desire smaller families. Economic theories on the other hand, contend that change in fertility result from costs associated with child rearing, their education and opportunities arising from a modernized economy. It has also been observed that despite couples and/or individuals choices regarding the number of children they have against other goods in any modern society, fertility is unlikely to reach zero levels. Thus may partly be explained by the socio-psychological factors.

2.2.7 Socio-Psychological factors

This approach is closely linked to the micro-economic approach and it focuses on the needs of individuals (which are satisfied by children), ways of meeting those needs and interaction among the psychological, social and economic values, and costs of children. Generally, the institutional mechanisms of every society define the utility that individuals and couples derive from having children, the rewards for having a family and the associated costs of having them (Blake, 1972). Consequently, variables such as urbanization, education, modern consumer goods and female labour force participation influence the utility of children and other costs. Therefore, development and other variables influence fertility through personal; attitudes and intensions (Fishben, 1972). The major limitation of this approach is the problem of measurement of psychological factors and how to relate them to fertility. It relies on self reports of motivations and these are subject to biases and subjectivity and hence compromise their reliability, validity and completeness.

2.2.8 The role of family planning programme effort

Couples and/or individuals desire for more children is affected by the costs and benefits associated with children. The family planning programme effort provides effective means for fertility reduction through birth control. Coale (1973) noted that fertility transitions occur when populations are simultaneously “ready, willing and able” to reduce fertility. Readiness means the economic advantage and motivation to control fertility while willingness involves the moral acceptability of fertility control. Ability, on the other hand, refers to the efficiency and safety of available methods of contraception.

2.3 Summary

The review of theories of fertility decline has clearly shown that factors affecting fertility and the mechanisms through which they operate to bring about fertility change are diverse. The review has shown that development variables create an enabling environment that facilitates couples to view small families as either good or not. This enables couples and individuals to evaluate the cost of rearing children as well as their benefits which in turn determines their demand and supply.

2.4 Literature review and conceptual framework

2.4.1 Introduction

This section presents a review of literature on fertility transition. Section 2.4.2 presents a review on the dynamics of fertility transition in Africa. This is followed by review of literature on fertility transition in Northern Africa, Southern and Eastern Africa and lastly on Kenya.

2.4.2 The dynamics of fertility transition in Africa

Fertility transition in Africa has been described as unique because it has been observed to have occurred across all age cohorts and at all parities. This was particularly evident in Kenya, Tanzania, Zimbabwe, Botswana and Nigeria (Capo-Chichi and Juarez, 2001; Hinde and Mturi, 2000). However, in the case of Kenya, Botswana, Zimbabwe and Nigeria; rapid declines in fertility were observed among women 15-19 years (Macrae et al., 2001). In contrast, Brass and Jolly (1993) observed that in South America and Asia, fertility transition spread from the middle parities even though in Thailand fertility

transition was noted to have occurred across all age cohorts and women of all parities just like in Africa (Guest and Chamratrithirong, 1992; Caldwell et al., 1992).

There is ample evidence that contraceptive use in Africa has not been used for limiting family sizes but spacing births. This is unlike the experiences of Europe during the fertility transition (Magadi and Curtis, 2003; Cohen, 1993). But this was not entirely true because a study by Larsen (1997) using 1992 Tanzanian Demographic and Health Survey found that deliberate stopping behaviour influenced birth intervals and fertility in the country in the early 1990s. Researchers have also documented evidence of increasing childbearing outside marriage in some African countries including Kenya, Botswana and Ghana (Population Reference Bureau (PRB), 1992; Agyei-Mensah and Asbjorn, 1998). This has been attributed to modernization which has led to a breakdown of social norms and practices that restricted childbearing to married couples only (Macrae et al., 2001; Molnas, 1973). However, this has also been documented in more developed and modernized countries and is therefore not unique to African countries.

Increased school enrolment has not been found to significantly influence fertility decline in Africa (Cohen, 1993; Caldwell et al., 1992). African Population Policy Research Centre (APPRC) (1998) also found that fertility decline was not responsive to declines in infant and child mortality. Other scholars have posited that fertility declines in Europe and Asia did not take place at the levels of education currently found in African countries (Van de Walle and Foster, 1990, Adamchak and Ntseane, 1992). These prompted Caldwell et al (1992) to conclude that fertility decline in Africa was likely to be very

different from that experienced in South America and Asia. However, data from Sub-Saharan Africa show that the region has experienced rapid declines in fertility. Total Fertility Rate (TFR) in Kenya declined from 6.7 in 1989 to 5.3 in 1993 to 4.9 in 2003. In Zimbabwe TFR declined from 5.4 in 1988 to 4.0 in 1999 while in South Africa TFR was 2.9 in both 1996 and 1999. Botswana experienced a decline of TFR from 5.3 in 1991 to 3.3 in 2003. In North Africa, Tunisia and Egypt has much lower TFRs of 2.1 and 3.5 in 1999 and 1998 respectively (CBS et al., 2004; Moultrie and Timaeus, 2001; Vignoli, 2006).

In conclusion, we note that the African fertility transition had some similarities with the experiences of South America and Asia and even those experienced in historical European fertility transition (Szreter, 1996). It is important to note that the social and economic development situation in Africa is different from that experienced in Europe, Asia and South America during their fertility transitions. Therefore, it is crucial to understand factors that influenced fertility transition in Africa in general and Kenya in particular. This is discussed in the next section.

2.4.3 Fertility transition in Northern African Countries

2.4.3.1 Fertility transition in Egypt and Morocco

Fertility dynamics for countries in this region are characterized by different childbearing patterns. Morocco and Egypt have experienced a slow pace of childbearing and a delay in the onset of childbearing. Algeria and Sudan are characterized by delay in the onset of childbearing (Eltigani, 2001). The author further observed that adoption of family

planning in Morocco and Egypt enable women to meet their desires for small family sizes. For instance, in Egypt, stall in fertility transition has been attributed to high education standards and preferences for sons (Vignoli, 2006). Morocco, on the other hand has been characterized by falling fertility levels and change in proximate determinants of fertility (D'Addato, 2006). In these countries, fertility differentials are evident among social groups but the different segments of the population including the most conservative groups such as illiterate women have all changed their fertility behaviour. Unlike in Egypt, there are no preferences for male children in the progression to the third birth in Morocco.

2.4.4 Fertility dynamics in West Africa

There is evidence that fertility transition is underway in a number of countries in West Africa. For instance, in Benin, available evidence show that fertility transition is associated with a pattern of stopping behaviour for childbearing and long birth intervals. Declines in child mortality and increased education levels for women have increased demand for fertility control. It has been suggested that the economic crisis of the 1980s may have played an important role in the fertility transition and the observed changes in fertility preferences may be attributed to ideational and diffusion processes from urban to rural areas and from more to less educated women(Capo-Chichi and Juarez, 2001).

2.5 Fertility dynamics in Southern and Eastern Africa

2.5.1 Introduction

This section presents literature on fertility transition in Southern and Eastern Africa. Specifically, it focuses on South Africa, Malawi, Ethiopia, Tanzania, Uganda and Kenya.

2.5.2. The Fertility transition in South Africa

Before the abolition of apartheid, lack of data and strict policies limited the analysis of fertility in South Africa. However, the 1996 census and 1998 Demographic and Health Survey (DHS) provided national level data for the country since 1970. Total fertility rate (TFR) was 3.2 nationally and 3.5 among black women in 1996. These levels of fertility were noted to be lower than for any other country in Sub-Saharan Africa at that time. Available literature also shows that, fertility had been falling in South Africa since the 1960s even before the introduction of the family planning programmme in 1970 (Moultrie and Timaeus, 2003). This silent fertility revolution was also noted to have taken place in the countries neighbouring South Africa including; Zimbabwe, Botswana and Lesotho (Potts and Marks, 2001). Despite the advances in fertility transition and declines in the economic value of children, the cultural values attached to reproduction remain high and the move towards smaller family sizes has not undermined the fundamental position of fertility in the society. Childbearing still remains the most common avenue for achieving social status for women while for men; it is a means for social esteem. According to Moultrie and Timaeus (2001), variation in fertility is influenced by urban-rural residence, level of education and household income. Socio-economic differences also explain the fertility of women of different language groups.

Household structure has been noted to be an important factor influencing fertility in South Africa. Available literature shows that living with a relative of the same generation has an important and negative effect on lifetime fertility. Women from Nguni language groups have been found to have comparatively higher fertility than those from Sotho groups. Unmarried and separated women also have lower fertility than married women of the same age (Moultrie and Timaeus, 2001).

2.5.3 Fertility Transition in Ethiopia

The total fertility rate (TFR) in Ethiopia declined from 6.4 to 5.9 between 1990 and 2000 and from 3.1 to 1.9 children per woman in the capital city Addis Ababa. Interestingly, this decline happened in the absence of a strong family planning programme. Sibanda et al (2003) attributed the decline in fertility in Addis Ababa to a decrease in the proportion of women who are married and increased contraceptive use. The study also opined that lack of employment opportunities and high costs of housing were most likely to encourage later marriage and increased use of contraception. Bhargava (2007) in a study on the determinants of children ever born and preferences for additional births found that, education of the mother and desired family size were important predictors of children ever born in Ethiopia.

2.5.4 The Fertility transition in Tanzania

Fertility transition in Tanzania in the late 1970s and early 1980s show similar pattern to those experienced in Kenya. The decline in fertility was more pronounced in urban areas and was accelerated by a rapid increase in contraceptive prevalence in the late 1990s. The

major drivers of fertility decline have been the decline in marital fertility, which was the consequence of increased contraceptive use, an increase in age at first marriage and the HIV/AIDS epidemic (Hinde and Mturi, 2000). Interestingly, fertility decline occurred in Tanzania despite the high levels of infant mortality, lower education levels and low levels of contraceptive use compared to Kenya, Botswana and Zimbabwe. Ainsworth et al (1998) in a study on the relationship between measures of mortality and the probability of a birth in the last twelve months found that, individual perceptions of mortality were likely to be influenced by mortality in the respective community as well as by deaths in the household and extended family. The findings showed that deaths of female adults were associated with lower fertility among surviving women from the same household as the deceased. Thus, high adult mortality would lead to lower fertility. The relationship of the deceased adult to the surviving woman was also found to be important. Overall, the results showed that the effect of mortality on fertility was significant and this was due to both behavioural and biological responses.

2.5.5 Comparison of Fertility transition in Kenya and Uganda

Blacker et al (2002) examined fertility dynamics between Kenya and Uganda. The findings show that between 1980 and 2000, the Total Fertility Rate (TFR) in Kenya fell by 40 percent from some eight births per woman to around five births per woman. During the same period fertility in Uganda declined by less than 10 percent. The higher drop in fertility registered in Kenya was mainly attributed to an increase in contraceptive use but in Uganda it was attributed to a decrease in pathological sterility. The study found that women in Kenya wanted fewer children compared to their counterparts in Uganda but

there was also greater unmet need in Uganda. This was attributed to the divergent paths to economic development pursued in the two countries and also the Kenya government's active promotion of family planning services through the health system, something that did not start in Uganda until 1995.

2.6 Determinants of Fertility transitions in Kenya and the rest of the world

2.6.1 Introduction

Evidence from the Kenya Demographic and Health Surveys (KDHS) and housing censuses conducted in the country have documented three major fertility trends in Kenya. First, fertility increased and peaked in the late 1970s and then a rapid decline began in the mid-1980s. Consequently, fertility stalled between 1998 and 2003 at 4.8 births per woman. A study by Brass and Jolly (1993) confirmed that indeed fertility transition had taken place in Kenya. Total Fertility Rate (TFR) was noted to have fallen from 7.8 during the 1973-1978 to 6.7 over the period 1984-1989. Parity progression ratios (PPRs) another important indicator of fertility were observed to have declined during the same period. Decline in fertility was noted across all age groups and all parities but it was greatest in the middle and late reproductive ages. Fertility decline was noted to be pervasive in all sub-groups of the Kenyan population-age groups, regions, areas of residence and education levels. Central province was identified as the region that experienced the greatest decline in fertility while Western and Nyanza provinces were observed to have experienced the least declines in fertility. The modest declines in fertility experienced in the two provinces were attributed to data issues. Nonetheless, the study ignored the role of structural factors as one of the possible causes of the decline.

2.6.2 Education

Available literature demonstrates strong association between education and fertility (Bledsoe et al. 1999). Evidence of the negative association between fertility and high level of education in Sub-Saharan Africa has been reported in Tanzania, Uganda, Sudan, Zimbabwe, Botswana, Ghana, South-Western Nigeria, Senegal, and Togo (Mturi and Hinde, 1995; Orubuloye, 1995; Cohen, 1993). The same has been reported in Latin America particularly in Brazil (Potter et al., 2002). In Kenya, fertility has been found to decline with education level (CBS et al., 2004; APPRC, 1998; NCPD, 1994; NCPD, 1999). Higher levels of education have been found to have a negative effect on age at first marriage in Kenya, Ghana, Egypt and Lesotho (Mhloyi, 1986; Aryee, 1985; Kafafi, 1983). Formal education is seen as an important measure of social change that helps in influencing attitudes and behaviour change. In the short run however, increased female education can raise fertility as it often leads to abandonment of traditional practices which have fertility suppressing effects such as prolonged breastfeeding, postpartum abstinence and polygamy (UN, 1995, Mosley et al, 1981). Education influences fertility through enabling women to acquire new ideas and values that are at variance with their traditional roles of childbearing. It also opens new opportunities for women participation in labour force and wage employment (Caldwell and Caldwell, 1987). In particular, more educated women have alternatives for personal development other than those associated with reproduction and child care (United Nations, 1995). Hence, educated women are better placed to assess the costs and benefits associated with childbearing vis-à-vis being engaged in wage employment. A study by Wasao (2002) found out that fertility was lower for women who had secondary education compared to other women who had lower levels of education. Exceptions to this pattern were observed in Bangladesh, Kenya and

Indonesia, where women with no education had lower fertility than those with some education. Some studies have however attempted to assess how education may influence women's personal attitudes and their roles in reproductive decision-making. Dixon-Muller (1993) also argued that women's education also influences attitudes and knowledge hence contraceptive behaviour.

Educated urban women also marry later than their rural counterparts and are in turn associated with low child mortality which negatively affects fertility (Hobcraft and Little, 1984; Bongaarts and Niemeyer, 1982). In Kenya, the highest desire to stop childbearing has been associated with highly educated women aged less than 30 years, women with no education and those whose husbands have no education (Omariba, 2006). According to Westoff and Cross (2006), the recent fertility increase in Kenya occurred among women with the least educational attainment. There is no evidence of how education influences fertility during periods of rapid declines and stall in fertility experienced in 1993 and 2003 in Kenya respectively. This needs to be investigated.

2.6.3. Place of residence and region of residence

Studies have also shown that fertility for women in urban areas is lower compared to women residing in rural areas (Ekisa and Hinde, 2005; Woldemicael 2005; Westoff, 1994; Cohen, 1993)**.** This is because women living in urban areas are in most cases more educated than their rural counterparts and they are able to embrace modernity that comes with access to job opportunities and better health care. They are also able to embrace new values and ideas regarding childbearing and rearing (Oheneba-Sakyi & Tukyi, 1997;

Diamond, 1999; Montgomery and Lloyd, 1999). In addition, exposure to modern lifestyles and their knowledge about the costs and benefits of children may influence their choice for small family sizes due to their need for personal development (Obudho, 1988). It has been observed that high costs associated with urban living are not supportive of large family sizes. This therefore means that the price of fertility control decreases and women are able to realize their desired number of children. Mlewa (2001) established that men in urban areas were more likely to desire smaller families compared to their rural counterparts. Alila (1990) in a study on fertility preference in Mathare Valley, Nairobi found out 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 it had occurred in urban and rural areas and in every region of the country. In a study focusing on regional proximate determinants in Kenya and how they had influenced fertility transition in the country, Ekisa and Hinde (2005) noted that there were substantial and persistent regional differences in fertility. Fertility was noted to be generally lower in urban areas and rural areas in Central province of Kenya and fertility was observed to be higher in Coastal and Western areas of Kenya. Furthermore, a variety of demographic regimes were observed, some associated with fertility decline, others associated with constant or even increasing fertility. For instance, Nairobi and Mombasa cities were noted to have different fertility experiences with the low fertility in Mombasa city not fully being explained by the levels of major proximate determinants. Region of residence has also been observed to exert a strong influence on the number of

children desired through language, ethnic origin, or religion as well as the stage of economic development (Westoff, 1994).

In addition, Blacker (2002) attributed substantial differentials in fertility in Kenya by place of residence, region of residence and educational levels to differences in socio-economic development. He observed that Central province which had better development indicators such as under-5 mortality, nutrition, education, housing amenities had experienced substantial fertility declines between 1989 and 1998. He also attributed fertility decline in the 1990s to worsening socio-economic conditions. This is 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 towards fertility declined between 1984 and 1998. He was of the view that fertility in Kenya was not going to fall below 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 of Kenya and also fertility for women with at least secondary level of education.

2.6.4 Age cohort

Other studies have linked fertility decline to a rise in age at first marriage and first birth (Ekisa and Hinde, 2005; Woldemicael, 2005; Blacker, 2002; Vavrus, 2000). 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) in a study on fertility decline in the 1980s in Kenya observed that women aged 34 years and above contributed to the greatest decline in fertility even though the decline occurred across women of all ages. He further attributed the rapid decline of fertility observed in the early 1990s to a rapid decline in fertility among younger women and a stall in fertility among women aged 35 years and above.

2.6.5 Mortality

The crucial role played by mortality decline in the process of fertility transition is well documented in a number of studies (Gymah, 2002; Hirschman and Young, 1998; Mason, 1997; Lloyd & Ivanov, 1988). The findings from these studies underscore the need for recent theories explaining fertility transition to acknowledge that even the classical demographic transition took cognisance of the fact that mortality decline was a prerequisite for fertility decline. For example, researchers have attributed the failure by many countries in Sub-Saharan to achieve real fertility transition to the inherently high levels of child mortality that have consistently been observed in the region. Gymah (2002) in a study on the relationship between infant and child mortality on fertility in Ghana and Kenya found that whereas the theoretical pathways through which infant and child mortality affect fertility are known, the empirical evidence had been inconsistent. He found that, women with prior infant deaths were found to have more subsequent births than those without mortality experience, suggesting both a physiological and behavioural response. However, the fertility response to child mortality was found to be larger in Ghana than in Kenya. The findings further showed that the death of a first child

was associated with an increased risk of a higher birth order. Moreover, the results demonstrated that models without unobserved heterogeneity tended to produce biased estimates. Another study by Hirschman and Young (1998) found that when mortality is high parents are more likely to give birth to more children with the knowledge that some may die. He also observed that during periods of low mortality, the associated opportunity costs of raising many children may force parents to have fewer children. A related study by Lloyd & Ivanov (1988) observed that child survival, family planning and fertility could be linked through a number of steps in a mortality transition. He noted that the stages in this linkage would involve family formation by fate, family formation by design, insurance and replacement. He opined that the evolution of family formation strategies and mortality declines overtime are dependent on the socio-cultural environment prevailing at a given time.

Brass and Jolly (1993) observed that changes in fertility in Kenya were consistent with changes in nutrition, prenatal health care and reduced neonatal mortality. They attributed rapid population growth in the country to rapid declines in mortality. However, a study by APPRC (1998) found that levels of child mortality were not significantly related to fertility in Kenya. The role of recent increases in childhood mortality in the late 1990s and early 2000s in explaining the stalled fertility experienced in the country in 2003 needs to be investigated.

2.6.6 Age at first marriage and marital patterns

Fertility is influenced by status of marriage. This is especially so in Africa, where marriage is a socially sanctioned union between a man and a woman for the purpose of procreation and nurture of children as well as companionship. Studies have established that age at first marriage has an effect on fertility (Chidambaram and Cleland, 1981). A study by Freedman (1993) observed that increasing age at marriage accounted for fertility decline in the countries covered by the World Fertility Surveys (WFS). Empirical evidence shows that the rapid decline in fertility of 60 percent experienced in China between 1970 and 1980 was influenced by marital status and an increase in age at first marriage (Coale, 1991). Fertility decline in Sri Lanka was also linked to changing age at first marriage (Simmons's, 1977). Sibanda et al (2003) attributed fertility decline in Addis Ababa city to the increase in the proportion of women not marrying. Another study by Macrae et al (2001) attributed fertility decline in Kenya to a reduction in the proportion of women currently married and an increase in age at first marriage. It is important to note that there have been considerable changes in the patterns of marriage and age at first marriage since the late 1980s. Ezeh (1997) in a study on Kenya found that men in high polygyny regime maintain high fertility through marriage of many wives while women on the other hand, maintain high fertility through maximization of their reproductive potential. This is achieved through early initiation of sexual activity, universal and minimal interruption of marriage, non-use of contraception and favourable feelings towards a large number of children.

Women in polygamous unions also tend to have lower socio-economic status than those in monogamous unions and are also likely to be less educated (Mukras et al 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 (Foot, Hill and Martin, 1993). The role of these changes in the stalled fertility experienced in the five years before KDHS 2003 needs to be investigated.

2.6.7 Religion

Religion has also been noted to play an important role in fertility decline in many communities (Njogu, 1991; Ahehu, 1998; Wasao, 2002; Benefo, 1995; Adegbola, 1988). For instance, Njogu (1991) noted that fertility declined among the Christians and Muslims in Kenya, but increased among traditional worshippers. Brass and Jolly (1993) observed differences between Christians and Muslims in the use of contraception in Kenya. On the other hand, Omariba (2006) found that Protestants and Catholics had no difference in the use of modern contraception and desire to cease childbearing but Muslims were less likely to actually cease childbearing. Ahehu (1998) found that a woman with no religious affiliation was about 1.53 times as likely to desire more children compared to a woman professing Catholic faith. Differential fertility has also been observed with respect to ethnicity, religion, type of marriage, and contraceptive use among others (Wasao, 2002). Wasao noted that religion was an important social institution which influences how individuals behave, the attitudes they acquire and the values they hold regarding the family unit. He observed that, religion shapes womens' values, norms and beliefs concerning reproduction and this ultimately affect their fertility behaviour (Benefo, 1995). In some societies, religious schooling provides such messages and teaching about traditional values that are inconsistent with widespread family

planning. However, religious-affiliations influence fertility differently; Islam endorses pronatalistic practices, while Christians particularly protestants, although pronatalistic, are more flexible with regard to reproductive choices including the use of contraception, whereas Catholics are strongly opposed to contraception. The traditional worshippers and other religions preach prolific childbearing as an unequivocal evidence of spiritual and ancestral benevolence. Thus, Muslims and traditionalists always exhibit higher fertility compared to Christians (Adegbola, 1988). It is not clear what role religion may have played in the rapid decline and stall in fertility experienced in the country in 1993 and 2003 respectively.

2.6.8 Crisis factors

Boserup (1985) argued that the 1980s crisis in Africa facilitated declines in fertility in some countries. For instance, Onuoha and Timaeus (1995) found that declines in fertility in the 1970s and stall in fertility experienced in the 1980s in Ghana was as a result of the economic crisis. However, it has been noted that factors that affect fertility during the crisis period turn out to be varied and unclear. For example, fertility in Tanzania did not decline during the economic stagnation and crisis of the 1970s and early 1980s but during the period of economic recovery in the late 1980s (Mturi and Hinde, 1995).

National Academy of Sciences (NAS) (1993) observed that economic reversals experienced in Sub-Saharan Africa had affected mortality, marriage and first and second births. The study associated increase in child mortality to the worsening economic conditions in Sub-Saharan Africa (especially Gross Domestic Product (GDP) and world

prices of major agricultural export crops). The study concluded that this led to delay or postponement of marriage. However, it was noted that the establishment of a causal association between long term economic and demographic changes had been made difficult by the complexity of processes involved and the inability to run true experimental tests (NAS, 1993). Robinson and Harbison (1995) also suggested that economic hardships had a negative effect on Kenya's fertility. On the other hand, Sibanda et al (2003) also attributed the low fertility in Addis Ababa city to the increasing proportion of unmarried women which was mainly due to unemployment. This implies that the effect of economic hardships and other crisis situations on both the rapid decline and stall in fertility experienced in the country in 1993 and 2003 respectively are not well understood.

2.7 Literature on causes of stalling fertility transitions in Kenya and the rest of the world

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 stall at levels above replacement in the late 1990s and early 2000s. Researchers have attempted to offer possible explanations why fertility may stall above replacement level. However, it is not yet very clear why fertility varies and/or remains constant over the course of time. Stalling fertility declines have been attributed to slowing of socio-economic development, rise in infant and child mortality, short birth intervals and declines in

contraceptive use (Shapiro& Gebresellassie, 2008; Garenne, 2007; Westoff and Cross, 2006; Bongaarts, 2005).

Westoff and Cross (2006) in a study of stalled fertility transition in Kenya observed that fertility stalled throughout the country. They noted that the stall was more pronounced among women with no education and those women with at least secondary education level experienced a modest decline in fertility. The stall in contraceptive prevalence occurred among women in the young age cohorts and those with little education but contraceptive use was noted to have increased for women who had been sexually active in the four weeks prior to the survey. The stall in contraceptive prevalence could perhaps also be attributed to the observed decline in the proportion of women who did not want more children in urban and rural areas, in all provinces, and ethnic groups and among women with less than secondary education. This was a marked departure from the steady increase in the proportion of women who did not want more children since 1997. The findings imply that, increase in child mortality may have played a role in the reversal of reproductive preferences in Kenya. This implies that women whose children had died were more likely to go on and replace them so as to act as insurance to the high incidences of child deaths.

Bongaarts (2006) studied the causes of stalling fertility transitions in developing countries. He noted that, although these declines in fertility were expected to continue until replacement level fertility was reached, 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 the number of children desired by women. The findings did not establish any particular pattern in the socio-economic 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 experienced any change. But in other countries such as Turkey, Peru, Columbia socio-economic development was noted to have continued and in over 85 percent of the countries fertility was lower than the expected level of development. He concluded that stalling fertility was therefore attributed to the levels of socio-economic development in Kenya and Ghana. Bongaarts, concluded that there were no significant increases in unwanted births in these countries and that fertility levels in these countries stalled at levels lower than the expected for the corresponding level of socio-economic development (as measured by Gross Domestic Product, child survival and the proportion of women who had been to school). He suggested that for desired family size and current fertility to come down from the high levels, socio-economic development will need to improve, particularly in Ghana and Kenya where it was low and had stagnated.

Using DHS data from 24 countries with multiple surveys, Shapiro and Gebresellassie (2008) examined the current status of fertility transition in Sub-Saharan Africa and the extent to which fertility had stalled. They found that fertility transition had started in almost all the countries studied and that in nearly two-thirds of these countries there was

evidence of fertility decline. They attributed stalling fertility in some of the countries to faltering in the pace of socio-economic development as reflected in the lagged infant and child mortality rates and lagged growth in GDP per capita. Their position was in agreement with Bongaarts (2006). However, it was also interesting to note that 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 fertility were not significantly related to any changes in fertility. Fertility transition was also found to be more pronounced in urban areas compared to 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 being significantly related to fertility levels. They observed that future perspective of the fertility transition in Sub-Saharan Africa will depend on the course of education and infant mortality. The literature seems to suggest that as it had been predicted in the past, fertility might remain at the four to five births per woman in Africa reflecting a demand for children as old age security. This would mean that the absence of old age security, even improved socio-economic development may not be adequate to prevent widespread leveling off in fertility.

A study by Garenne (2007) attributed stalling fertility transitions at national level to changes in age at birth, contraceptive use and socio-economic conditions. In a related study by Ojakaa (2007) he 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. This scenario was observed in the areas and regions perceived as

modernized particularly in urban areas and rural areas of Central Kenya. The study also found that child survival was significantly related to the risk of a woman having another child and that motivation for fertility control was noted to be significant while access to family planning was not. Furthermore, the findings revealed a reversal in the trend of fertility decline in Kenya in the five year period before the 2003 Kenya Demographic and Health Survey. This was attributed to a rapid increase in infant and child mortality in the 1990s, education and exposure to mass media messages. 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 socio-economic development and conservative cultural practices with respect to reproduction. The study found that rural women were more likely to experience second births compared to their urban counterparts and that transition from first to second and from second to third births increased with an increase in age at first birth.

Blacker (2002) on the question of how far fertility decline in Kenya was likely to go, suggested that fertility was unlikely to fall below three births per woman. His conclusion was based on the projection of completed family size for cohorts of women of childbearing age, stalled contraceptive prevalence, the stable trend in total fertility rate in Central province, among women with secondary education and the steadying of ideal family size at about 3.7 births per woman. Other studies have suggested that the stall in fertility experienced between 1998 and 2003 was attributed to fertility norms (White et al., 2006). Large ideal family size has been used to support the view that high fertility prevails in countries in Sub-Saharan Africa but, for the decline in fertility in Kenya, the

question arises whether family size norms and attitudes have similarly fallen. The fastest reduction in ideal family size occurred between 1984 and 1989. However, the most rapid decline in total fertility rate took place ten years later, between 1989 and 1998. The data therefore, support traditional view that demand for fertility limitation leads to fertility decline. The decline in family size norms has both period and cohort effects. The new fertility norm of four children per woman may have developed by 1989 and continued to 1998. This is consistent with and could have been used to predict the stall in fertility (White et al., 2006).

2.8 Summary of literature review and research gaps in the Kenyan fertility transition

The association between changes in macro-developmental factors such as urbanization, industrialization and fertility has been theorized (Notestein, 1953, 1945). Urbanization has been documented to have a negative relationship with fertility (APPRC, 1998; Brass and Jolly, 1993, UN, 1986). Westoff and Cross (2006) observed that decline in fertility in Kenya had taken place in both more developed and less developed provinces and also across different socio-cultural groups in the country. However, overall fertility was noted to have increased for both urban and rural women in 2003 compared to 1993. Fertility was also noted to have declined marginally across all levels of education in 1993 although the KDHS results of 2003 showed that fertility increased for women with no education and those with primary incomplete education level but stalled for women with completed primary education. Fertility was also noted to have declined for women with at least secondary education level (Westoff and Cross, 2006, CBS et al., 2004). Hence,

the effect of urbanization as measured by type of place of residence and education attainment in parity transitions in particular and rapid decline and stall in fertility both 1993 and 2003 in Kenya are not well understood.

Moreover, contraceptive use has been linked to fertility transition in Kenya (Macrae et al., 2001; Jolly and Gribble, 1993; Brass and Jolly, 1993; Cross et al., 1991). Interestingly, regions in Kenya have experienced unique fertility levels and trends. For instance, Nyanza and Coast provinces have experienced declines in fertility at relatively low levels of contraceptive prevalence (CBS et al., 2004). However, the stalling of contraceptive prevalence and fertility in the five year period before KDHS 2003 raised interesting questions on the role of the family planning programme effort on fertility transition in Kenya. This led researchers to suggest the need for investigation of determinants of fertility transition in Kenya beyond contraceptive use (Bongaarts, 2006; Cleland et al., 2006). This is central to this study.

Available evidence indicates that fertility and infant and child mortality are related (World Bank, 1884a, Caldwell et al., 1992). On the contrary, research findings on this relationship are contradictory. For instance, Brass and Jolly (1993) attributed rapid population growth in Kenya to rapid declines in mortality while a study by APPRC (1998) found that levels of child mortality were not significantly related to fertility in Kenya. Several studies have also linked fertility decline to marital patterns and age at first marriage. Coale (1971) attributed fertility decline in China between 1970 and 1980 to marital status and age at first marriage. Fertility decline in Addis Ababa city in Ethiopia

was attributed to the increase in the proportion of women not marrying (Sibanda et al., 2003). A study in Kenya by Macrae et al (2001) attributed fertility decline to a reduction in the proportion of women who were currently married and an increase in age at first marriage. The role marital status in the stalling fertility experienced in Kenya in 2003 is not well understood.

Another school of thought has averred that fertility transition in Sub-Saharan Africa in general and Kenya in particular may have been influenced by economic problems experienced in the region (Brass and Jolly, 1993; NAS, 1993). However, it has been observed that the results from the NAS (1993) were not conclusive. Blacker (2002) seemed to support this view when he insisted that the economic crisis experienced in the 1990s in Kenya may have influenced Kenyan fertility behavior at the time. It is not clear what role economic hardships played during the period when the country was experiencing rapid decline in fertility in 1993 and during the period of fertility stall experienced five years to the 2003 KDHS.

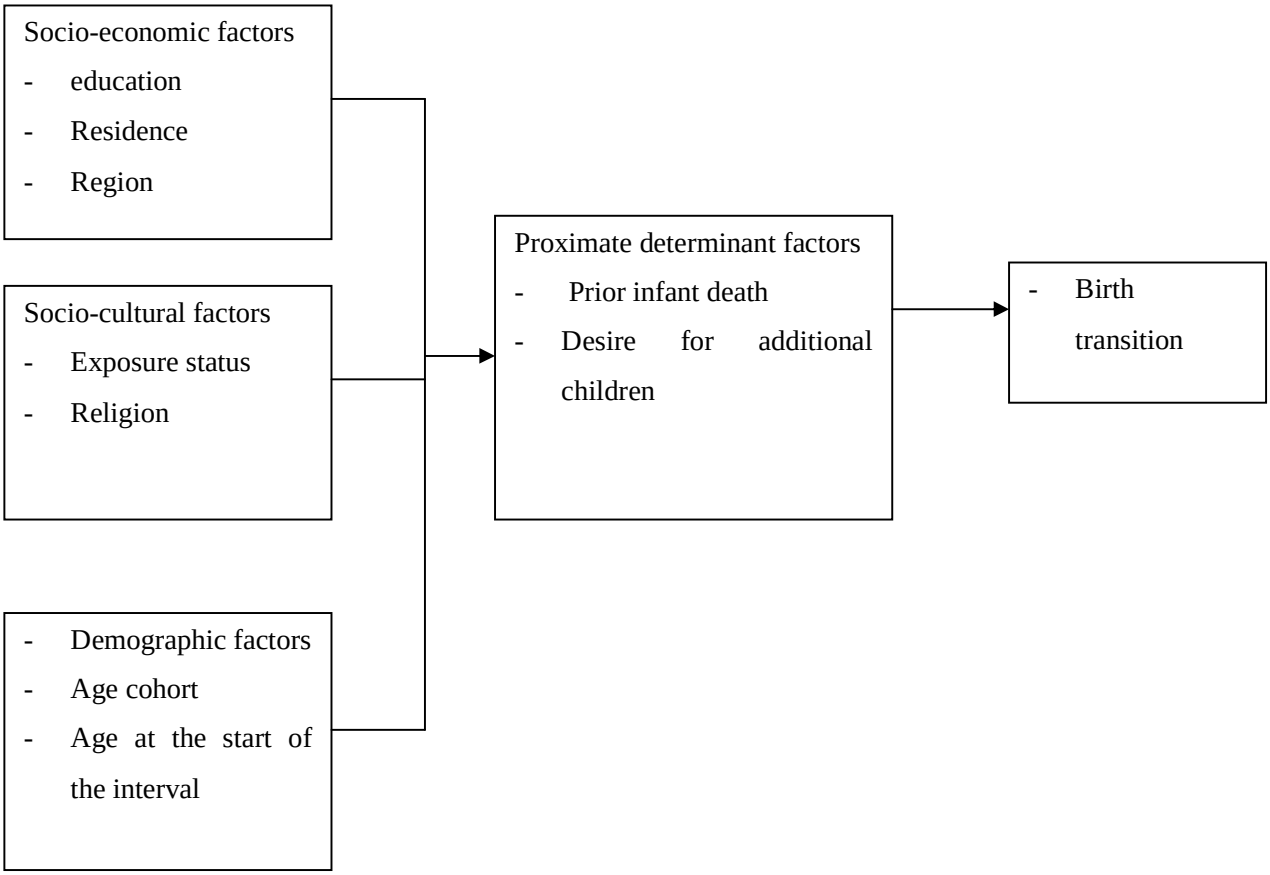
In summary, it is clear from the literature reviewed that the causes of fertility transitions remain inconsistent and controversial. For instance, the role of socio-economic factors in explaining fertility transition remains inconclusive. Fertility has been observed to decline even in countries with low levels of socio-economic development such as Bangladesh and stalled in countries with poorer indicators of socio-economic 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. This study sought to establish determinants of fertility transition in Kenya during the period when the country was experiencing rapid fertility decline in the five year period before 1993 KDHS and during the period when the country was experiencing a stall in fertility in 2003.

2.9 Conceptual framework for explaining fertility Transition in Kenya

This section conceptualizes the study. The framework for this study is based on the Bongaarts (1978) framework for the analysis of fertility. Bongaarts framework was an improvement of Davis and Blake (1956) social and structure and fertility analytical framework. Bongaarts (1978) framework posits that socio-economic, cultural and environmental variables affect fertility through intermediate fertility variables. The framework identifies intermediate fertility variables as consisting of biological and behavioural factors. The framework allowed identification of pathways through which socio-economic factors influence fertility. For instance, he argued that educated women often enter into marriage late and are associated with greater use of contraception and this directly affects fertility. This framework was adapted to explain fertility transition in Kenya. It describes how socio-economic, cultural and demographic factors act through proximate factors to affect birth transitions. This framework posits that background factors such as; education, residence, region of residence, exposure status, religion, age cohort and age at the start of the interval act through proximate factors to influence transition from say second birth to third birth, from third birth to fourth birth and so on.

Figure 1: Conceptual framework illustrating fertility transition in Kenya



Source: Adapted from Bongaarts (1978)

The framework explores mechanisms through which background factors act through proximate factors to influence transition from say second to third birth and from third to fourth birth and so on (see Conceptual framework, Figure 1). There are two pathways through which background and proximate factors affect transition from say second to third birth and from third to fourth birth and so on. One mechanism is where background factors affect transition from say second to third birth and from third to fourth birth independent of proximate factors. The background factors included are a proxy measure for the socio-economic conditions. The assumption is that socio-economic development

is considered as 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 and declines in mortality raises survival chances of children and that means that parents need fewer children to achieve their desired fertility. This scenario creates demand for family planning as parents seek to maintain their desired fertility. Consequently, as a society advances in socio-economic development the social costs of birth control are also reduced.

The second pathway is where background factors act through proximate factors to influence transition from say second to third birth, from third to fourth birth and so on. The proximate factors included in this study are; a prior infant death, and desire for additional children. This stems from the assumption that a woman's background characteristics such education level, residence and region of residence determines her socio-economic status and hence level of exposure to knowledge and access of health services. More educated women and those living in urban areas are more likely to access and use modern methods of contraception and this is likely to influence whether or not they transit from second to third birth and from third to fourth birth and so on.

We therefore, hypothesise that more educated women, those living in urban areas, those from Central province, currently married women and those women professing Protestant faith are less likely to transition from say second to third birth and from third to fourth birth and so on. We also hypothesise that women who have never experienced a prior

infant death and those who do not desire another child were less likely to transition from say second to third birth and from third to fourth birth and so on.

2.10 Definition of terms and Concepts

Demographic transition

This refers to the movement from high birth and death rates to low birth and death rates as a country develops from pre-industrial to an industrialized economy.

Fertility

This is defined as the natural human capacity to produce an offspring.

Total fertility rate

This is the average number of children a woman would have if she were to live through the reproductive years (15-49) and bear children at each age at the rates observed in a particular year or period.

Fertility transition

This is defined as the path from high levels of fertility (natural fertility) to low levels of fertility (i.e. replacement level fertility).

Fertility stall

This is defined as a failure of the national Total Fertility Rate (TFR) to decline between two (most recent) Demographic and Health Surveys (DHS) after an established trend of decline in national fertility.

Birth interval

This is the duration of time between two consecutive live births of one woman or over a group of women in a community or country.

Parity

This refers to the number of children a woman has ever borne alive.

Parity Progression Ratios

These are the fractions of women who progress from their own birth to first marriage, from first marriage to first birth, from first birth to second birth and so on.

Marriage

This refers to the legal union of people of the opposite sex .The legality of the union may be established by civil, religious or other means as may be recognized by each state. In this study, marriage included those in stable and consensual unions.

Family formation

This is a series of stages through which women move from marriage to first birth, from first birth to second birth, and so on.

Life Table

This is a statistical presentation of the life history of a cohort, commencing with the starting event, as the cohort is progressively thinned out over time by failures.

Censoring

This occurs when we have some information about individual survival time, but we don't know the survival time exactly.

Infant mortality

This is defined as the probability of dying before the first birthday.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents a description of source of data and methods of data analysis that were utilised in this study. Section 3.2 describes the source of data while section 3.3 and 3.4 describes the methods of data analysis. Issues pertaining to the quality of KDHS data are discussed in section 3.5.

3.2 Sources of Data

The source of data for the study was the Kenya Demographic and Health Surveys of 1993 and 2003. These were nationally representative surveys of 7540 and 8195 women aged 15-49 respectively. The surveys were designed to provide data to monitor population and health situation in Kenya. The data was collected information on fertility, marriage, sexual activity, awareness and use of family planning methods, fertility preferences, and breastfeeding. For the first time additional information was collected on malaria and use of mosquito nets, domestic violence and HIV testing of adults in 2003 survey.

The implementation of the survey was successfully undertaken (CBS, 2003 & NCPD, 1993). Of the eligible 8889 households in 2003, 8561 were successfully interviewed, yielding a response rate of 96 percent. In the interviewed households, 8717 eligible women aged 15-49 were identified and 8195 were successively interviewed, yielding a response rate of 94 percent. In 1993 DHS there were 7952 eligible women out of whom 7540 were successfully interviewed giving a response rate of 95 percent. 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. It is therefore, possible to determine the spacing between any two live births and also the intervals at which the infant/child deaths occurred. Finally, for each respondent her background and demographic characteristics were obtained. Information on sexual behaviour and family planning practice that is expected to affect directly a woman's reproductive performance was also collected.

3.3 Methods of Data Analysis

3.3.1 Introduction

This section describes the methods of data analysis utilised in this study. The study utilised parity progression ratios and Cox Proportional hazard model for data analysis.

3.3.2 Parity progression models and their rationale

A woman's parity is defined as the number of children a woman has ever borne alive. Parity Progression Ratios (PPRs) are the fractions of women who progress from their own birth to first marriage, from first marriage to first birth, from first birth to second birth and so on. Ryder(1964) using what he called translation formulae made the first attempt to estimate fertility rates for successive cohorts of women. He demonstrated the tendency for period and cohort total fertility rates and mean ages of fertility to diverge in the short run and in the long run. These divergences were attributed to the changing distribution through time of successive cohorts. Akers (1965) observed that, in both the period fertility and cohort fertility methods, the schedule of fertility rates are specific for age of mother and sometimes for marital status of mother. However, he noted that, in the

period fertility method, the analysis is in terms of annual fluctuations in the age specific fertility rates whereas in the cohort fertility method, the analysis is in terms of the expected lifetime experience of a generation of women. The analysis is in terms of completed fertility and the distribution of births by age of mother. The parity progression ratio method is a variant of period rather than the cohort method. This method attempts to nearly represent the experience of actual groups of women by increasing the specificity of rates. The rates are specific not only to age and marital status of mothers but also for number of children previously born (or parity) and length of time since marriage or the birth of the previous child (or interval). These rates state the probability of a woman of a given parity having an additional birth in the following year. The parity progression approach is an alternative approach to the estimation of fertility through parity progression ratios. It is useful for analysing the family-building process and provides an understanding of fertility trends. The method is useful since it enables us to examine fertility change in terms of its components and can be linked to the TFR.

3.3.3 Approaches to estimation of Parity Progression Ratios (PPRs)

Akers (1965) observed that there were three approaches to the estimation of completed fertility. These were: the historical, mathematical and survey approaches. The historical approach used the interpretation of past experience in order to project the future. This approach was used by Whelpton to estimate completed cohort fertility using the US Census Bureau data. The mathematical approach has also been used to estimate completed cohort fertility. This approach uses an equation to extrapolate past trends. The approach has been widely used by Ryder before. Thirdly, is the survey approach which

uses expressed expectations of women from a national survey to determine future fertility. This approach was widely used by Whelpton, Freedman and Goldberg (Srinivasan, 1980; Pressat, 1972). This method has proved highly predictive of future cohort fertility. However, it suffers from a number of limitations. It has been used during periods of comparative stability in the level of fertility. It has been noted that there are large differences between expressed expectations of individual women and size of actual family achieved. Thirdly, it does not take into account external factors such as the future of the economy and other developmental changes such as marketing of contraceptive devices. These methodological difficulties led to the development of an alternative approach which was a synthesis between the cohort fertility and parity progression methods. This was applied by various researchers such as (Srinivasan, 1980; Pressat, 1972; Feeney, 1987) with a number of modifications to suit changing circumstances such as data requirements.

However, it is important to note that most of the earlier works on the use of parity progression ratios to estimate fertility were methodological in nature and did not attempt to explain factors that were responsible for the observed changes in transition in the various parities. An innovative approach in this perspective was pioneered by Park (1976). He observed that determinants of fertility affect family building patterns differently at every parity. He noted that higher birth orders are influenced by economic factors first and this later trickle down to first birth orders. He argued that a higher birth orders, people make choices regarding termination of child bearing while at low birth orders people normally make choices regarding postponement of childbearing. This was

based on the experiences of American women. Njogu (1991) using DHS data of 1989 during the period of rapid decline of fertility in Kenya found that fertility decline affected all women of all ages and across all parities. This study examines factors responsible for changes in family building structures in Kenya during the period of rapid decline in fertility (1993) and period of stall in fertility (2003) to establish what might have happened to the PPRs at these two time periods and factors that may have been responsible for the observed PPRs.

3.3.4 Estimation of Parity Progression Ratios (PPRs) and Total Fertility Rate (TFR)

The approach developed by Feeney (1986) was utilized in the estimation of PPRs. This approach is an improvement to the approach proposed by Henry (1953) cited in Henry (1980). Period parity progression measures of fertility are particularly useful in populations in which fertility is controlled. Early interest in order-specific birth rates was based on the view that period variations in socio-economic conditions affect fertility differentially by order of birth (Bhrolchain, 1987). The likelihood that socio-economic factors influence reproduction performance at the individual level in an order-specific way has also long been recognized in micro-demographic discussions of how to improve explanatory inquiry. Generally, family building is a sequential process and there is evidence that factors affecting the probability of having an additional birth vary with birth order. This is explicitly recognized by incorporating parity specificity into fertility measurement.

Period parity progression measures of fertility are particularly useful in populations in which fertility is controlled. Parity progression measures provide an overall measure of fertility in the population and are comparable to measures based on age-specific rates. Their computation is explained below.

Let $r^{i}_{E\ (y)}$ denote the proportion of women having an i-th birth in year y who have an (i+1)th birth in the same year and

Let $r^{i}_{X\ (y)}$ denote the proportion of parity i women with x completed years duration in parity at the beginning of year *y* who have an (i+1)-th birth during the year. These statistics are referred to as parity progression rates for progression from i-th birth to (i+1)-th birth. For any given year y and i, the rates $r^{i}_{X\ (y),}$ X=E, 0,1, 2,…are referred to as a period schedule of parity progression rates for year y and the rates $r^{i}_{E\ (y)}$ and $r^{i}_{E\ (y+x),\ x=0,\ 1,}$ …are referred to as a cohort schedule of parity progression rates for the parity cohort of women who have an i-th birth in year y.

Let $P^{c}_{i\ (y)}$ denote the proportion of women having an i-th birth in year y who ever have an (i+1)-th birth. This proportion is referred to as the cohort parity ratio for progression from i-th to (i+1)-th birth for the cohort of women who have an i-yh birth in year y. It may be expressed as parity progression rates $r^{i}_{X\ (y)}$ as:

$$P^{c}_{i\ (y)} = 1-(1- r^{i}_{E\ (y)})[1- \prod_{x=0} r^{i}_{E\ (y+x)}]. \ldots(1)$$

We can define the period parity progression ratio $P^{P}_{i\ (y)}$ for year y by:

$$P^{y}_{i\ (y)} = 1-(1- r^{i}_{E\ (y)})[1- \prod_{x=0} r^{i}_{x\ (y)}]. \ldots(2)$$

The period parity progression ratio may therefore be thought of as the ratio that would be observed in a hypothetical cohort that experiences the parity progression rates of year y.

The parity progression ratios P_i, i=1,2,… describe the movement of women in a population from a woman's own birth to her first birth, to her second birth and on to higher order births. These period parity progression ratios can be used to calculate total fertility rate. This idea was first explored by Henry (1953). Although, he dealt with marital fertility only, this has been extended without difficulty to overall fertility. The general formula is given as:

$TFR=P_o+P_oP_1+ P_oP_1P_2+\ldots$ (3)

Where P_o denotes the proportion of women born who ever have a first birth and P_i denotes the proportion of women having an i-th birth who ever have an (i+1)-th birth. If P_i are defined for the birth cohort, then the above expression gives the same results as the summation of the age-specific fertility rates. If P_i are taken to be the period statistics for a given year, the TFR given by equation (3) represents the completed fertility that would be observed in a hypothetical cohort that experiences these P_i values. Since, our parity progression values end with an aggregate ratio for progression sixth and higher order births, we approximate the terms:

$P_0P_1P_2P_3P_4P_5P_6\ (P_7 + P_7P_8 + P_7P_8\,P_9 + P_7P_8\,P_9\,P_{10}+ P_7P_8\,P_9\,P_{10}P_{11} + P_7P_8\,P_9\,P_{10}P_{11}\,P_{12}+\ldots)$

By

$(P_1P_2P_3P_4P_5P_6^*)/\ (1- P_6^*)$

Where

P_6^* denotes the ratio of progression from sixth and higher order births. This expression is obtained by assuming that P_6 and higher order ratios equal P_6^* and pulling out a geometric series. The formula for calculating TFR thus becomes:

$TFR=Po+PoP_1+PoP_1P_2+ PoP_1P_2P_3+ PoP_1P_2P_3P_4+\ldots+ PoP_1P_2P_3P_4P_5\ P_6^*/\ (1- P_6^*)\ldots$ (4)

The parity progression ratios were used to determine the parities responsible for the rapid decline in fertility in the five year period before Kenya Demographic and Health Survey of 1993 and those parities responsible for the stall in fertility experienced in the five-year period before KDHS 2003. The number of births that occur after 10 years of duration in parity is negligible, so we terminate our life tables for these transitions after 10 years.

3.4. Cox Proportional hazard Model

A hazard in ordinary use means risk. A hazard model is therefore, a model that defines the risk of instantaneous occurrence of a given event. The Cox proportional hazard model is usually stated in continuous form. The model was developed by Cox in 1972. It is fitted by the method of partial likelihood. The proportional hazard model assumes that the covariates are multiplicatively related to the hazard. Censoring and truncation are key analytical issues in survival analysis. The Cox proportional hazards model is able to deal with the problem of right censoring (i.e. women who had not yet experienced a second birth at the time of the survey). Such cases are treated as censored and are included in the analysis. Censored cases are considered to have been in the risk bracket just before the time of the survey. Left truncation also arises because some of the third births enter into the risk set before observation starts. Thus, observation for all third and above births was restricted to those births that occurred 10 years prior to the date of the survey. Any births that occurred more than 10 years prior to the surveys were excluded from the analysis.

In this model, the dependent variable was the duration of progression from say a second birth to a third birth, from a third to a fourth birth and so on for the five year period before Kenya Demographic and Health Surveys of 1993 and 2003. The Cox model is

semi-parametric and is expressed as a product of a baseline Hazard Function (HF) that has an unspecified form, and another factor that is a linear function of a specified number of independent variables which are expressed in exponential form. The baseline hazard is representative of an individual whose covariates or independent variables are zero. It is a proportional model because it is assumed that the hazard for one individual is simply a constant proportion of the hazard of another. In Mathematical notation, the Cox model can be expressed as:

$h(t\ |x_j) = h0(t)\ \exp(x_jBx)$

where h0(t) is the baseline hazard (which is left unspecified); and exp (xjBx) is a linear function of a set of x independent variables that are exponentiated; Bxs are coefficients which are to be estimated from the data.

This model was used to determine the covariates associated with risks of transitions from second to third birth, third birth to fourth birth, fourth birth to fifth birth and from fifth birth to sixth and above birth for both 1993 and 2003. These transitions were associated with rapid decline and stall in fertility respectively for the five year-periods before the two time periods.

3.5 Data Quality

Kenya has enjoyed relative peace compared to most countries in Sub-Saharan Africa. This has enabled the country to collect data through surveys and censuses in regular time periods. This means that Kenya has a rich data source on fertility and mortality. However, due to the retrospective nature of the data collection, particularly Kenya

Demographic and Health Surveys (KDHS) data, the quality is often affected by misreporting of the age of mother, omission of births, mis-allocation of date of birth of child and truncation(Brass and Jolly, 1993; Goldman et al., 1985). This means that births can be misplaced especially those closer to the time of the survey dates being displaced backwards in time. Some women tend to prefer certain ages especially those ending with 0 and 5 both for themselves and their children. Thus, DHS data suffers from age heaping.

Pullum (2006) observed that data for fertility estimates usually suffers from errors due to mis-reporting of age of woman, omission of children from the birth history schedule or movement of dates of birth of children. He observed that there was a tendency of ages at death to be heaped at intervals of six and twelve months and this can lead to underestimation of infant mortality and overestimation of child mortality. Reporting of infant deaths was also more problematic for deaths that took place further back from the survey period. But, assessment of data on early child deaths shows that it was of good quality. Among women, age heaping was observed for ages ending with 0 or 5. But, overall, reporting on the woman's age and also her first age at marriage showed good quality data for the 1993 and 2003 KDHS (CBS et al., 2004; NCPD, 1994).

Pullum further noted that data on date of birth and age of children can be assessed for quality by estimating completeness of information and the amount of imputation required. Assessment of 1993 and 2003 KDHS showed that less than 9 percent of children had missing month of birth while the month and year of birth was missing for only 0.3 percent of the births. Overall, completeness of reporting has been shown to

improve with education level, in urban areas and among younger women. These findings imply that incompleteness is not a serious problem and hence data is of good quality (CBS et al., 2004; NCPD, 1994).

Researchers have also made several attempts to assess the quality of DHS data and its suitability. Marckwardt and Rutstein (1996) noted that the quality of DHS data had improved tremendously over time. They observed that reporting of birth dates had improved over time and that heaping at twelve months in the reported age at death of children had also been reduced dramatically. Macrae et al (2001) observed that the number of births by single births prior to the 1993 KDHS appeared to have undergone some displacement. They attributed this to the inclusion of additional questions relating to children aged under five years in the relevant schedule of the DHS questionnaire. They noted that respondents and or/enumerators tended to push dates of birth of children who may have been aged just under five years back, so that they could appear older than they actually were. This was done to conveniently avoid asking additional questions on health, breastfeeding and family planning and also avoid having to take physical measurements to establish height and weight of children under five years. Nonetheless, it is generally, accepted that these problems are not serious in the KDHS data sets (Blacker et al., 2002; Macrae et al., 2001; Cohen, 1993; Brass and Jolly, 1993).

There have been attempts to try and correct for misreporting in KDHS data sets of 1993 and 1998. Overall, scholars are in agreement on the difficulty of choosing the best model to use to make the corrections. Indeed, there have been suggestions that some of the

models used have over corrected the data to make the estimates comparable with those from other sources (Blacker, 2002). Generally, it has been observed that Kenya has a more comprehensive data base than any other country in Sub-Saharan Africa (Garenne and Gakusi, 2005; Macrae et al., 2001). Thus, the data sets chosen are very appropriate for this study.

CHAPTER FOUR

FERILITY LEVELS AND TRENDS IN KENYA

4.1 Introduction

This study set out to establish the determinants of fertility transition in Kenya between 1993 and 2003. These two time periods were chosen for their unique demographic characteristics. The five year period before the Kenya Demographic and Health Survey (KDHS) of 1993 experienced rapid declines in fertility while the five year period before KDHS of 2003 experienced a stall or a reversal in fertility decline. The study sought to determine whether there were any changes in the determinants of fertility transition between the two time periods and whether these changes in the determinants could explain the stall or reversal in fertility decline experienced in Kenya in the five year period before the KDHS of 2003. In order to address this objective, the study was guided by the specific objectives highlighted in chapter one of this thesis.

To achieve those objectives, fertility levels were estimated using period parity progression ratios (PPRs), the proportion of women in each parity who proceed from one parity to the next (e.g. the proportion of women who proceed from parity one to parity two and so on). Period parity progression ratios have the advantage of being natural in the measurement of fertility. This is because when people think of having children they think in terms of whether or not and when to have a first or subsequent birth. The aggregate results of these decisions are represented in parity progressions. This is explicitly recognized by incorporating parity specificity into fertility measurement (Feeney, 1986). Parity progression measures provide information on the tempo or spacing of births (UN,

1997). Researchers have observed that, changes in the proportions of women moving from one parity to another may be an indication of a more sensitive signal of changing fertility behaviour than conventional summary fertility measures (Ryder, 1982, Srinivasan & Freymann, 1989). Parity progression measures are also less sensitive to period fluctuations in fertility than total fertility rate (TFR). TFR is a hypothetical measure and may not be very helpful for measuring fertility trends and especially in situations where fertility is rapidly changing. It is a hypothetical measure, which under certain circumstances can give distorted results. This distortion results from changes in the timing of childbearing, which can inflate or deflate the TFR (Bongaarts, 1999; Ryder, 1983). It does not distinguish the various components of observed change in fertility and cannot reveal whether an increase or decrease in fertility is due to change in timing of the start of reproduction, in the spacing of births and /or in the proportion of women reaching higher parities.

Period parity progression measures are particularly useful in providing a better understanding of fertility trends and that is why they are preferred over conventional TFR in the current study. The period parity progression ratios are used to enable us determine the parities that were responsible for the rapid decline in fertility observed in the five period before the 1993 KDHS and whether or not they were the same parities responsible for the observed stall or reversal in fertility decline in the five year period before the 2003 KDHS.

To identify the factors responsible for rapid decline in fertility observed in 1993 and also factors that led to a reversal in fertility decline in 2003, the Cox Proportional hazards model was used to identify risk factors associated with each transition such as from a woman's own birth to first birth, from a woman's first to second birth and so on. Data were obtained from the Kenya Demographic and Health Surveys of 1993 and 2003. The choice of the two time periods was pertinent because they represent two contrasting periods of fertility transition in Kenya. Fertility was declining rapidly in 1993 while there was a stall in 2003 (NCPD, 1994; CBS et al., 2004). Scholars have attempted to explain fertility transition in Kenya from three perspectives. Fertility transition has been attributed to changes in proximate determinants especially increases in contraceptive prevalence (Ekisa and Hinde, 2005; Cross et al.,1991; Njogu, 1991; Brass and Jolly, 1993; Blacker, 2002; Ezeh and Dodo, 2001; Sibanda, 1999; Population council, 1998; Njogu, 1991;Dow et al., 1994), changes in attitudes regarding large family sizes due to high costs associated with raising up many children (Robinson, 1992) and changes in cultural environment supporting high fertility due to the pressures of modernization (Watkins, 2000).

Evidence from countries that have completed their fertility transitions indicate that once fertility decline is underway, it tends to continue without interruption until replacement level fertility of about two births per woman is achieved. This historical pattern has been observed in both developed and developing countries with low fertility (Bongaarts, 2006). However, there is no consensus among scholars why fertility stalls. The causes of stalling fertility remain largely unexplored and poorly understood. The interruption of

this well know pattern of fertility transition in Kenya has necessitated a search for explanations as to why fertility varies and/or remains constant over the course of time.

However, this is not unique to Kenya. For instance, in some countries fertility transition has been noted to occur at widely varying levels of development. For example, in Bangladesh, fertility transition has been underway despite lack of socioeconomic progress. In France, fertility fell below replacement level in the 1930s despite opposition from both the government and the church on use of contraception to control fertility (Blacker et al., 2005). It has also been noted that despite the high correlation between development indicators and fertility, the onset of fertility transition and the pace of decline in the early phases of transition are poorly predicted by these indicators (Bongaarts, 2006). Stalling fertility declines have been attributed to slowing of socio-economic development, increase in infant and child mortality, short birth intervals, declines in contraceptive use, HIV/AIDS (Shapiro& Gebresellassie, 2008; Garenne, 2007; Westoff and Cross, 2006; Bongaarts, 2005). Bongaarts (2005) found that fertility had stalled in Bangladesh, Dominican Republic, Ghana, Kenya and Turkey and attributed these stalls to a plateauing in contraceptive prevalence and demand for contraception and also a stall in the number of children desired by women.

In this chapter we begin our analysis by estimating Period Parity Progression Ratios (PPPRs) in order to answer the first objective of this study. The analysis begins by describing the distribution of births in the five year periods before each survey in 1993 and 2003. This is then followed by an estimation of fertility levels and trends by single

calendar years for each of the five year periods before 1993 and 2003 KDHS. Fertility levels are estimated using parity progression ratios. Finally, fertility levels and trends are presented by key background characteristics. These key background characteristics included; educational attainment, place of residence, region of residence and marital status. This was done to establish whether fertility levels and trends varied by socio-economic conditions and whether these variations were markedly different during the five year period of rapid fertility decline before 1993 KDHS and the five-year period of fertility stall before the 2003 KDHS.

4.2 Background characteristics of study sample

4.2.1 Distribution of births

This section presents the distribution of births by the five-year periods prior to the Kenya Demographic and Health Surveys of 1993 and 2003. The results are shown in Table 4.1. These results show that, the total number of births five years prior to the survey due to these women were 6,115 and 5,949 respectively for the two time periods. The table also shows their distributions by the various parities. These results indicate that, these two time periods had distinct childbearing patterns; which necessitates explanations as to what could be responsible for the dynamics observed. The proportion of higher order births (5 and above) was higher (37%) in the five-year period before 1993 KDHS than in the five-year period before 2003 KDHS (28%). However, the proportions of first order births were higher (25%) for the five-year period before 2003 KDHS compared to the same period before 1993 KDHS (20%). The distribution of births in the other birth orders was similar in the five-year periods before Kenya Demographic and Health surveys of

1993 and 2003. This seems to reflect lower fertility in 2003 (4.8) compared to 1993 (5.4).

These births are utilized for the calculation of Period Parity Progression Ratios (PPPRs) and estimation of fertility levels and trends in the five year-periods before each of the two time periods. These are presented in the next section.

Table 4.1: Distribution of births in the five year periods before the survey for KDHS 1993 and 2003

Period	**Birth order**					
	1	2	3	4	5+	N
1989-1993	1,229 (20.10)	1,040 (17.01)	861 (14.08)	734 (12.00)	2,251 (36.81)	6,115 (100)
1998-2003	1,488 (25.01)	1,162 (19.53)	943 (15.85)	692 (11.63)	1,664 (27.97)	5,949 (100)

Source: Analysis of KDHS, 1993 and 2003.

4.3 Fertility levels and trends in Kenya 1993-2003

4.3.1 Introduction

This section presents the results of fertility levels and trends in Kenya for the five year periods before the Kenya Demographic and Health Surveys of 1993 and 2003 estimated using the births presented above using Parity Progression Ratios (PPRs). The section therefore begins by briefly reviewing the process of estimating the PPRs using the approaches described in the methodology section. This is followed by describing how these PPRs are converted to the TFR, their presentations and interpretations.

4.3.2 Estimates of Parity Progression Ratios (PPRs) and Total Fertility Rate (TFR)

As explained in the methodology section, the approach developed by Feeney (1986) was utilized in the estimation of PPRs. This approach is an improvement to the approach proposed by Henry (1953). The details of the approach are presented under the methodology section of this thesis (See chapter 3 section3.3). Period parity progression measures of fertility are particularly useful in populations in which fertility is controlled. These, measures like the age specific fertility rates can be used to derive TFR. The general formula for converting period parity progression measures in total fertility rate (TFR) is given as:

$TFR=P_o+P_oP_1+ P_oP_1P_2+ P_oP_1P_2\ P_3+\ldots$

Where P_o denotes the proportion of women born who ever have a first birth and P_i denotes the proportion of women having an i-th birth who ever have an (i+1)-th birth. If P_i are defined for the birth cohort, then the above expression gives the same results as the summation of the age-specific fertility rates. If P_i are taken to be the period statistics for

a given year, the TFR given by the equation above represents the completed fertility that would be observed in a hypothetical cohort that experiences these P_i values. Since, our parity progression values end with an aggregate ratio for progression sixth and higher order births, we approximate the terms:

$P_0P_1P_2P_3P_4P_5P_6\ (P_7 + P_7P_8 + P_7P_8\,P_9 + P_7P_8\,P_9\,P_{10} + P_7P_8\,P_9\,P_{10}P_{11} + P_7P_8\,P_9\,P_{10}P_{11}\,P_{12}+\ldots)$

By

$(P_1P_2P_3P_4P_5P_6^*)/(1- P_6^*)$

Where

P_6^* denotes the ratio of progression from sixth and higher order births. This expression is obtained by assuming that P_6 and higher order ratios equal P_6^* and pulling out a geometric series. The formula for calculating TFR thus becomes:

$TFR=Po+PoP_1+PoP_1P_2+ PoP_1P_2P_3+ PoP_1P_2P_3P_4+\ldots+ PoP_1P_2P_3P_4P_5\ P_6^*/ (1- P_6^*)\ldots$ (1)

Since the approach of estimating TFR using PPRs is not very common, it is illustrated here using the 1993 KDHS data. The estimation procedure starts by calculating the probability of progression from one birth to the next in the last five years for each of the survey periods i.e. 1993 and 2003. Parity progression ratios for progression to second and higher order births may be calculated for parity cohorts; groups of women who have a birth of a given order during a given time period. For calculation of parity progression ratios, one considers a group of all women having an i-th birth in a given period and computes the proportion of these women who ever go on to have an (i+1)-th birth. The calculation of parity progression ratios for parity cohort gives rise to period parity progression ratios (PPPRs). The period parity progression ratio may therefore be thought

of as the ratio that would be observed in a hypothetical cohort that experiences the parity progression rates of year y. The parity progression ratios Pi, i=1,2,… describe the movement of women in a population from first to second and on to higher order births. The period parity progression ratios can be used to compute TFR using equation (1). The TFR values computed this way can be compared with measures based on age-specific rates. For instance, for the case of 1993; to obtain the proportion of women experiencing a first birth (0.896), we first obtained the parity progression ratio for progression to second birth. This was obtained by dividing the number of births to women who had a second birth by those who had a first birth in the last five years before 1993 KDHS (i.e. 1033/1228=0.841). Secondly, we obtained the proportion of women who had a first birth by duration in parity using the life table method (0.346). We then obtained the proportion of survivors for the progression to first birth by subtracting the proportion obtained earlier (0.841) from one (i.e. 1-0.841=0.159) and also the proportion of survivors of the progression to first birth by duration in parity from the life table method by subtracting the proportion obtained (0.346) from one (i.e. 1-0.346=0.654). The product of these proportions obtained using the life table approach (0.159*0.654=0.104) was then subtracted from one to obtain the proportion of women who experienced a first birth (0.896). This gives the period parity progression ratio (PPPR) for women who had experienced a first birth. These parity progression ratios are the ones used to calculate TFR. This process is repeated for each parity up to parity 6 and above. The period parity progression ratios were then used to calculate total fertility rate (TFR) by applying equation (1) above.

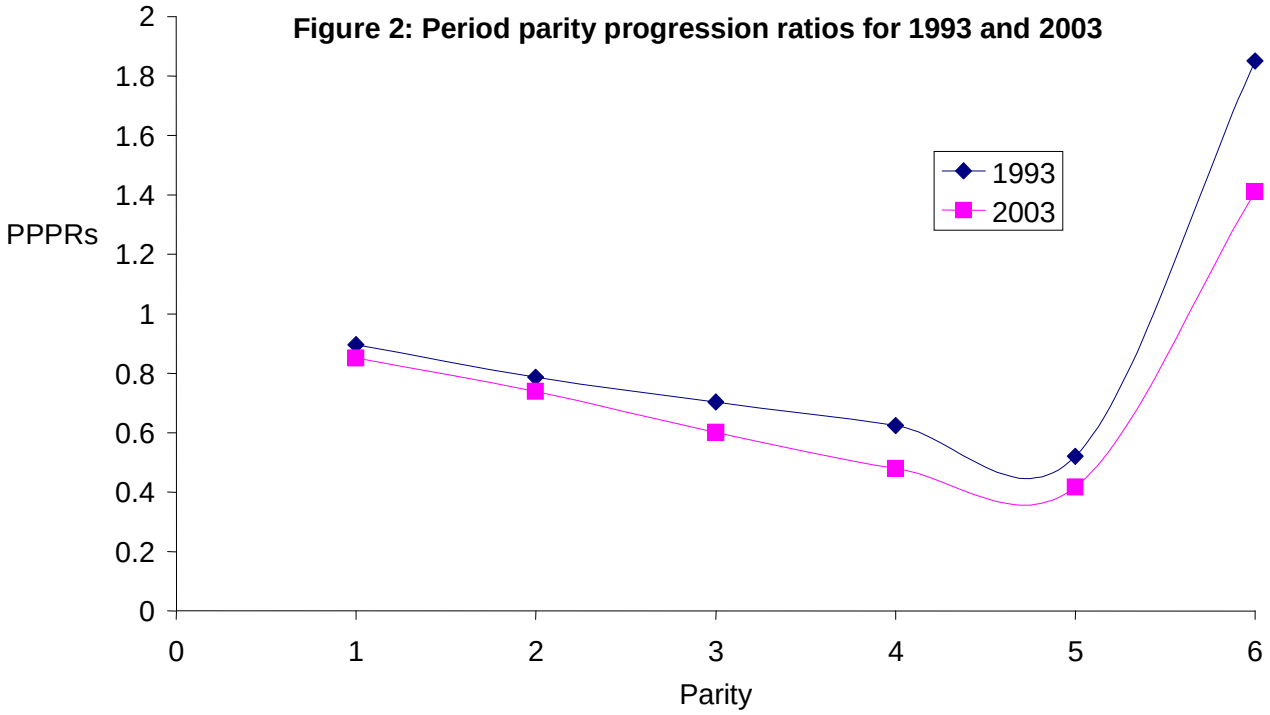
The results of the analysis are shown in Table 4.3. These results show that, fertility estimates obtained for the five-year periods before the Kenya Demographic and Health surveys (KDHS) of 1993 and 2003 using the period parity progression ratio approach proposed by Feeney (1986) compares favourably well with the estimates obtained using the conventional approaches for estimating Total Fertility Rate (TFR). These results are an indication of clearly contrasting changes in childbearing patterns between these two time periods when fertility was declining rapidly in 1993 and when fertility had stalled in 2003. TFR was estimated at 5.4 births per woman in 1993 and 4.5 births in 2003. It is important to note that for consistency of estimation; the fertility estimates of 2003 exclude North Eastern province. When North Eastern Province was included in the estimation, TFR was 4.7. The exclusion of North Eastern was done to enable us compare the results of the two time periods. This is due to the fact that before KDHS 2003 North Eastern province had always been excluded from the surveys. The findings show that the period parity progression ratios (PPPRs) declined more rapidly for the five-year period before 1993 KDHS when the country was experiencing rapid fertility decline(see figure 1). The declines in PPPRs were more dramatic for women experiencing births of orders 2, 3, 4 and 5. These parities could perhaps explain the decline in fertility witnessed in the five-year period before 1993 KDHS. The five-year period before the 2003 KDHS also experienced declines in PPPRs but these were less rapid than those experienced in the five-year period before 1993 KDHS. The decline was observed to be more rapid for women experiencing births of parities 2, 3 and 4. For instance, the proportion of women having a fourth birth in 1993 was 62 percent compared to only 48 percent in 2003. The less rapid declines in the proportions of women experiencing births of parities 2, 3, 4 and

5 in 2003 compared to the same women in 1993 could be attributed to the stall or reversal in the decline of fertility observed in the five year period before 2003 KDHS.

Table 4.2: Period parity progressions ratios and fertility level 1993 and 2003

Year	Parity						
	TFR	**0-1**	**1-2**	**2-3**	**3-4**	**4-5**	**6+**
1993	**5.4**	**0.896**	**0.786**	**0.703**	**0.624**	**0.520**	**1.85**
2003	**4.5**	**0.851**	**0.739**	**0.601**	**0.480**	**0.417**	**1.41**

Source: Analysis of KDHS, 1993 and 2003.



To understand the dynamics of childbearing patterns for the five-year periods before the Kenya Demographic and Health surveys of 1993 and 2003, we also estimated fertility

levels by single calendar years for the two time periods. This was to enable us explain the dynamics of fertility decline and fertility stall experienced in the five-year period before KDHS of 1993 and 2003 respectively. This is presented in the next section.

4.3.2 Fertility levels and trends by single calendar years for the five year periods before each survey in 1993 and 2003

To examine the dynamics of fertility levels and trends in the five year periods before the 1993 and 2003 Kenya Demographic and Health Surveys, total fertility rate (TFR) was estimated for each single calendar year using the approach proposed by Feeney (1986). The results are presented in Tables 4.3 and 4.4 respectively. The findings indicate that, fertility declined in the five-year period before 1993 KDHS and there is also evidence of a stall or reversal in the trend of fertility decline in the five year-period before 2003 KDHS. The results show that fertility declined in the four-year period before 1993 KDHS but increased slightly in 1993. TFR declined from 6.2 births per woman in 1989 to 5.2 births per woman in 1992 before increasing slightly to 5.9 in 1993 (see figure 2). There is clear evidence that fertility stalled in the five year period before 2003 KDHS. TFR was estimated between 4.1 to 4.3 in the five-year period before 2003 KDHS except in 2002 when it increased slightly to 4.6. The decline and stall in fertility could be attributed to the changing childbearing patterns observed during these two time periods. An examination of the period parity progression ratios (PPPRs) could perhaps explain the dynamics in fertility decline and stall observed during the two time periods (see figure 3). PPPRs declined in the five year period before 1993 KDHS for women experiencing a first birth but the greatest decline was observed in 1991.

Table 4.3 Fertility levels and trends by single calendar year for the five year period before KDHS 1993

Year	Parity						
	0-1	1-2	2-3	3-4	4-5	6+	TFR
1989	0.950	0.884	0.665	0.665	0.560	2.45	6.2
1990	0.945	0.819	0.781	0.631	0.561	1.96	5.7
1991	0.788	0.735	0.729	0.566	0.507	2.04	5.4
1992	0.895	0.782	0.640	0.577	0.493	1.83	5.2
1993	0.923	0.731	0.707	0.718	0.510	2.28	5.9

Source: Analysis of KDHS, 1993 and 2003

Table 4.4 Fertility levels and trends by single calendar year for the five year period before KDHS 2003

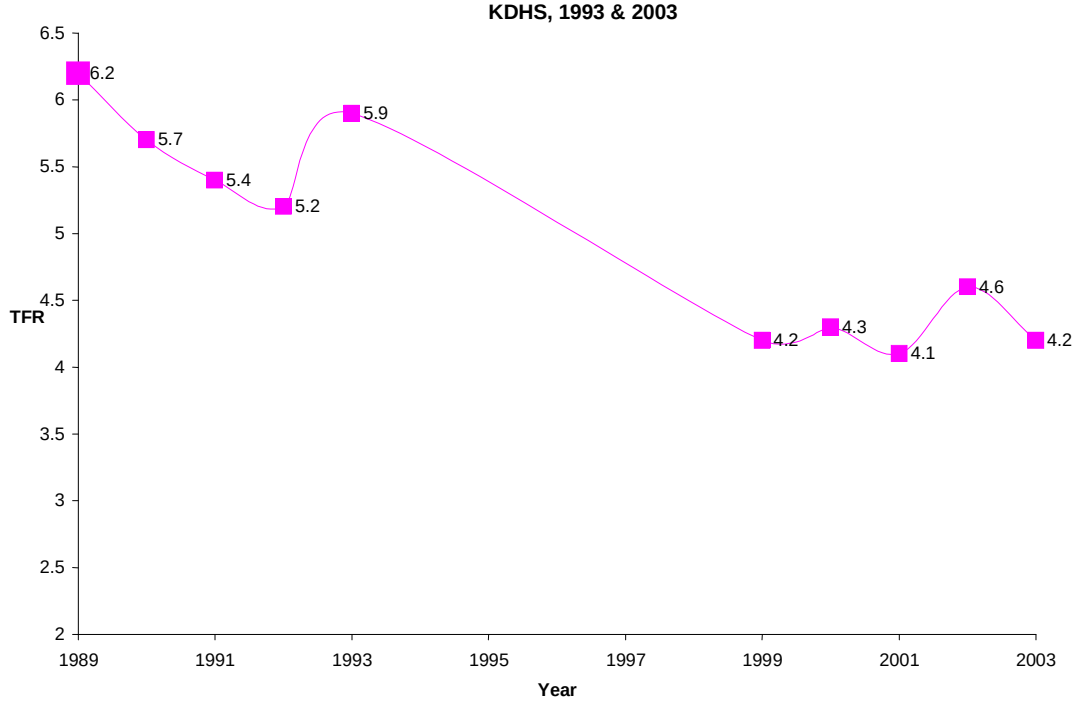
Year	Parity						
	0-1	1-2	2-3	3-4	4-5	6+	TFR
1999	0.825	0.676	0.527	0.417	0.467	1.31	4.2
2000	0.865	0.716	0.559	0.443	0.360	1.35	4.3
2001	0.731	0.651	0.559	0.428	0.402	1.28	4.1
2002	0.780	0.722	0.619	0.524	0.359	1.55	4.6
2003	0.795	0.699	0.594	0.446	0.385	1.25	4.2

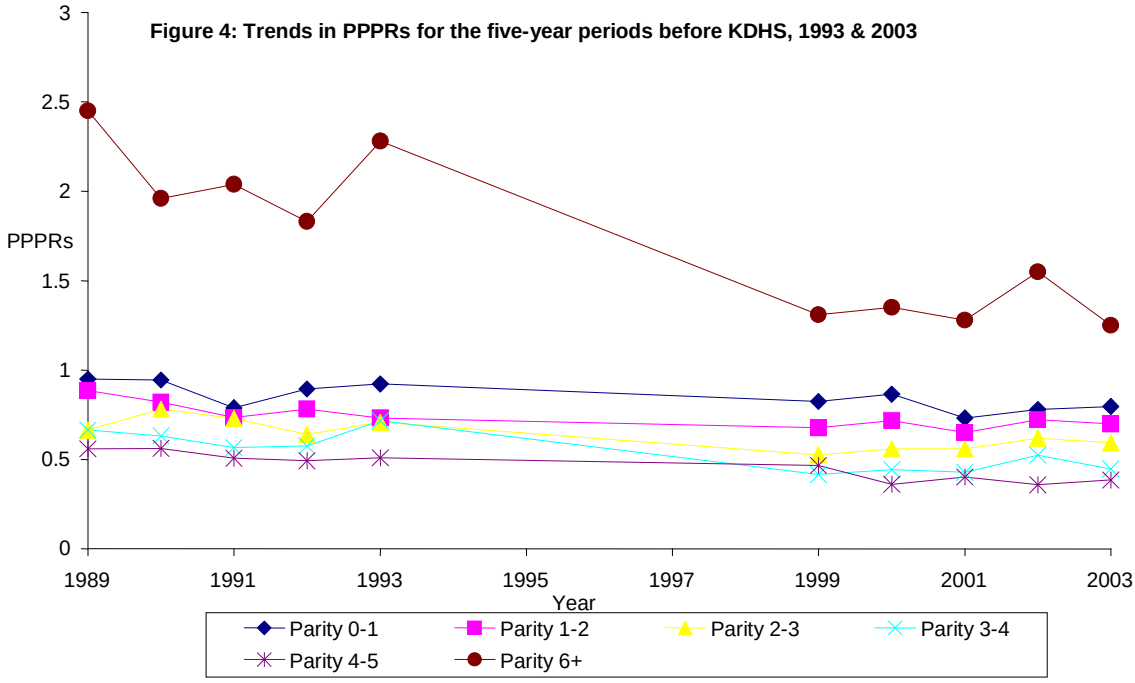
Source: Analysis of KDHS, 1993 and 2003

Declines in PPPRs were also observed for women experiencing a first birth in the five year period before 2003 KDHS but the decline was greatest for women in 2001. The results show that rapid declines were observed in the proportions of women experiencing

second births in 1991 and 1993 while there was a near stall in the proportion of women experiencing second births in the five-year period before 2003 KDHS. Moreover, a mixed pattern is observed for women progressing to have a third birth in the five-year periods before each of the surveys. The proportion women experiencing third births were relatively lower for women in 1989 and 1992 while the proportions of women having third births stalled in the first three years before 2003 KDHS. This could explain the stall in TFR experienced during this period. A stall in the proportions of women experiencing fourth births was also observed between 1991 and 1992 and in all the five years before 2003 KDHS except in 2002. These coincide with the periods when TFRs had stalled. Therefore, it is highly likely the stall experienced in TFRs could be explained by the stalled PPPRs observed. Furthermore, a decline in the proportions of women progressing to a fifth birth was evident in the five year-periods before 1993 and 2003 KDHS. There is evidence in the stall in PPPRs between 2000 and 2002 an indication that these parities could have contributed to the stall in TFRs experienced in the five year-period before 2003 KDHS.

Figure 3: Fertility levels and trends by single calendar year for the five year periods before KDHS, 1993 & 2003





4.4 Discussion of results and conclusions

In conclusion it is important to note a number of important implications from these findings. The findings clearly show evidence of fertility decline and fertility stall in the five-year periods before Kenya Demographic and Health surveys of 1993 and 2003. The decline in fertility observed in the five-year period before 1993 KDHS could be attributed to rapid declined in the proportions of women experiencing births of orders 3, 4 and 5. There was also a slower decline in the proportion of women experiencing births of lower parities (1-2). On the other hand, the evidence of a reversal in the trend of fertility decline observed in the five-year period before 2003 KDHS could be attributed to a stall in the proportions of women having births of orders 3, 4, 5 and 6 and above and a slower decline in the proportion of women making a transition to parities 1-2. The slightly high

TFR of 4.6 experienced in 2002 could be attributed to displacement of births. This happens when dates of childbirths are transferred by interviewees. This is a serious problem in Sub-Saharan Africa according to Pullum (2006). This problem often leads to either underestimation or overestimation of fertility.

It is therefore apparent that that there was a rapid decline in fertility in Kenya in the five year period before KDHS 1993 and also a stall in fertility decline was observed in Kenya in the five year period before 2003 KDHS. These findings are consistent with other studies (Machiyama, 2010; Shapiro& Gebresellassie, 2008; Garenne, 2007; Westoff and Cross, 2006; Bongaarts, 2005). The next part of the analysis will focus on identifying the factors responsible for the rapid decline in fertility in the five year period before 1993 KDHS and also the stall in fertility decline observed in the five year period before 2003 KDHS.

CHAPTER FIVE

DETERMINANTS OF FERTILITY TRANSITION IN KENYA

5.1 Introduction

The previous chapter established levels and trends of total fertility rate (TFR) in Kenya for the five year periods before Kenya Demographic and Health Surveys of 1993 and 2003. The findings showed evidence of rapid fertility decline five years before 1993 KDHS and fertility stall in the five-year period before 2003 KDHS. The decline in fertility observed in the five-year period before 1993 KDHS was attributed to the decline in the proportions of women experiencing births of orders 3, 4, 5, 6 and above. On the other hand, the evidence of a reversal in the trend of fertility decline observed in the five-year period before 2003 KDHS was attributed to a stall in the proportions of women having births of orders 3, 4, 5 and 6 and above.

This chapter seeks to identify determinants of fertility transition in Kenya for the two time periods; 1993 and 2003 for these parities. The study sought to determine whether there were any changes in the determinants of fertility transition between the two time periods and whether these changes in the determinants could explain the stall or reversal in fertility decline experienced in Kenya in the five year period before the 2003 KDHS which is the key focus of the study. These determinants were established for those birth orders identified to have been responsible for rapid decline in fertility in the five-year period before 1993 KDHS and those responsible for a stall in fertility in the five-year period before 2003 KDHS. The birth orders that contributed to both rapid decline and stall in fertility in the two time periods were: 3, 4, 5 and 6 and above. In seeking to

establish determinants explaining these transitions; this study addressed specific objectives two, three and four highlighted in chapter one.

To achieve those, Cox Proportional hazards model was utilized to identify risk factors associated with each birth transition such as from a woman's second birth to third birth, from a woman's third to fourth birth and so on. These determinants were then analyzed to enable us explain fertility transition in Kenya for the two time periods and then determine the factors responsible for the stall in fertility.

Scholars and researchers have attempted to explain fertility transition in Kenya from three perspectives. Fertility transition in Kenya has been attributed to changes in proximate determinants especially increases in contraceptive prevalence (Ekisa and Hinde, 2005; Cross et al.,1991; Njogu, 1991; Brass and Jolly, 1993; Blacker, 2002; Ezeh and Dodo, 2001; Sibanda, 1999; Population council, 1998; Njogu, 1991;Dow et al., 1994), changes in attitudes regarding large family sizes due to high costs associated with raising up many children (Robinson, 1992) and changes in cultural environment supporting high fertility due to the pressures of modernization (Watkins, 2000). We test the hypothesis that fertility transition in Kenya is influenced by socio-economic, cultural, demographic, fertility preference and infant mortality factors.

We begin by describing the variables utilized for data analysis. Thereafter, we present the distribution of births for each of the parities for 1993 and 2003 respectively by the various parities by the background characteristic. This is followed by the presentation of

the results of the bivariate Cox regression results and finally, the results of the multivariate Cox regression results are presented.

5.2 Variables and their measurement

The dependent variable in this study is the duration of progression from say a second birth to a third birth, from a third to a fourth birth and so on for the five year period before Kenya Demographic and Health Surveys of 1993 and 2003. The independent variables included socio-economic, socio-cultural, demographic and the proximate determinants according to the conceptual framework. The socio-economic variables included educational attainment level, place of residence and region of residence. Socio-cultural variables included exposure status and religion while demographic variables included age cohort and age at the start of the interval. Infant mortality and desire for additional children were included as proximate variables in the study. Educational attainment level was categorized into: no education, primary incomplete level, primary complete level and secondary and above levels of educational attainment. Educational level is highly correlated with fertility. It is associated with higher future incomes and demand for quality children. Education increases the chances of participating in labour force (or employment) for women. Better educated women may reduce their completed fertility because of competing demands of their time by either limiting the number of births (children) or by having longer birth intervals.

Residence was categorized as rural and urban. Type of place of residence (rural/urban) is important because past studies suggest that it has an important effect on fertility transition (Oheneba-Sakyi & Tukyi, 1997; Diamond, 1999; Montgomery and Lloyd, 1999). Women

living in urban areas are in most cases more educated than their rural counterparts and they are able to embrace modernity that comes with access to job opportunities, better health care, family planning, and other social services. They are also able to embrace new values and ideas regarding childbearing and rearing, Consequently, fertility rates are expected to be lower in urban than in rural areas.

Kenya has eight administrative provinces including Nairobi, which is the capital city. Seven dummy variables representing each of these regions were created and Western province was chosen as the reference category. North Eastern province was excluded from this analysis for the purposes of comparability of the data sets. This is because North Eastern province was not included in the sample of KDHS 1993. Region of residence was included to capture regional differentials in socio-economic conditions in the country and also differences in socio-cultural practices. Studies have shown that that regions whose women have low education, limited formal-sector employment, and limited access to health and family planning outlets are expected to have high fertility rates. On the other hand, region of residence may be a proxy for ethnic or cultural differences that are related to fertility behaviour and fertility rates. Each of the regions in Kenya is inhabited by a particular ethnic group except Nairobi province that is cosmopolitan. Ethnicity may influence fertility rates through norms and customs affecting age at marriage, type of marital unions, postpartum abstinence, breastfeeding, and resilience in the face of innovation

Religion refers to a particular system of belief one is affiliated to. In this study the variable was recoded into: Catholics, Protestants/other Christians, Muslims and other religions. This variable was included to capture some of socio-cultural issues related childbearing. However, the variable does not measure religiosity i.e. the extent to which an individual may be committed to the ideals of his/her religion and hence it was only used as a proxy.

Survival status of the birth opening the interval (infant mortality) was a key study variable and was included to capture both the biological and insurance effects and how they influence transition from one birth to another. This is because the death of a child can result to shorter birth intervals. This occurs due to cessation of breastfeeding which shortens the period of post partum amenorrhea thus increasing the probability of conception. The insurance effect consists of both replacing a dead child with additional births and also giving birth to additional children with an anticipation that some may die. The advent of HIV/AIDS has rendered the relationship between child loss and fertility behaviour more complex, a fact that should be borne in mind when studying mortality-fertility relationships in Kenya. This variable was coded as equal to 1 if death occurred within twelve months (i.e. death at infancy) and equal to 0 if infant survives beyond 12 months since the effect of infant death on fertility behaviour is greater in infancy. The variable on desire for additional children was included to capture future fertility intentions. It was coded as: those who wanted no more children, and those who desired additional children. The age of the woman at the birth of the child opening the interval was included as a proxy variable for fecundity related differences in child bearing since

the onset of secondary sterility rises with age. In order to capture differential experiences of women at that age at the start of the interval, this variable was coded as; less than 25 years and 25 years and above.

5.3. Distribution of births of key parities by background characteristics for 1993 and 2003

This section presents a description of births of key parities by background characteristics for the Kenya Demographic and Health surveys of 1993 and 2003. The births of parities described here are: 3, 4, 5 and 6 and above. These parities were identified as having been responsible for the rapid decline in fertility in the five year period before 1993 KDHS and also for the stall in fertility in the five-year period before KDHS 2003. The analysis is based on 4,451 cases of parity 3 in 1993 and 4,458 cases of parity three in 2003, 3,608 cases of parity 4 in 1993 and 3,402 cases of parity 4 in 2003, 2,907 cases of parity 5 in 1993 and 2,487 cases of parity 5 in 2003, 7,272 cases of parity six and above in 1993 and 5,106 cases of parity six and above in 2003. The results are presented in table 5.1. (The detailed tables for these descriptions are attached as appendixes in this thesis).

The results show differential patterns of childbearing by levels of educational attainment for women in both 1993 and 2003 for parities 3.4, 5, 6 and above. The results indicate that most births in 1993 and 2003 occurred among women with primary education and in lower parities but in higher parities among those with no education. Similarly, most births occurred in rural areas and this increased at higher parities. The distribution of births by region of residence show that, majority of the births in 1993 and 2003 occurred to women living in Rift Valley, Nyanza, Eastern, Central and Western provinces and in lower

parities. In both time periods, majority of higher parity births were observed among women living in Rift Valley, Nyanza, Eastern, Western and Coast provinces. Furthermore, the findings show that majority of births occurred among women of middle age cohort in 1993 and in lower birth orders while for higher birth orders most of the births occurred among women of oldest age cohort in both 1993 and 2003. The results further indicate that most of the births were attributable to women who were currently in union both in 1993 and 2003 across all the parities. The distribution of births by religious affiliation shows that, majority of births occurred to women professing Protestant faith across all parities in both 1993 and 2003. Among women professing Catholic faith most births were attributed to women in 1993 while for women professing Muslim/other faith majority of the births occurred to women in 2003.

It is important to note that the distribution of births of key parities by background characteristics were generally higher in 2003 compared to 1993. The results have clearly shown that there were larger proportions of women of primary complete and secondary and above level of educational attainment, higher proportions from urban areas, higher proportions from Western, Nairobi, Central, Eastern, Nyanza and Rift Valley provinces, older age cohorts, other women and also women professing Muslim and other faith in all parities in 2003 compared to 1993. The shift in these proportions is likely to have influenced the differences in parity progression ratios between the two time periods and may also have played a part in the stall in fertility experienced in the country in 2003.

The next section of this analysis focuses on the identification of risk factors associated with transition to these key parities that were observed to have been responsible for the decline and stall in fertility between 1993 and 2003 respectively. These parities are: 3, 4, 5 and 6 and above.

Table 5.1: Distribution of births of key parities by key background characteristics for KDHS 1993 and 2003

Variable	Parity							
	2-3		3-4		4-5		5-6+	
	1993	2003	1993	2003	1993	2003	1993	2003
Educational attainment								
No education	25.39	21.58	28.41	25.40	31.99	29.67	42.50	41.15
Primary incomplete	37.09	29.59	37.25	30.39	38.18	31.56	39.31	31.69
Primary complete	18.96	24.02	18.49	23.31	17.27	21.75	11.58	16.88
Secondary plus	18.56	24.81	15.85	20.90	12.56	17.01	6.61	10.28
Residence								
Urban	12.15	27.01	10.17	23.60	8.26	20.91	5.63	15.80
Rural	87.85	72.99	89.83	76.40	91.74	79.09	94.37	84.20
Region								
Western	12.63	13.35	12.94	13.85	13.21	14.91	15.31	16.38
Nairobi	3.48	10.25	2.83	7.99	2.24	6.35	1.24	3.20
Central	14.18	16.97	13.80	15.70	13.18	14.11	11.20	8.96
Coast	13.37	12.77	13.08	12.56	12.45	13.27	11.29	13.84
Eastern	15.10	12.87	15.24	13.27	15.41	13.23	15.06	12.75
Nyanza	17.50	14.21	18.18	15.13	19.26	16.16	19.50	20.00
Rift Valley	23.75	19.57	23.92	21.20	24.25	21.97	26.40	24.88
Age cohort								
1969-1978	16.15	14.47	7.93	6.79	3.03	2.37	0.29	0.29
1959-1968	44.89	42.58	46.23	42.00	42.76	37.72	23.63	21.58
1944-1958	38.96	42.96	45.84	51.21	54.21	59.91	76.08	78.12
Exposure status								
Other	15.50	16.31	13.19	15.40	13.07	15.52	11.83	14.96
In union	84.50	83.69	86.81	84.60	86.93	84.48	88.17	85.04
Religion								
Catholic	30.64	22.32	30.17	22.12	31.27	21.33	33.13	20.88
Protestant	60.49	60.69	61.31	59.11	60.32	58.11	59.00	54.63
Muslim/Other	8.87	17.00	8.53	18.77	8.41	20.56	7.87	24.49

Source: Analysis of KDHS 1993 and 2003.

5.4 Determinants of fertility transition in Kenya

This section focuses on the identification of risk factors associated with transition to these key parities that were observed to have been responsible for the decline and stall in fertility between 1993 and 2003 respectively. These parities were: 3, 4, 5 and 6 and above. This section starts by presenting the bivariate Cox regression results for women in both 1993 and 2003. This entailed running a total of nine models for each of the identified birth transitions. The next section will present results of the multivariate analysis.

5.4.1 Determinants of birth transitions: Bivariate Analysis

The analyses included key variables that were identified as important in influencing fertility transition in Kenya. These factors were broadly identified as: socio-economic, socio-cultural, demographic and proximate factors. Socio-economic factors included: educational attainment levels, place of residence and region of residence while socio-cultural factors included were: exposure status and religion. Demographic factors included were: age cohort and age at the start of the interval and infant mortality was included as a proximate factor. The summarized results of the analysis are presented in Table 5.2. (The detailed tables are attached as appendixes in this thesis).

5.4.2 Determinants of transition from second birth to third birth in 1993 and 2003

Socio-economic factors

Educational attainment

The results show that educational attainment was associated with reduced risks of transition from second birth to third birth in both 1993 and 2003. The association was however, stronger in 2003 compared to 1993. Women with primary incomplete, primary complete and secondary and above level of educational attainment were associated with reduced risks of transition to a third birth in 2003 compared to 1993. Women with secondary and above level of educational attainment were 35 percent 26 percent respectively less likely to transition to a third birth in 2003 and 1993 respectively compared to women with no education. This implies that educational attainment was associated with fertility decline in both 1993 and 2003 and therefore may not have contributed to the stall in fertility experienced in 2003.

Residence

The findings show that, place of residence was an important factor associated with higher risks of transition for women from second birth to third birth in both 1993 and 2003. Women living in rural areas were 1.6 and 1.3 times more likely to transition from second birth to third birth respectively in 1993 and 2003. The effect of residence in both time periods was to increase the risk of transition to parity 3 even though the effect was less for women in 2003. This implies that residence may not have contributed much to the stall in fertility observed in 2003.

Region of residence

The effect of region of residence on the risk of transition from second birth to third birth was important for women in both 1993 and 2003. Women in Nairobi and Central provinces were associated with lower risks of transition from second birth to third birth in both 1993 and 2003. But for women in Nairobi province, the risk was lower for women in 1993 compared to 2003 while for women in Central province; the risk of transition to parity three was slightly lower in 2003 compared to 1993. Women in Coast and Eastern provinces were associated with lower risks of transition to parity 3 in 1993 and 2003 respectively. These results imply that it is not possible to directly link the stall in fertility experienced in the country in 2003 to reduced risk of transition to parity 3 in a few regions of the country.

Demographic factors

Age cohort

Age cohort was significantly associated with increased risks of transition from second birth to third birth for women in the middle and older age cohorts in 1993 but was associated with lower risks of transition for women 2003. The decline in the risks of transition to parity 3 for women in the middle and older age cohorts in 2003 suggest that this may have contributed to fertility stall experienced in 2003. It is important to note that these two groups of women had different socio-economic experiences. The period before KDHS 1993 was characterized by harsh economic conditions in the country which was exacerbated by the high inflation and post election violence resulting from the first multi-party general elections in 1992. The period before KDHS was relatively calm and the

economy had started showing signs of recovery. These may have influenced the fertility behaviour of these two groups of women.

Age at the start of the interval

Age at the start of the interval was significantly associated with reduced risks of transition from second birth to third birth for women in both 1993 and 2003. In both time periods women aged 25 years and above were less likely to transition to parity three and this implied that age at the start of the interval may not have played an important role in explaining the stall in fertility observed in 2003.

Socio-cultural factors

Exposure status

The findings showed that exposure status was associated with increased risks of transition from second birth to third birth in both 1993 and 2003. Women who were currently in union were 52 percent and 22 percent more likely to transition to a third birth compared to other women. These risks were much lower for women in 2003 compared to 1993 and hence associated with less fertility raising momentum. However, exposure status cannot be linked directly with the stall experienced in fertility in 2003.

Religion

Religion was not significantly associated with transition from second birth to third birth for women in both 1993 and 2003. This implies that religion cannot be directly linked with stalled fertility in 2003.

Proximate factors

Infant mortality

The findings showed that infant mortality was significantly associated with higher risks of transition to parity three in 2003 and not in 1993. Women who had experienced a death of an infant in 2003 were 63 percent more likely to transition from a second birth to a third birth compared to those whose infants had survived. The increased risk associated with transition to parity three may possibly be linked to the insurance effect where women who experienced the death of a young child are more likely than other women to want another child (Westoff and Cross, 2006). This has also been confirmed by other studies which found that increased child mortality increases fertility (Gyimah and Rajulton, 2004, 2002; Gyimah and Fernado, 2004; Gyimah, 2002, 2000). These results strongly suggest that infant mortality may have played an important role in the stall in fertility experienced in the five year period before KDHS 2003.

Desire for additional children

The findings show that desire for additional children was significantly associated with risks of transition from second birth to third birth for women in both 1993 and 2003. Women who desired an additional child were 31 percent and 23 percent respectively less likely to transition to a third birth in both 1993 and 2003. Researchers have noted a close relationship between fertility and fertility preferences (White et al., 2007; Bongaarts, 2006; Bongaarts and Watkins, 1996). These results imply that desire for additional children may not have played an important role in the stall in fertility experienced in the country in 2003.

5.4.3 Determinants of transition from third birth to fourth birth in 1993 and 2003

Socio-economic factors

Educational attainment

The findings show that educational attainment was associated with reduced risks of transition from third birth to fourth birth in 2003 and not in 1993. The impact of this association was strongest for women with primary complete and secondary and above level of educational attainment. Women with primary complete and secondary and above level of educational attainment were 19 percent and 23 percent respectively less likely to transition to a fourth birth compared to women with no education in 2003. This implies that educational attainment was associated with fertility decline in 2003 and not 1993 and therefore may have contributed to the stall in fertility experienced in 2003.

Residence

The results indicate that, place of residence was associated with higher risks of transition from third birth to fourth birth for women in both 1993 and 2003. Women living in rural areas were 79 percent and 22 percent more likely to transition from third birth to fourth birth respectively in both 1993 and 2003. Thus, the effect of residence in both time periods was to increase the risk of transition to parity 4 even though the effect was much less for women in 2003. This implies that residence may not have contributed much to the stall in fertility observed in 2003.

Region of residence

The results show that the effect of region of residence on the risk of transition from third birth to fourth birth was important for women in both 1993 and 2003. Women in Nairobi, Central, Coast and Eastern provinces were associated with lower risks of transition from third birth to fourth birth in both 1993 and 2003. But for women in Nairobi, Coast and Eastern provinces, the risks for transition to parity 4 were lower for women in 1993 compared to 2003 while for women in Central province, the risk of transition to parity four was slightly lower in 2003 compared to 1993. These results imply that it is not possible to directly link the stall in fertility experienced in the country in 2003 to reduced risk of transition to parity 4 in a few provinces in the country.

Demographic factors

Age cohort

Age cohort was significantly associated with increased risks of transition from third birth to fourth birth for women in the middle and older age cohorts in 1993 but was associated with lower risks of transition for women 2003. The decline in the risks of transition to parity 4 for women in the middle and older age cohorts in 2003 suggest that this may have contributed to fertility stall experienced in 2003. It is important to note that these two groups of women had different socio-economic experiences. The period before KDHS 1993 was characterized by harsh economic conditions in the country which was exacerbated by the high inflation and post election violence resulting from the first multi-party general elections in 1992. The period before KDHS was relatively calm and the

economy had started showing signs of recovery. These may have influenced the fertility behaviour of these two groups of women.

Age at the start of the interval

Age at the start of the interval was significantly associated with reduced risks of transition from third birth to fourth birth for women in both 1993 and 2003. The results show that women aged 25 years and above were less likely to transition to parity four compared those aged less than 25 years in both 1993 and 2004 and this means that it is unlikely that age at the start of the interval was an important factors in explaining the stall in fertility observed in 2003.

Socio-cultural factors

Exposure status

The results indicate that exposure status was associated with increased risks of transition from third birth to fourth birth in both 1993 and 2003. Women who were currently in union were 23 percent and 21 percent more likely to transition to a fourth birth compared to other women. These risks were slightly lower for women in 2003 compared to 1993. These results imply that, exposure status is not likely to have played a direct role in explaining stall in fertility experienced in 2003.

Religion

Religion was also significantly associated with transition from third birth to fourth birth for women in both 1993 and 2003. Women professing Protestant and Muslim/other

faiths were associated with lower risks of transition to parity 4 in 1993 while women professing Muslim/other faiths were associated with higher risk of transition to parity 4 in 2003. This group of women only constitutes a small proportion of the total number of women in the country and are unlikely to have played an important role in influencing the stall in fertility experienced in the country in 2003 (Westoff and Cross, 2006).

Proximate factors

Infant mortality

The results show that infant mortality was significantly associated with higher risks of transition to parity four in 2003 and not in 1993. Women who had experienced a death of an infant in 2003 were 57 percent more likely to transition from a third birth to a fourth birth compared to those whose infants had survived. The increased risk associated with transition to parity four may possibly be linked to the insurance effect where women who experienced the death of a young child are more likely than other women to want another child (Westoff and Cross, 2006; Gyimah and Fernado, 2004). These results strongly suggest that infant mortality may have played an important role in the stall in fertility experienced in the five year period before KDHS 2003.

Desire for additional children

The results indicate that desire for additional children was significantly associated with risks of transition from third birth to fourth birth for women in both 1993 and 2003. The risks to this transition were however, slightly higher for women in 2003 compared to women in 1993. The findings show that women who desired an additional child were 13

percent less likely to transition to a fourth birth in 2003 compared to 30 percent risk of transition to a fourth birth for women in 1993. Since, the relative risks of transition to a fourth birth are operating in the same direction, the results imply that desire for additional children may not have played an important role in the stall in fertility experienced in the country in 2003.

5.4.4 Determinants of transition from fourth birth to fifth birth in 1993 and 2003

Socio-economic factors

Educational attainment

The results show that educational attainment was associated with reduced risks of transition from fourth birth to fifth birth in both 1993 and 2003. The risk of transition to parity 5 was lowest for women with secondary and above level of educational attainment in 1993 compared to 2003 while women with primary complete level of educational attainment were associated with lower risks of transition to parity 5 in 2003 compared to 1993. This implies that educational attainment was associated with fertility decline in both 1993 and 2003 and not 1993 and therefore may have played a role in fertility stall experienced in 2003.

Residence

The results indicate that, place of residence was associated with higher risks of transition from fourth birth to fifth birth for women in both 1993 and 2003. Women living in rural areas were 1.4 and 1.1 times more times respectively more likely to transition from fourth birth to fifth birth respectively in both 1993 and 2003. This implies that the effect of

residence in both time periods was to increase the risk of transition to parity 5 even though the effect was much less for women in 2003. These results imply that residence may not have played an important role in the stalling fertility observed in 2003.

Region of residence

Moreover, the findings show that region of residence was associated with lower risks of transition from fourth birth to fifth birth for women in both 1993 and 2003. However, the impact was greater for women in 1993 compared to 2003. Women in Central province were associated with lower risks of transition from fourth birth to fifth birth in both 1993 and 2003 but women in Nairobi province were only associated with lower risk of transition to parity 5 in 1993. These findings imply that the stall in fertility experienced in 2003 cannot be directly linked to lower risks associated with transition to parity 5 in Nairobi and Central provinces of Kenya.

Demographic factors

Age cohort

The results show that age cohort was significantly associated with increased risks of transition to parity 5 for women in the middle and older age cohorts in 1993 but was associated with lower risks of transition to parity 5 for women 2003. The great declines in the risks associated with transition to parity 5 for women in 2003 imply that this may have contributed to the stall in fertility experienced in 2003.

Age at the start of the interval

The findings show that age at the start of the interval was also significantly associated with reduced risks of transition from fourth birth to fifth birth for women in both 1993 and 2003. Women aged 25 years and above were 39 percent and 44 percent less likely to transition to a fifth birth respectively compared to those aged less than 25 years at the time of entering this transition in both time periods. This implies that age at the start of the interval is unlikely to have played a major role in explaining the stall in fertility observed in 2003.

Socio-cultural factors

Exposure status

Exposure status was an important factor associated with increased risks of transition from fourth birth to fifth birth in both 1993 and 2003 although the risk was much lower for women in 2003. Women who were currently in union were 38 percent and 33 percent more likely to transition to parity 5 compared to other women in both time periods. These findings imply that exposure status may not have played a direct role in explaining stall in fertility experienced in 2003.

Religion

The results show that religion was significantly associated with higher risk of transition to parity 5 for women in 2003 only. Women professing Muslim/other faiths were 34 percent more likely to transition to parity 5 in 2003 compared to women professing the Catholic faith. These group of women only constitutes a small proportion of the total number of women in the country and are unlikely to have played an important role in influencing the stall in fertility experienced in the country in 2003 (Westoff and Cross, 2006).

Proximate factors

Infant mortality

The results show that infant mortality was significantly associated with higher risks of transition to parity 5 in 2003 and not in 1993. Women who had experienced a death of an infant in 2003 were 1.3 times more likely to transition to parity 5 compared to those whose infants had survived. The increased risk associated with transition to parity 5 may possibly be linked to the insurance effect where women who experienced the death of a young child are more likely than other women to want another child (Westoff and Cross, 2006). These findings imply that infant mortality may have played an important role in the stall in fertility experienced in the five year period before 2003 KDHS.

Desire for additional children

The findings indicate that desire for additional children was significantly associated with risk of transition from a fourth birth to fifth birth for women in 1993 and not 2003. Women who desired additional children were 23 percent less likely to transition from fourth birth to fifth birth in 1993 compared to those women who didn't desire additional children. Hence, desire for additional children is unlikely to have played a role in stall in fertility experienced in the country in the five-year period before KDHS 2003.

5.4.5 Determinants of transition from fifth birth to Sixth and above birth in 1993 and 2003

Socio-economic factors

Educational attainment

The findings show that educational attainment was associated with reduced risks of transition 6 and above 2003 and not in 1993. The risks of transition to parity 6 and above were lower for women with primary complete and secondary and above level of educational attainment in 2003 These results imply that educational attainment was associated with fertility decline in 2003 and may therefore have played a role in fertility stall experienced in 2003.

Residence

The results indicate that place of residence an important factor associated with associated with higher risks of transition from fifth birth to sixth and above birth for women in both 1993 and 2003. However, the risk was lower for women in 2003 compared to 1993.

Women living in rural areas were 24 and 14 percent more times respectively more likely to transition from fifth birth to sixth and above birth respectively in both 1993 and 2003. This implies that the effect of residence in both time periods was to increase the risk of transition to parity 6 and above. These results imply that residence may not have played an important role in the stalling fertility observed in 2003.

Region of residence

The findings show that region of residence was associated with reduced risk of transition from fifth birth to sixth and above birth. Women in Nairobi and Central provinces were associated with lower risks of transition from fifth birth to sixth and above birth both 1993 and 2003. But for women in Nairobi and Central provinces, the risks were lower in 1993 compared to 2003 while for women in Coast and Eastern provinces, the risk of transition to parity 6 and above were only significantly lower for women in 1993 and not in 2003. These findings imply fertility stall experienced in the country in 2003 may not have been directly linked to lower transitions to parity 6 and above associated with some of the regions in the country.

Demographic factors

Age cohort

The results show that age cohort was significantly associated with lower risk of transition to parity 6 and above for women in the older age cohort in both 1993 and 2003 but the risk was slightly lower for women in 2003 compared to 1993. The findings imply that in both time periods, the risks of transition to parity 6 and above were associated with

reduced fertility and that means that age cohort may have contributed directly to the stall in fertility experienced in 2003.

Age at the start of the interval

The results also show that age at the start of the interval was significantly associated with reduced risks of transition from fifth birth to sixth and above births for women in both 1993 and 2003. In both time periods, women aged 25 years and above at the start of this interval were 50 percent less likely to transition to parity 6 and above compared to women who were aged less than 25 years at the start of the interval. This implies that age at the start of the interval may not have played a direct role in explaining the stall in fertility observed in 2003. This is despite the existence of evidence from literature which has noted a close relationship between fertility and fertility preferences (White et al., 2006; Bongaarts, 2006; Bongaarts and Watkins, 1996).

Socio-cultural factors

Exposure status

Exposure status was an important factor associated with increased risks of transition from fifth birth to sixth and above birth in both 1993 and 2003 but the risk was slightly lower for women in 2003. Women who were currently in union were 24 percent and 23 percent more likely to transition to parity 6 and above compared to other women in both time periods. These findings imply that exposure status may not have played a direct role in explaining stall in fertility experienced in 2003.

Religion

The findings indicate that religion was significantly associated with higher risk of transition to parity 6 and above for women in 2003 only. Women professing Muslim/other faiths were 1.2 times more likely to transition to parity 6 and above in 2003 compared to women professing the Catholic faith. These group of women only constitutes a small proportion of the total number of women in the country and are unlikely to have played an important role in influencing the stall in fertility experienced in the country in 2003 (Westoff and Cross, 2006).

Proximate factors

Infant mortality

The findings indicate that infant mortality was significantly associated with higher risks of transition from fifth birth to sixth and above births for women in 2003 and not in 1993. Women who had experienced a death of an infant in 2003 were 35 percent more likely to transition to parity 6 and above compared to those whose infants had survived. Studies have linked increased child mortality with increases in fertility (Gyimah, 2002, 2000). These results suggest that infant mortality may have played an important role in the stall in fertility experienced in the five year period before KDHS 2003.

Desire for additional children

The findings indicate that desire for additional children was significantly associated with risks of transition from a fifth birth to sixth and above birth for women in both 1993 and 2003. The risks were however, significantly higher for women in 2003 compared to 1993.

Women who desired additional children were 27 percent more likely to transition from fifth birth to sixth and above birth in 2003 compared to those women who did not desire additional children. On the other hand, women who desired additional children were 17 percent less likely to transition from fifth birth to sixth and above birth in 2003 compared to those women who did not desire additional children. This implies that, desire for additional children may have partly played a role in stall in fertility experienced in the country in the five-year period before KDHS 2003. This may support evidence from literature which has noted a close relationship between fertility and fertility preferences (White et al., 2006; Bongaarts, 2006; Bongaarts and Watkins, 1996).

5.4.6 Summary

This section focused on the bivariate Cox Proportional hazard regression results to identify factors associated with transition to key parities that were identified as having been responsible for the rapid decline in fertility experienced in Kenya in 1993 and the stall in fertility experienced in the country in 2003. The results showed that, educational attainment was significantly associated with reduced risk of transition to the parities considered in both 1993 and 2003 but this association was stronger in 2003 compared to 1993. This pattern was observed in all parities except parity 3-4 where the effect was higher in 1993. These findings imply that in both time periods, educational attainment was associated with fertility decline and cannot possibly explain the stall in fertility experienced in 2003. This is because educational attainment played a similar and an even stronger role in fertility reduction in 2003 compared to 1993. Place of residence was also an important factor influencing transition to these parities in both 1993 and 2003.

Women living in rural areas were associated with higher risks of transition for all parities and the effect was lower in 2003 compared to 1993 and the effect was observed to decline for higher parities. Hence, place of residence cannot be directly linked to the stall in fertility observed in the country in 2003. The effect of region of residence on the risks associated with transition to all parities was important in 1993 and 2003 with women in Nairobi and Central provinces having lower risks of transition but the effect for Nairobi was greater in 1993 compared to 2003 while in Central province the effect was stronger in 2003. These risks were observed to reduce at higher parities. These results imply that it is difficult to link region of residence with fertility stall experienced in the country in 2003. Age cohort was equally significantly associated with higher risks of transition to these parities in 1993 but lower risks of transition for all parities in 2003 and it is possible that it may have played a role in the stall in fertility observed in 2003. Furthermore, age at the start of the interval was associated with lower risks of transitions to these parities in both 1993 and 2003 and may not have played a direct role in the stalling fertility in 2003.

Marital status was also an important factor associated with higher risks of transition in both 1993 and 2003 but the reduced effects in 2003 were associated with lower fertility and hence may not have played a direct role in fertility stall experienced in 2003. Infant mortality was an important factor associated with higher transitions for all parities in 2003 and not in 1993. The increased risk associated with transition to these parities may possibly be linked to the insurance effect where women who experienced the death of a young child are more likely than other women to want another child (Westoff and Cross, 2006). This has also been confirmed by other studies which found that increase child

mortality increases fertility (Gyimah and Rajulton, 2004). These results strongly suggest that infant mortality may have played an important role in the stall in fertility experienced 2003. All the above factors were included in the multivariate model to determine their net effect on the transitions to these parities in both 1993 and 2003. The results also showed that desire for additional children was only partly associated with stall in fertility for women transitioning from fifth birth to sixth and above birth. These findings seem to support evidence from literature which has noted a close relationship between fertility and fertility preferences (White et al., 2006; Bongaarts, 2006; Bongaarts and Watkins, 1996).

Due to the limitations associated with the variable on fertility preference on regression models, this variable was excluded in the multivariate analysis. The inclusion of such a variable into regression models tends to bias the estimates of the parameter coefficients and renders the regression results biased and inconsistent (Kennedy, 2003; Kmetta, 1997). The results are discussed in the next section. The next section will present results for the multivariate analysis. This will give the broad relationship of these factors and parity transitions with a view to unveiling the specific factors which may have influenced the decline and stall in fertility in 1993 and 2003 respectively.

Table 5.2: Bivariate Cox regression results for transitions to third, fourth, fifth and sixth above birth: KDHS 1993 and 2003.

Variable	Parity							
	2-3		3-4		4-5		5-6+	
	1993	2003	1993	2003	1993	2003	1993	2003
Educational attainment								
No education (Ref.)	-	-	-	-	-	-	-	-
Primary incomplete	1.051 (0.050)	0.916 (0.039)*	0.977 (0.050)	0.906 (0.042)*	0.957 (0.053)	0.865 (0.044)**	1.029 (0.031)	0.980 (0.032)
Primary complete	0.947 (0.054)	0.802 (0.036)***	0.798 (0.051)	0.806 (0.040)***	0.853 (0.061)*	0.789 (0.045)***	0.942 (0.042)	0.861 (0.035)***
Secondary plus	0.739 (0.045)***	0.645 (0.029)***	0.639 (0.045)	0.666 (0.034)***	0.632 (0.054)***	0.719 (0.044)***	0.943 (0.053)	0.753 (0.037)***
Residence								
Urban (Ref.)	-	-	-	-	-	-	-	-
Rural	1.608 (0.103)***	1.256 (0.043)***	1.791 (0.142)***	1.222 (0.050)***	1.374 (0.129)***	1.105 (0.055)*	1.247 (0.072)***	1.136 (0.044)***
Region								
Western (Ref.)	-	-	-	-	-	-	-	-
Nairobi	0.574 (0.073)***	0.650 (0.042)***	0.494 (0.075)***	0.664 (0.053)***	0.489 (0.096)***	0.851 (0.085)	0.669 (0.081)***	0.796 (0.073)***
Central	0.799 (0.059)***	0.713 (0.041)***	0.766 (0.063)***	0.691 (0.046)***	0.711 (0.066)***	0.712 (0.056)***	0.774 (0.040)***	0.804 (0.050)***
Coast	0.804 (0.061)***	0.898 (0.055)	0.723 (0.062)***	0.834 (0.058)**	0.894 (0.084)	1.020 (0.081)	0.822 (0.043)***	0.973 (0.054)
Eastern	0.922 (0.067)	0.826 (0.050)***	0.853 (0.068)*	0.858 (0.059)*	0.929 (0.081)	0.884 (0.070)	0.876 (0.043)**	0.978 (0.055)
Nyanza	0.977 (0.068)	0.974 (0.058)	0.962 (0.073)	0.943 (0.063)	0.962 (0.081)	0.995 (0.075)	0.926 (0.043)	1.015 (0.051)
Rift Valley	0.905 (0.060)	0.948 (0.052)	0.923 (0.067)	0.955 (0.059)	0.941 (0.075)	1.006 (0.071)	0.987 (0.043)	1.063 (0.051)

Age cohort								
1969-1978 (Ref.)-	-	-	-	-	-	-	-	-
1959-1968	1.598 (0.118)***	0.618 (0.029)***	1.659 (0.206)***	0.603 (0.043)***	1.921 (0.519)*	0.580 (0.078)***	-	-
1944-1958	1.845 (0.137)***	0.661 (0.030)***	2.160 (0.266)***	0.547 (0.039)***	2.363 (0.636)***	0.467 (0.062)***	0.720 (0.024)***	0.676 (0.023)***
Age at start of interval								
Less than 25 years (Re.)	-	-	-	-	-	-	-	-
25 years and above	0.489 (0.021)***	0.414 (0.016)***	0.553 (0.025)***	0.460 (0.020)***	0.606 (0.039)***	0.438 (0.027)***	0.537 (0.060)***	0.477 (0.036)***
Infant mortality								
Alive (Ref.)	-	-	-	-	-	-	-	-
Dead	1.103 (0.106)	1.627 (0.098)***	1.053 (0.121)	1.568 (0.105)***	1.117 (0.146)	1.284 (0.105)***	0.923 (0.055)	1.350 (0.068)***
Desire for additional children								
Wants no more(Ref.)	-	-	-	-	-	-	-	-
Wants more children	0.687 (0.031)***	0.769 (0.028)***	0.695 (0.038)***	0.868 (0.039)***	0.765 (0.050)***	0.983 (0.0541)	0.829 (0.049)***	1.265 (0.044)***
Exposure status								
Other (Ref.)	-	-	-	-	-	-	-	-
In union	1.515 (0.087)***	1.215 (0.049)****	1.230 (0.080)***	1.214 (0.058)***	1.384 (0.102)***	1.133 (0.063)*	1.241 (0.051)***	1.234 (0.049)***
Religion								
Catholic	-	-	-	-	-	-	-	-
Protestant	1.044 (0.044)	0.998 (0.037)	0.911 (0.043)*	0.996 (0.043)	0.981 (0.052)	1.053 (0.054)	0.994 (0.029)	1.044 (0.038)
Muslim/Other	0.877 (0.060)	1.129 (0.055)*	0.800 (0.067)**	1.219 (0.066)***	0.996 (0.094)	1.336 (0.083)***	0.968 (0.052)	1.178 (0.049)***

Ref. means reference category. ****p<0.000 **p<0.01 *p<0.05. Standard errors are in parentheses.

Source: Analysis of KDHS 1993 and 2003.

5.5 Determinants of Fertility in 1993 and 2003 in Kenya

This section presents the results of the multivariate analysis. The results focus on the factors identified as being associated with transition to third, fourth, fifth, sixth and above births for both 1993 and 2003. These key parities were observed to have been responsible for the decline and stall in fertility between these two time periods. A total of eight Cox proportional hazard models were fitted; four models for each of the time periods. The summarized results are presented in table 5.3. (The detailed tables are attached in the appendix). The results are discussed below for key socio-economic, cultural, demographic and proximate factors influencing transition to these parities for the two time periods.

5.5.1 Determinants of transition from second birth to third birth in 1993 and 2003

Socio-economic factors

Educational attainment

When all factors are controlled, the results show that educational attainment was significantly associated with increased risk of transition from second birth to third birth in 1993 and reduced risk of transition in 2003. Women with primary incomplete and primary complete level of education were associated with increased risks of transition to a third birth in 1993. Women with primary incomplete and primary complete level of education were 17 percent and 13 percent respectively more likely to transition to a third birth in 1993 compared to women with no education. For 2003, women with primary complete and secondary and above level of educational attainment were less likely to transition to a third birth compared to women who had no education. These results imply that educational attainment was associated with fertility increase 1993 and fertility

reduction in 2003 and therefore may have contributed to the stall in fertility experienced in 2003.

Residence

The findings show that place of residence was an important factor associated with higher risks of transition from second birth to third birth for women in 1993 and not 2003. Women living in rural areas were 35 percent and 16 percent respectively more likely to transition from second birth to third birth in 1993 and 2003 compared to those living in urban areas. The effect of residence in both 1993 and 2003 was to increase the risk of transition to parity 3 and hence place of residence may not have played an important role in the stalling fertility observed in 2003.

Region of residence

Region of residence was significantly associated with reduced risk of transition from second birth to third birth in 2003 and not in 1993. Women in Central and Nairobi provinces were associated with lower risk of transition from second birth to third birth in 2003. These findings imply that fertility stall experienced in the country in 2003 may not have been directly linked to lower transitions from second birth to third birth 3 experienced by women in Central and Nairobi provinces of the country.

Demographic factors

Age cohort

The results show that age cohort was significantly associated with higher risks of transition from second birth to third birth for women in the middle and older age cohorts in both 1993 and 2003 but the risk was slightly higher for women in 2003 compared to 1993. These results imply that in both time periods, the risks of transition from second birth to third birth were associated with increased fertility and that hence age cohort may not have contributed directly to the stall in fertility experienced in 2003.

Age at the start of the interval

The findings show that age at the start of the interval was significantly associated with lower risk of transition from second birth to third birth in both 1993 and 2003 but the risk was slightly lower for women in 2003 compared to 1993. Women who were aged 25 years and above were 60 percent less likely to transition from a second birth to a third birth in both time periods compared to those aged less than 25 years at the start of the interval. It is therefore, unlikely that age at the start of the interval may have played an important role in stalling fertility experienced in the country in 2003.

Socio-cultural factors

Exposure status

Exposure status was an important factor associated with increased risks of transition from second birth to third birth in both 1993 and 2003 although the risk was slightly lower for women in 2003. Women who were currently in union were 40 percent and 23 percent

respectively more likely to transition to parity 3 compared to other women in both time periods. These findings imply that exposure status was associated with fertility increase in both time periods and may not have played a direct role in explaining stall in fertility experienced in 2003.

Religion

The findings indicate that religion was not significantly associated with the risk of transition from second birth to third birth for women in both 1993 and 2003. This implies that religion may not have directly contributed to the stall in fertility experienced in the country in 2003.

Proximate factors

Infant mortality

The results show that infant mortality was significantly associated with higher risk of transition from second birth to third birth for women in 2003 and not in 1993. Women who had experienced a death of an infant in 2003 were 68 percent more likely to transition to parity 3 compared to those whose infants had survived. The increased risk associated with transition to parity 3 may possibly be linked to the insurance effect where women who experienced the death of a young child are more likely than other women to want another child (Westoff and Cross, 2006). This has also been confirmed by other studies which found that increased child mortality increases fertility (Gyimah and Rajulton, 2004, 2002; Gyimah and Fernado, 2004; Gyimah, 2002, 2000). These results

imply that infant mortality may have played an important role in the stall in fertility experienced in the five year period before 2003 KDHS.

5.5.2 Determinants of transition from third birth to fourth birth in 1993 and 2003

Socio-economic factors

Educational attainment

The results show that educational attainment was significantly associated with the risk of transition from third birth to fourth birth for women in 2003 and not in 1993. Women with secondary and above level of education were 23 percent less likely to transition from thirds birth to fourth birth compared to women with no education. This implies that secondary and above level of educational attainment is associated with decline in fertility and is consistent with KDHS results of 2003 which found that women with secondary and above level of education had experienced a modest fertility decline. It is clear that educational attainment was not likely to have played a direct role in the stall in fertility experienced in the country in 2003.

Residence

The findings indicate that place of residence was an important factor associated with the risk of transition from third birth to fourth birth for women in both 1993 and 2003 but the risk of transition was higher for women in 1993 compared to 2003. Women living in rural areas were 50 percent and 18 percent respectively more likely to transition from a third birth to a fourth birth in both 1993 and 2003 compared to women living in urban areas.

These results imply that residence in rural areas was associated with increase in fertility and may not have been directly linked to the stall in fertility experienced in 2003.

Region of residence

The results show that region of residence was significantly associated with reduced risk of transition from third birth to fourth birth for women in both 1993 and 2003. Women in Central were associated with lower risk of transition from third birth to fourth birth in both 1993 and 2003 compared to women in Western province. On the other hand, women in Nairobi and Coast provinces were associated with lower risks of transition from third birth to fourth birth in 2003 and not in 1993. Hence, the lower risks associated with transition to parity 4 for women in Nairobi, Central and Coast provinces cannot be directly linked to the stall in fertility experienced in the country in 2003.

Demographic factors

Age cohort

Age cohort was significantly associated with higher risks of transition from third birth to fourth birth for women in the middle and older age cohorts in both 1993 and 2003. However, these risks were slightly higher for women in 2003 compared to 1993. The findings imply that the risks of transition to parity 4 were associated with a tendency towards increased fertility in both 1993 and 2003 and hence age cohort may not have contributed directly to the stall in fertility experienced in 2003.

Age at the start of the interval

The results show that age at the start of the interval was an important factor associated with lower risk of transition from third birth to fourth third birth in both 1993 and 2003 although the risk was slightly lower for women in 2003 compared to 1993. In both time periods women aged 25 years and above at the start of the interval were 50 percent and 52 percent respectively less likely to transition from third birth to fourth birth compared to women aged less than 25 years at the start of the interval. Hence, age at the start of the interval may not have contributed directly to the stall in fertility experienced in 2003.

Socio-cultural factors

Exposure status

Exposure status was significantly associated with increased risks of transition from third birth to fourth birth in both 1993 and 2003. Women who were currently in union were 24 percent and 22 percent respectively more likely to transition to parity 3 compared to other women in both time periods in 1993 and 2003. Thus, exposure status was associated with fertility increase in both time periods and may not have played a direct role in the stall in fertility experienced in 2003.

Religion

Religion was significantly associated with the risk of transition from third birth to fourth birth for women in 2003 and not in 1993. Women professing Muslim/other religious faiths were 23 percent more likely to transition from third birth to fourth birth in 2003 compared to women professing the Catholic faith. But given the small proportion of

women professing Muslim/other religious faiths it is highly unlikely that religion may have played a direct role to the stall in fertility experienced in the country in 2003.

Proximate factors

Infant mortality

Infant mortality was an important factor associated with higher risk of transition from third birth to fourth birth for women in 2003 and not in 1993. Women who had experienced a death of an infant in 2003 were 1.6 times more likely to transition to parity 4 compared to those whose infants had survived. Death of an infant may have prompted women to replace them due to the high infant and child mortality prevailing in the country at the time (Magadi and Agwanda, 2010; Westoff and Cross, 2006). Such findings have also been confirmed by other studies which found that increase child mortality increases fertility (Gyimah and Rajulton, 2004, 2002; Gyimah and Fernado, 2004; Gyimah, 2002, 2000). Thus, the findings suggest that infant mortality may have played an important role in the stall in fertility experienced in the five year period before 2003 KDHS.

5.5.3 Determinants of transition from fourth birth to fifth birth in 1993 and 2003

Socio-economic factors

Educational attainment

Educational attainment was significantly associated with the risk of transition from fourth birth to fifth birth for women in both 1993 and 2003. Women with secondary and above level of educational attainment were associated with lower risks of transition to parity 5

in both 1993 and 2003 while women with primary complete level of educational attainment were associated with lower risk of transition from a fourth birth to a fifth birth in 2003 and not 1993. In both time periods, educational attainment is associated with fertility decline and hence it is unlikely to have played an important role in the fertility stall experienced in the country in 2003.

Residence

The results show that place of residence was an important factor associated with the risk of transition from fourth birth to fifth birth for women in 2003 and not 1993. Women living in rural areas were 21 percent more likely to transition from fourth birth to fifth birth in 2003 compared to those residing in urban areas. Hence, place of residence may not have had a direct role in influencing the stalling fertility experienced in 2003.

Region of residence

Region of residence was associated with lower risks of transition from fourth birth to fifth birth for women in both 1993 and 2003. Women in Central province were associated with lower risks of transition from fourth birth to fifth birth in both 1993 and 2003 compared to women from Western province while women in Nairobi province were associated with lower risk of transition from fourth to fifth birth in 1993 only. These findings imply that region of residence may not have played a direct role in fertility stall experienced in 2003.

Demographic factors

Age cohort

The findings also indicate that age cohort was an important factor associated with higher risks of transition from fourth birth to fifth birth for women in the middle and older age cohorts in both 1993 and 2003. However, the risk was slightly higher for women in 2003 compared to 1993. These findings imply that in both 1993 and 2003, the risks of transition to parity 5 were associated with increased fertility and that means that age cohort may not have contributed directly to the stall in fertility experienced in 2003.

Age at the start of the interval

The effect of age at the start of the interval was important for women in both 1993 and 2003. Age at the start of the interval was associated with lower risk of transition from fourth birth to fifth third birth in both time periods although the risk was slightly lower for women in 2003 compared to 1993. In both time periods, women aged 25 years and above at the start of the interval were 45 percent and 57 percent respectively less likely to transition to a fifth birth compared to women who were aged less than 25 years at the start of the interval. Hence, age at the start of the interval may not have played a direct role in the stall in fertility experienced in 2003.

Socio-cultural factors

Exposure status

Exposure status was significantly associated with increased risk of transition from fourth birth to fifth birth for women in 1993 and not in 2003. Women who were currently in

union were 41 percent more likely to transition from fourth birth to fifth birth compared to other women in 1993. This implies that exposure status was associated with fertility increase in 1993 and was therefore unlikely to have played any direct role in the fertility stall experienced in 2003.

Religion

The results indicate that religion was not an important factor associated with the risk of transition from fourth birth to fifth birth for women in both 1993 and 2003. Hence, religion is not likely to have directly influenced the stall in fertility observed in 2003.

Proximate factors

Infant mortality

The results show that infant mortality was significantly associated with higher risk of transition from fourth birth to fifth birth for women in 2003 and not in 1993. Women who had experienced a death of an infant in 2003 were 46 percent more likely to transition from fourth birth to fifth birth compared to those whose infants had survived. Studies have linked increased infant and child mortality to increases in fertility (Westoff and Cross, 2006; Gyimah and Rajulton, 2004, 2002). Hence, these findings imply that infant mortality may have played an important role in the stall in fertility experienced in the country in 2003.

5.5.4 Determinants of transition from fifth birth to sixth and above birth in 1993 and 2003

Socio-economic factors

Educational attainment

In the presence of control factors, educational attainment was significantly associated with increased risk of transition from fifth birth to sixth and above birth for women in both 1993 and 2003. However, the association was stronger in 1993 compared to 2003. Women primary complete level of education were associated with lower risk of transition from a fifth birth to a sixth and above birth in 1993 and not in 2003 while women with secondary and above level of education were associated with lower risks of transition from fifth birth to sixth and above birth in both 1993 and 2003. Educational attainment was associated with fertility decline in both 1993 and not 2003 for women with secondary and above level of educational attainment. The proportion of this group of women to the overall was about 10 percent in 2003 and hence may not have directly contributed to the stall in fertility experienced in 2003.

Residence

The findings show that the effect of place of residence was important for women in both 1993 and 2003. Residence was associated with higher risks of transition from fifth birth to sixth and above birth for women in both 1993 and 2003. However, the risks were slightly lower for women in 2003 compared to 1993. Hence, the effect of residence in both 1993 and 2003 was to increase the risk of transition to parity 6 and above and hence residence may not have contributed directly to the stalling fertility observed in 2003.

Region of residence

Region of residence was significantly associated with reduced risk of transition from fifth birth to sixth and above births in both 1993 and 2003 but the effect was stronger for women in 1993 compared to 2003. Women in Central province were associated with lower risk of transition from fifth birth to sixth and above births in both 1993 and 2003. However, the risk was lower for women in 1993 compared to 2003. On the other hand, women in Coast and Eastern provinces were associated with reduced risks of transition from fifth birth to sixth birth in 1993 and not in 2003. These results imply that the fertility stall experienced in the country in 2003 may not have been directly linked to lower transitions to parity 6 and above experienced by women in Central, Coast and Eastern provinces of Kenya.

Demographic factors

Age cohort

The results show that age cohort was significantly associated with higher risks of transition from fifth birth to sixth and above births for women in older age cohort in both 1993 and 2003. These women were 14 percent more likely to transition from fifth birth to sixth and above births in 1993 while in 2003 these women were 31 percent less likely to transition to the same parity. The findings imply that the high risk of transition to parity 6 and above was associated with fertility decline in 1993 and lower risk of transition to parity 6 and above was associated with fertility stall in 2003 and hence age cohort may have partly played a role in the stall in fertility experienced in 2003.

Age at the start of the interval

Age at the start of the interval was associated with lower risks of transition from fifth birth to sixth and above births for women in both 1993 and 2003. Women aged 25 years and above were 50 percent less likely to transition from fifth birth to six and above births in both 1993 and 2003 compared to women aged less than 25 years. Hence, age at the start of the interval was associated with reducing effect on fertility and may not have played a direct role in the stall in fertility experienced in 2003.

Socio-cultural factors

Exposure status

Exposure status was significantly associated with increased risk of transition from fifth birth to sixth and above births for women in both 1993 and 2003. However, the risk was slightly lower for women in 2003 compared to 1993. Women who were currently in union were 21 percent and 22 percent respectively more likely to transition from fifth birth to sixth and above births compared to other women in both 1993 and 2003. Thus, exposure status was associated with fertility increase in 1993 and 2003 and was therefore unlikely to have played a direct role in the fertility stall experienced in 2003.

Religion

Religion was not significantly associated with the risk of transition from fifth birth to sixth birth for women in both 1993 and 2003. Hence, religion is not likely to have played a direct role in the stall in fertility observed in 2003.

Proximate factors

Infant mortality

Infant mortality was significantly associated with higher risk of transition from fifth birth to sixth and above births for women in 2003 and not in 1993. Women who had experienced a death of an infant in 2003 were 1.3 times more likely to transition from fifth birth to sixth and above births compared to those whose infants had survived. The increased risk associated with transition to parity 6 and above may be attributed to desire by women who experienced the death of a young child to want a replacement (Westoff and Cross, 2006). Such findings have also been confirmed by other studies which found that increased child mortality increases fertility (Gyimah and Rajulton, 2004, 2002; Gyimah and Fernado, 2004; Gyimah, 2002, 2000). These findings strongly suggest that infant mortality may have played an important role in the stall in fertility experienced in the country in 2003.

Table 5.3: Multivariate Cox regression results for transitions to third, fourth, fifth and sixth above birth: KDHS 1993 and 2003.

Variable	Parity							
	2-3		3-4		4-5		5-6+	
	1993	2003	1993	2003	1993	2003	1993	2003
Educational attainment								
No education (Ref.)	-	-	-	-	-	-	-	-
Primary incomplete	1.170 (0.059)***	0.931 (0.051)	1.082 (0.058)	1.000 (0.060)	1.044 (0.061)	0.890 (0.061)	0.981 (0.036)	0.998 (0.039)
Primary complete	1.130 (0.069*	0.884 (0.052)*	1.032 (0.071)	0.959 (0.064)	1.016 (0.077)	0.814(0.063)***	0.821 (0.049)***	0.957 (0.045)
Secondary plus	1.084 (0.074)	08.10 (0.051)***	0.871 (0.068)	0.773 (0.056)***	0.748 (0.068)**	0.715 (0.0062)***	0.722 (0.058)***	0.842 (0.046)***
Residence								
Urban (Ref.)	-	-	-	-	-	-	-	-
Rural	1.352 (0.110)***	1.164 (0.062)***	1.505 (0.151)***	1.177 (0.076)***	1.145 (0.130)	1.209 (0.095)*	1.282 (0.120)***	1.137 (0.058)***
Region								
Western (Ref.)	-	-	-	-	-	-	-	-
Nairobi	0.954(0.141)	0.810 (0.071)*	0.800 (0.144)	0.733 (0.081)***	0.619 (0.139)*	0.866 (0.126)	0.875 (0.166)	0.913 (0.094)
Central	0.874 (0.066)*	0.775 (0.052)***	0.811 (0.068)***	0.718 (0.057)***	0.785 (0.074)****	0.675 (0.065)***	0.815 (0.053)***	0.853 (0.054)***
Coast	0.976 (0.085)	0.936 (0.073)	0.845 (0.082)	0.755 (0.068)***	0.927 (0.099)	0.906 (0.099)	0.823 (0.064)***	0.935 (0.059)
Eastern	0.979 (0.071)	0.890 (0.062)	0.863 (0.069)	0.860 (0.068)	0.977 (0.086)	0.838 (0.078)	0.871 (0.052)*	0.963 (0.055)
Nyanza	0.954 (0.067)	0.905 (0.060)	0.918 (0.071)	0.938 (0.071)	0.996 (0.085)	0.975 (0.085)	0.917 (0.053)*	0.981 (0.050)

Rift Valley	0.940 (0.063)	0.950 (0.059)	0.896 (0.066)	0.918 (0.065)	0.972 (0.079)	0.959 (0.078)	0.983 (0.052)	1.025 (0.050)
Age cohort								
1969-1978 (Ref.)-	-	-	-	-	-	-	-	-
1959-1968	2.2.99 (0.174)***	2.419 (0.189)***	2.717 (0.346)***	3.779 (0.609)***	3.278 (0.903)***	6.181 (2.805)***	-	-
1944-1958	2.723 (0.211)***	3.44 (0.258)***	3.420 (0.437)***	5.309 (0.849)***	4.159 (1.146)***	8.768 (3.970)***	1.140 (0.051)***	0.690 (0.027)***
Age at start of interval								
Less than 25 years (Ref.	-	-	-	-	-	-	-	-
25 years and above	0.425 (0.020)***	0.372 (0.016)***	0.494 (0.024)***	0.421 (0.021)***	0.548 (0.037)***	0.430 (0.030)***	0513 (0.0059)***	0.509 (0.045)***
Infant mortality								
Alive (Ref.)	-	-	-	-	-	-	-	-
Dead	1.003 (0.098)	1.683 (0.117)***	0.990 (0.114)	1.620 (0.129)***	1.003 (0.132)	1.457 (0.144)***	0.935 (0.070)	1.304 (0.072)***
Exposure status								
Other (Ref.)	-	-	-	-	-	-	-	-
In union	1.404 (0.081)***	1.226 (0.059)***	1.240 (0.081)***	1.221 (0.070)***	1.413 (0.106)***	1.085 (0.074)	1.212 (0.063)***	1.215 (0.052)***
Religion								
Catholic(Ref.)	-	-	-	-	-	-	-	-
Protestant	**1.016 (0.044)**	**0.992 (0.042)**	**0.917 (0.044)**	**1.084 (0.0.055)**	**1.000 (0.053)**	**1.064 (0.064)**	**0.966 (0.035)**	**1.026 (0.038)**
Muslim/Other	0.938 (0.083)	0.943 (0.071)	0.921 (0.090)	1.234 (0.110)*	1.020 (0.113)	1.092 (0.118)	0.979 (0.081)	1.040 (0.065)

Ref. means reference category. ****p<0.000 **p<0.01 *p<0.05. Standard errors are in parentheses.

Source: Analysis of KDHS 1993 and 2003.

5.5.5 Discussion

This chapter tested a number of hypotheses regarding factors influencing parity transition in Kenya between the 1993 KDHS and 2003 KDHS. We hypothesized that socio-economic, socio-cultural, demographic and proximate factors are likely to be important determinants of parity transition in Kenya for the two time periods. We sought to explain fertility transition in Kenya by examining factors responsible for the birth transitions that were critical in explaining the rapid decline in fertility experienced in the five year-period before KDHS 1993 and the stall in fertility experienced in the five-year period before KDHS 2003. The factors responsible for these birth transitions may be indicative of changes in family size preferences in Kenya. The parity specific approach adopted by this study is useful for analysing the family-building process. This is because when people think in terms of having children, they think in terms of whether or not and when to have a first or a subsequent birth.

According to the demographic transition theory, changes in socio-economic conditions are considered as a major cause of fertility change over time. This is because the high costs and benefits associated with children motivate parents to have fewer children and decline in mortality raises survival chances of children. This means that parents need fewer children to achieve their desired fertility. This scenario creates demand for family planning as parents seek to maintain their desired fertility. Consequently as a society advances in socio-economic development the social costs of birth control are also reduced.

For each of the two time periods i.e. 1993 and 2003 ; four Cox proportional hazard regression models were fitted to identify factors responsible for transitions from second

birth to third birth, third birth to fourth birth, fourth birth to fifth birth and fifth to sixth and above births. The first three transitions were critical in the identification of factors responsible for birth spacing in the two time periods while the last transition was meant to identify factors associated with stopping behaviour of childbearing among women in the higher parities during these two unique periods in fertility transition in Kenya. The multivariate results showed that in the presence of other control factors, the effect of educational attainment was parity specific and this was contrary to earlier generalizations about the effect of education on parity transitions. Secondary and above level of educational attainment was significantly associated with lower risk of transition to parity 3,4, 5 and parity 6 and above for women in 2003 while for 1993 secondary and above level of educational attainment was only associated with lower risk of transition to parity 5 and parity 6 and above. Women with primary incomplete and complete primary level of educational attainment were associated with increased risk of transition to parity 3 in 1993 and not 2003. Women with primary complete level of educational attainment were associated with lower risk of transition to parity 3 and 5 and above in 1993 while in 2003 these women were associated with lower risk of transition to parity 3 and 6 and above. However, the results also indicate that educational attainment levels were not significantly associated with the transitions to parities 4 for both 1993 and 2003.

Evidence from KDHS results in 2003 showed that overall fertility increased for women with no education and those who had primary incomplete level of educational attainment but it remained the same for those who had completed primary level of education. The results also showed that fertility continued to decline for women who had secondary and

above level of educational attainment. The findings from this study therefore imply that the continued decline in fertility for this group of women in the five year period before KDHS 2003 could have been attributed to the lower risks associated with transition to parities 3, 4, 5 and 6 and above for women in 2003. It is also possible that the decline in fertility for this group of women could be attributed to the increase in the proportion of women sampled in 2003 compared to those included in the KDHS of 1993.

Other studies done in Kenya also support the view that fertility decline continued for women with secondary and above level of education (Askew et al., 2009; Westoff and Cross, 2006 & CBS et al., 2004). Given the relatively small proportion of women secondary and above level of education relative to other women in Kenya in 2003, it is unlikely that this category of women may have played such an important role in the stall in fertility observed in the country in 2003.

Available literature demonstrates strong association between fertility change and education. For instance, research has shown a strong association between education and fertility (Bledsoe et al. 1999). Formal education is seen as an important measure of social change that helps in influencing attitudes and behaviour change. Education influences fertility through enabling women to acquire new ideas and values that are at variance with their traditional roles of childbearing. It also opens new opportunities for women participation in labour force and wage employment (Caldwell and Caldwell, 1987). In particular, more educated women have alternatives for personal development other than those associated with reproduction and child care (United Nations, 1995). Educated

women are better placed to assess the costs and benefits associated with childbearing vis-à-vis being engaged in wage employment. A study by Wasao (2002) found out that fertility was lower for women who had secondary education compared to other women.

With respect to place of residence, the findings showed that, the risk of transition to parities 3, 4, 5 and 6 and above were lower for women in 2003 compared to 1993. These results imply that, the risks to these transitions were much lower for rural women in 2003 compared to 1993. The findings imply that the risks associated with transitions to parities 3, 4, 5 and 6 and above in both 1993 and 2003 were associated with increase in fertility. The proportion of women in these parities was also much lower in 2003 compared to 1993 and these differences in compositional effects may also have contributed to the increase in the risk of transition to these parities. Moreover, infant mortality was also higher in rural areas in 2003 compared to 1993 and the increased risk to these parities may have been as a result of the insurance effect where women responding to the need to replace their dead infant (NCPD et al., 1994). The effect of residence in both 1993 and 2003 was to increase the risk of transition to parities 3, 4, 5 and 6 and above and hence residence may not have contributed directly to the stalling fertility observed in 2003.

The results show that, there were differentials in the risks of transition to parities 3, 4, 5, 6 and above for women in both 1993 and 2003 by region of residence and that these risks were parity specific. Generally, the risks to these transitions were lower for women in 2003 compared to 1993 for women particularly living in Nairobi, Central, Coast, Eastern and Nyanza provinces for specific parities. For example, the risks of transition to parity

3 and 4 were lower for women living in Nairobi province in 2003 compared to 1993. Women who resided in Central province were also associated with lower risks of transition to parities 3, 4, and 5 in 2003 compared 1993. The risk of transition to the higher parities (6 and above) were slightly higher for women in 2003 compared to 1993 in this province. It is important to note that, women living in Central province were noted to have continued to experience a decline in overall fertility in 2003 when the country was experiencing a stall in fertility (CBS et al., 2004). The lower risks of transition to parities 3, 4 and 5 are consistent with fertility decline for women in Central province.

Women living in Coast province were associated with lower risk of transition to parity 4 in 2003 compared to 1993. The same group of women were associated with slightly lower risk of transition to parity 6 and above in 1993 compared to 2003. The lower risk associated with transition to parity 4 were not consistent with the stall in fertility associated with women from Coast province in 2003 (CBS et al., 2004). Women living in Eastern province were only associated with lower transition to parity 6 and above for women in 1993 and not in 2003 and this was also not consistent with the overall fertility in the province which stalled in 2003. Women living in Nyanza province were significantly associated with lower risk of transition to parity 6 and above in 1993 and not in 2003. Women in this province were also noted to have experienced an increase in overall fertility in 2003 and the lower risks of transition to parity 6 and above are not consistent with this trend in overall fertility.

The results did not establish any significant association between women living in Rift Valley province and transition to any of these parities considered. Women in Rift Valley province were associated with a stall in fertility preference and it is likely that this may have contributed to the increase in fertility reported in 2003. Generally, these results suggest that the lower risks associated with transition to these parities for women in Nairobi, Central, Coast and Nyanza provinces imply a reduction in fertility in both 1993 and 2003 and therefore region of residence may not have played a direct role in the stall in fertility experienced in the country in 2003. The results also support the view that the socio-economic and socio-cultural differences of the various regions in Kenya could have been responsible for the differential patterns of fertility transition in the country and also to the overall stall in fertility at national level (Ekisa, 2008; Ojakaa, 2008; Westoff and Cross, 2006).

In conclusion, we note that, unlike in 1993 when all provinces in the country experienced fertility declines, the situation was slightly different in 2003. Some provinces such as Nyanza and Rift valley experienced an increase in fertility while for others such as Coast, Eastern, Nairobi and Western experienced a stall in fertility. Central province continued to experience a decline in fertility and all provinces experienced a stall in fertility preferences (CBS et al., 2004).

Region of residence has also been observed to exert a strong influence on the number of children desired through language, ethnic origin, as well as the stage of economic development (Westoff, 1994). These results support the evidence from researchers that

fertility for women in urban areas is lower compared to women residing in rural areas (Ekisa and Hinde, 2005; Woldemicael 2005; Westoff, 1994; Cohen, 1993). Women living in urban areas are in most cases more educated than their rural counterparts and they are able to embrace modernity that comes with access to job opportunities and better health care. They are also able to embrace new values and ideas regarding childbearing and rearing (Oheneba-Sakyi & Tukyi, 1997; Diamond, 1999; Montgomery and Lloyd, 1999). The results also support the demographic transition hypothesis that socio-economic conditions influence fertility change over time.

Researchers have also argued that socio-economic conditions are important determinants of the differential patterns of fertility transition experienced in the country (Bongaarts, 2005). For Kenya, differentials in levels of socio-economic development are evident in rural and urban areas and also by region of residence. Researchers have not established any pattern in the trend of socio-economic conditions during periods of fertility stalls (Shapiro and Gebresellassie, 2008; Garenne, 2007; Westoff and Cross, 2006; Bongaarts, 2005). For instance, it has been noted that for some countries such as Kenya and Ghana fertility stalled with little changes in socio-economic development indicators while other countries experienced stalling fertility as socio-economic development continued at a fairly rapid pace (Bongaarts, 2006). There is still no consensus on how and under what conditions social and economic conditions affect changes in reproductive behaviour (Bongaarts, 2006).

The findings further indicated that age cohort was significantly associated with parity transition in Kenya for both 1993 and 2003. The findings indicate that, the risks of transition to parities 3, 4, and 5 were consistently higher for women in the middle and older age cohorts in 2003 compared to 1993. For women in the middle and older age cohorts, the risks of transition to these parities were consistently higher in 2003 compared to 1993. But for parity 6 and above, women in the older age cohort were associated with increased risk of transition in 1993 while in 2003 these same group of women were associated with lower risk of transition to this higher parity. These results were contrary to those observed by the bivariate analysis which indicated that the risks associated with the transitions to these births were lower for women in 2003 compared to 1993. This suggests that the effect of age cohort in both 1993 and 2003 was associated with increase in fertility and may not have played a direct role in the stalling fertility experienced in the country in 2003.

Age at the start of the interval was consistently associated with slightly lower risks of transition to all the parities considered for women in 2003 compared to 1993. For all the parities, women aged 25 years and above at the start of the interval were consistently associated with lower risk of transition to the next parity. Age at the start of the interval may not have played a role in the observed fertility stall experienced in the country in 2003. Furthermore, exposure status was significantly associated with parity transition in Kenya in both 1993 and 2003. Generally, the risks associated with transition to these parities were slightly lower for women in 2003 compared to 1993. There is evidence that, fertility preferences and wanted fertility among married women stalled during the five

years before KDHS 2003 (Askew, 2009; Westoff and Cross, 2006; CBS et al., 2004). The stall in both fertility preferences and wanted fertility, together with the reduced risks associated with the transition to these parities for women in 2003 could have played a part in the stall in fertility experienced in the country in 2003. These findings imply that exposure status was associated with fertility increase in both 1993 and 2003 and was therefore unlikely to have had a direct role in the fertility stall experienced in 2003.

The results show that in the presence of other control factors, religion was only significantly associated with increased risk of transition to parity 4 for women professing Muslim/other faiths in 2003. This implies that religion did not play a direct role in the stall in fertility observed in the country in 2003. This is contrary to what other studies have found out with respect to religion. Researchers have found religion to play an important role in fertility decline in many communities. For instance, fertility has been found to be higher among women professing Muslim and other religious faiths compared to those professing the Catholic faith in Kenya (Njogu, 1991; Ahehu, 1998; Wasao, 2002; Adegbola, 1988). This is because religion is an important social institution which influences how individuals behave, the attitudes they acquire and the values they hold regarding the family unit. It shapes womens' values, norms and beliefs concerning reproduction and this ultimately affect their fertility behaviour (Benefo, 1995).

Infant mortality was an important factor influencing parity transition in Kenya in 2003 and not in 1993. Generally, the risk of transition to the next parity was higher in situations where a woman had lost an infant in all the parities considered for women in

2003 and not in 1993. There seems to be a clear association between wanting more children and having experienced the loss of a child under five in the past five years. It therefore, seems reasonable to conclude that the increase in child mortality partly because of HIV/AIDS in Kenya, may have played a role in the changes in reproductive intentions and this could have led to a stall in fertility experienced in the country.

Several researchers have linked the high infant and child mortality and HIV/AIDS prevailing in the country then to have been one of the possible explanations for the observed stall in fertility transition (Magadi and Agwanda, 2010; Westoff and Cross, 2006). Literature has documented the crucial role played by mortality decline in the process of fertility transition. 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 that have consistently been observed in the region (Gymah, 2002; Hirschman and Young, 1998; Mason, 1997; Lloyd and Ivanov, 1988). Gymah (2002) in a study on the relationship between infant and child mortality on fertility in Ghana and Kenya found that whereas the theoretical pathways through which infant and child mortality affect fertility are known, the empirical evidence had been inconsistent. He found that, women with prior infant deaths were found to have more subsequent births than those without mortality experience, suggesting both a physiological and behavioural response.

5.5.6 Conclusion

The chapter began by hypothesizing that socio-economic, socio-cultural, demographic and proximate factors were likely to be important determinants of parity transition in Kenya for the five-year period before KDHS 1993 when fertility was rapidly declining and also for the five-year period before KDHS 2003 when there was a stall in fertility in Kenya. We also hypothesized that women who had experienced a prior infant death were also likely to influence the direction of parity transition in Kenya between the two periods.

The bivariate results clearly showed that the effect of educational attainment on parity transition was not consistent across all the parities considered for women in 1993 and 2003. This was contrary to earlier generalizations about the effect of education. Women with primary complete and secondary and above level of educational attainment were significantly associated with lower risks of transition to parities 3, 4, 5, 6 and above in 2003 and inconsistently associated with the risk of transition to these parities in 1993. Women with primary incomplete educational attainment level were also consistently associated with lower risks of transition to parities 3, 4 and 5 in 2003 but were not significantly associated with the risk of transition to these parities in 1993 which was contrary to expectations. This implies that the effect of educational attainment was greater in 2003 compared to 1993. But since, the effect of education was associated with fertility decline in both 1993 and 2003 then it is unlikely to have played a major role in the stall in fertility experienced in the country in 2003.

The results showed that the risks of transition to these parities were also much lower for rural women in 2003 than in 1993. Hence, the effect of residence in both 1993 and 2003 was to increase the risk of transition to these parities hence residence may not have contributed directly to the stalling fertility observed in 2003.

The findings also indicated that, women living in Nairobi and Central provinces were consistently associated with lower risks of transition to parities 3, 4, 5, 6 and above for both 1993 and 2003 while women resident in Coast and Eastern provinces were inconsistently associated with lower risks to these parities between the two time periods. The differential patterns in the risks of transition to these parities by region of residence may have contributed to the differentials in the patterns of fertility transitions experienced in the regions in particular and the country in general in 2003.

Women in the middle and older age cohorts were associated with higher risks of transition to parities 3, 4, 5, 6 and above in 1993 but were associated with lower risks of transition to these parities in 2003. The lower risks associated with transition to these parities in 2003 could have contributed to the slow down in the pace of fertility transition experienced in 2003. Age at the start of the interval was consistently associated with lower risk of transition to these parities for women aged 25 years and above at the start of the interval in 2003 compared to 1993. Moreover, women who were currently in union were associated with lower risks of transition to these parities in 2003 compared to 1993. Being currently in union was associated with increase in fertility in both 1993 and 2003 and may not have played a direct role in the stall in fertility experienced in 2003.

Women professing Muslim and other faiths were also associated with higher risks of transition to these parities in 2003 but this was inconsistent in 1993. However, this is not unique to this group of women because research has associated them with higher fertility compared to women of other religious persuasions (Njogu, 1991; Ahehu, 1998; Wasao, 2002). Given the small proportion of this group of women in Kenya, their contribution to the stall in fertility might have been negligible. Furthermore, infant mortality was associated with increased risk of transition to these parities in 2003 and the same was not the case in 1993.

Infant mortality was associated with increased risks of transition to parities 3, 4, 5, 6 and above for women in 2003 and not in 1993. It is possible that the desire for women to replace dead infants in 2003 could be attributed to the high infant and child mortality and also the high prevalence of HIV/AIDS prevailing in the country then. Women whose children had died were more likely to go on and replace them so as to act as an insurance against the high incidence of child deaths. Researchers have linked the high infant and child mortality and HIV/AIDS prevailing in the country then to have been one of the possible explanations for the observed stall in fertility transition (Magadi and Agwanda, 2010; Westoff and Cross, 2006; Gyimah and Rajulton, 2004; Gyimah and Fernado, 2004).

The findings also showed that desire for additional children was significantly associated with lower risks of transition to parities 3, 4 and 5 for women in both 1993 and 2003. But, women in 2003 were associated with higher risk of transition for parity 6 and above,

while the same group of women were associated with lower risk of transition to this parity in 1993. Thus, the results imply that transition to parity 6 and above was associated with increase in fertility for women in 2003. Hence, desire for additional children may not have played a direct role in the stall in fertility experienced in the country in 2003. Due to the limitations associated with the variable on fertility preference on regression models, this variable was excluded in the multivariate analysis. Its inclusion into regression models tends to bias the estimates of the parameter coefficients and renders the regression results biased and inconsistent (Kennedy, 2003; Kmetta, 1997).

The multivariate results clearly showed that when other factors were controlled for, the effect of educational attainment was parity specific and not consistent across the parities considered and this was contrary to earlier generalizations about education. Secondary and above level of educational attainment was significantly associated with lower risk of transition to parity 3,4 5 and parity 6 and above for women in 2003 while for 1993 secondary and above level of educational attainment was only associated with lower risk of transition to parity 5 and parity 6 and above. Women with primary incomplete and complete primary level of educational attainment were associated with increased risk of transition to parity 3 in 1993 and not 2003. Women with primary complete level of educational attainment were associated with lower risk of transition to parity 3 and 5 and above in 1993 while in 2003 these women were associated with lower risk of transition to parity 3 and 6 and above. However, the results also indicate that educational attainment

levels were not significantly associated with the transitions to parities 4 for both 1993 and 2003.

Evidence from KDHS results in 2003 showed that overall fertility increased for women with no education and those who had primary incomplete level of educational attainment but it remained the same for those who had primary complete level of educational attainment. The results also showed that fertility continued to declined for women who had secondary and above level of educational attainment. It is also possible that the decline in fertility for this group of women could be attributed to the increase in the proportion of women sampled in 2003 compared to those included in the KDHS of 1993. Evidence from other studies done in Kenya also support the view that fertility decline continued for women with secondary and above level of education (Askew et al., 2009; Westoff and Cross, 2006; CBS et al., 2004). Given the relatively small proportion of women secondary and above level of education relative to other women in Kenya in 2003; it is unlikely that this category of women may have played such an important role in the stall in fertility observed in the country in 2003.

With regard to place of residence, the findings showed that the risk of transition to parities 3, 4, 5 and 6 and above were lower for women in 2003 compared to 1993. These results imply that the risks to these transitions were much lower for rural women in 2003 compared to 1993. The findings thus imply that the risks associated with transitions to parities 3, 4, 5 and 6 and above in both 1993 and 2003 were associated with increase in fertility. The proportion of women in these parities was also much lower in 2003

compared to 1993 and these differences in compositional effects may also have contributed to the increase in the risk of transition to these parities. Moreover, infant mortality was also higher in rural areas in 2003 compared to 1993 and the increased risk to these parities may have been as a result of the insurance effect where women responding to the need to replace their dead infant (NCPD et al., 1994). The effect of residence in both 1993 and 2003 was to increase the risk of transition to parities 3, 4, 5 and 6 and above and hence residence may not have contributed directly to the stalling fertility observed in 2003.

Furthermore, the findings show that, there were differentials in the risks of transition to parities 3, 4, 5, 6 and above for women in both 1993 and 2003 by region of residence and that these risks were parity specific. Generally, the risks to these transitions were lower for women in 2003 compared to 1993 for women particularly living in Nairobi, Central, Coast, Eastern and Nyanza provinces for specific parities. For instance, the risks of transition to parity 3 and 4 were lower for women living in Nairobi province in 2003 compared to 1993. Women resident in Central province were also associated with lower risks of transition to parities 3,4, and 5 in 2003 compared 1993. The risk of transition to the higher parities (6 and above) were slightly higher for women in 2003 compared to 1993 in this province. It is important to note that, women living in Central province were noted to have continued to experience a decline in overall fertility in 2003 when the country was experiencing a stall in fertility (CBS et al., 2004). Hence, the lower risks of transition to parities 3, 4 and 5 are consistent with fertility decline for women in Central province.

Women living in Coast province were associated with lower risk of transition to parity 4 in 2003 compared to 1993. The same group of women were associated with slightly lower risk of transition to parity 6 and above in 1993 compared to 2003. The lower risk associated with transition to parity 4 were not consistent with the stall in fertility associated with women from Coast province in 2003 (CBS et al., 2004). Women living in Eastern province were only associated with lower transition to parity 6 and above for women in 1993 and not in 2003 and this was also not consistent with the overall fertility in the province stalled in 2003. Women living in Nyanza province were significantly associated with lower risk of transition to parity 6 and above in 1993 and not in 2003. Women in this province were also noted to have experienced an increase in overall fertility in 2003 and the lower risks of transition to parity 6 and above are not consistent with this trend in overall fertility.

The results did not establish any significant association between women living in Rift Valley province and transition to any of these parities considered. Women in Rift valley province were associated with a stall in fertility preference and it is likely that they may have contributed to the increase in fertility reported in 2003. Generally, these results suggest that the lower risks associated with transition to these parities for women in Nairobi, Central, Coast and Nyanza provinces imply a reduction in fertility in both 1993 and 2003 and therefore, the region of residence may not have played a direct role in the stall in fertility experienced in the country in 2003.

The results also support the view that the socio-economic and socio-cultural differences of the various regions in Kenya could have been responsible for the differential patterns of fertility transition in the country and also to the overall stall in fertility at national level (Ekisa, 2008; Ojakaa, 2008; Westoff and Cross, 2006). In conclusion, we note that, unlike in 1993 when all provinces in the country experienced fertility declines, the situation was slightly different in 2003. Some provinces such as Nyanza and Rift Valley experienced an increase in fertility while for other such as Coast, Eastern, Nairobi and Western experienced a stall in fertility. Central province continued to experience a decline in fertility and all provinces experienced a stall in fertility preferences (CBS et al., 2004).

The findings further indicated that age cohort was significantly associated with parity transition in Kenya for both 1993 and 2003. The results indicate that, the risks of transition to parities 3, 4, and 5 were consistently higher for women in the middle and older age cohorts in 2003 compared to 1993. For women in the middle and older age cohorts, the risks of transition to these parities were consistently higher in 2003 compared to 1993. But for parity 6 and above, women in the older age cohort were associated with increased risk of transition in 1993 while in 2003 these same group of women were associated with lower risk of transition to this higher parity. These results were contrary to those observed by the bivariate analysis which indicated that the risks associated with the transitions to these births were lower for women in 2003 compared to 1993. This suggests that the effect of age cohort in both 1993 and 2003 was associated with increase

in fertility and may not have played a direct role in the stalling fertility experienced in the country in 2003.

Age at the start of the interval was consistently associated with slightly lower risks of transition to all the parities considered for women in 2003 compared to 1993. For all the parities, women aged 25 years and above at the start of the interval were consistently associated with lower risk of transition to the next parity. Therefore, age at the start of the interval may not have played a role in the observed fertility stall experienced in the country in 2003.

Exposure status was significantly associated with parity transition in Kenya in both 1993 and 2003. Generally, the risks associated with transition to these parities were slightly lower for women in 2003 compared to 1993. There is evidence that, fertility preferences and wanted fertility among married women stalled during the five years before KDHS 2003 (Askew, 2009; Westoff and Cross, 2006; CBS et al., 2004). But, these findings imply that that exposure status was associated with fertility increase in both 1993 and 2003 and was therefore unlikely to have had a direct role in the fertility stall experienced in 2003. The results show that in the presence of other control factors, religion was only significantly associated with increased risk of transition to parity 4 for women professing Muslim/other faiths in 2003. This implies that religion may not have played a direct role in the stall in fertility observed in the country in 2003.

Infant mortality was an important factor influencing parity transition in Kenya in 2003 and not in 1993. Generally, the risk of transition to the next parity was higher in situations where a woman had lost an infant in all the parities considered for women in 2003. The increased risks associated with transition to these parities could possibly be linked to effect that HIV/AIDS might have had in the stall of reproductive preferences in Kenya through an increase in infant and child mortality experienced in the five year period before the 2003 KDHS in the country. Women who experienced the death of a young child were found to be more likely than other women to want another child (Westoff and Cross, 2006).

The desire for women to replace dead infants could be attributed to the high infant and child mortality prevailing in the country 2003 (Magadi and Agwanda, 2010; Westoff and Cross, 2006). Death of an infant may result to the shortening of a birth interval which occurs as a result of cessation of breastfeeding following a child death. Consequently, this shortens the period of post partum amenorrhea, hence increasing the probability of conception. It could also have resulted from the desire by women to replace dead infants in anticipation that some may die. This has been alluded to by researchers (Askew et al., 2009; Magadi and Agwanda, 2010; Westoff and Cross, 2006; Van de Walle, 1992).

A study in Tanzania found that an increase in child mortality increases fertility and this is consistent with the situation experienced in Kenya in 2003 (Gyimah and Rajulton, 2004; Gyimah and Fernado, 2004). In the virtual absence of effective means of contraception other than breastfeeding, the shortening of birth interval induced by a reduction in infant

and child survivorship may signify a higher ultimate parity. Higher fertility may thus be largely a biological response to higher mortality. It is more likely that the behavioural response has a greater effect on the total number of children to whom a woman gives birth, or alternatively, on the parity of her last live birth since women entertain a rough idea of the number of surviving children they would like to have, even if they do not have a predetermined target (van de Walle, 1992).

CHAPTER SIX

SUMMARY, CONLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This study set out to establish the determinants of fertility transition in Kenya between 1993 and 2003. These two time periods were chosen for their unique demographic characteristics during this period of Kenya's fertility transition. The five year period before the 1993 KDHS experienced rapid declines in fertility while the five year period before 2003 KDHS experienced a stall in fertility. The study sought to determine whether there were any changes in the determinants of fertility transition between the two time periods and whether these changes in the determinants could explain the stall in fertility decline experienced in Kenya in the five year period before the 2003 KDHS. In order to address this general objective, the study was guided by the following specific objectives:

i) To determine trends in fertility levels in Kenya between 1993-2003.

ii) To determine the socio-economic, cultural and demographic determinants of the observed fertility trends in Kenya between 1993-2003.

iii) To establish the effect of changing fertility intensions on fertility transition in Kenya between 1993-2003.

iv) To determine the effect of infant mortality on fertility transition in Kenya between 1993-2003.

This chapter summarises the research findings based on the above objectives, in light of similar studies done in the past. The chapter also provides general conclusions and recommendations regarding the future of fertility transition in Kenya. Section 6.2

presents a general summary of the study findings on fertility levels while section 6.3 presents summary findings on determinants of parity transition. Section 6.4 presents general conclusions of the study and section 6.5 describes the contribution of the study. The last section presents recommendations of the study regarding the future of fertility transition in Kenya. Recommendations are made for future researchers and policy makers. These are based on the research findings.

6.2 Summary of study findings on Fertility levels and Trends in Kenya; 1993 and 2003

In relation to the first objective of the study on the trends of fertility in Kenya in the five year period before the 1993 and 2003 Kenya Demographic and Health Surveys, the findings show the two periods had clearly contrasting changes in childbearing patterns when fertility was declining rapidly in 1993 and when fertility had stalled in 2003. Total Fertility Rate (TFR) was estimated at 5.4 births per woman in 1993 and 4.5 births per woman in 2003. The findings show that the period parity progression ratios (PPPRs) declined more rapidly for the five-year period before 1993 KDHS when the country was experiencing rapid fertility decline compared to the five year period before 2003 KDHS when the country was experiencing a stall in fertility. The declines in PPPRs were more dramatic for women experiencing births of orders 3, 4, 5 and 6 and above. These parities may have played an important role in the decline in fertility witnessed in the five-year period before 1993 KDHS. The five-year period before the 2003 KDHS also experienced declines in PPPRs but these were less rapid than those experienced in the five-year period before 1993 KDHS. The less rapid declines in the proportions of women experiencing

births of parities 3, 4, 5, 6 and above in 2003 compared to the same women in 1993 could have played a role in the stall in fertility observed in the five year period before 2003 KDHS .

Fertility levels and trends by single years further confirmed that fertility declined in the five-year period before 1993 KDHS and there was evidence of a stall in fertility in the five year-period before 2003 KDHS. The results show that Total Fertility Rate (TFR) declined in the four-year period before 1993 KDHS but increased slightly in 2003. TFR declined from 6.2 births per woman in 1989 to 5.2 births per woman in 1992 before increasing slightly to 5.9. There is clear evidence that fertility stalled in the five year period before 2003 KDHS. TFR was estimated between 4.1 to 4.3 in the five-year period before 2003 KDHS except in 2002 when it increased slightly to 4.6. The decline and stall in fertility could be attributed to the changing childbearing patterns observed during these two time periods. The dynamics of fertility decline and stall in the two time periods are better explained by a close examination of the period parity progression ratios (PPPRs).

Generally, PPPRs declined more rapidly in the five year period before 1993 KDHS compared to the five year period before 2003 KDHS. It is therefore, highly likely that the less rapid declines associated with PPPRs in the five year period before the 2003 KDHS were responsible for the stall in fertility experienced in the country at the time.

In conclusion, we note that the findings clearly show evidence of fertility decline and fertility stall in the five-year periods before the 1993 and 2003 Kenya Demographic and

Health surveys. The decline in fertility observed in the five-year period before 1993 KDHS could be attributed to rapid decline in the proportions of women experiencing births of orders 3, 4, 5 and 6 and above. On the other hand, the evidence of a stall in fertility observed in the five-year period before 2003 KDHS could be attributed to a stall in the proportions of women having births of orders 3, 4, 5 and 6 and above. The slightly high TFR of 4.6 experienced in 2002 could be attributed to displacement of births. This happens when dates of childbirths are transferred by interviewees. This is a serious problem in Sub-Saharan Africa according to Pullum (2006). This problem often leads to either underestimation or overestimation of fertility.

These findings are consistent with what other researchers have established particularly with respect to stalling fertility in Kenya (Machiyama, 2010; Shapiro and Gebresellassie, 2008; Garenne, 2007; Westoff and Cross, 2006; Bongaarts, 2005). It would also be important to establish factors that were responsible for fertility decline and fertility stall experienced in the country in the five year periods before 1993 and 2003 KDHS. This is an important area of investigation and the results are presented and discussed below.

6.3 Summary of study findings on determinants of parity transition in Kenya; 1993 and 2003

In chapter five, the factors associated with the transitions from the second birth to third birth, third birth to fourth birth, fourth birth to fifth birth, and fifth birth to sixth and above births were examined using Cox Proportional hazard regression analysis. For each of these transitions, the following objectives were tested:

i) To determine the socio-economic, cultural and demographic determinants of the observed fertility trends in Kenya between 1993-2003.

ii) To determine the effect of infant mortality on fertility transition in Kenya between 1993-2003.

The study sought to determine whether there were any changes in the determinants of parity transition between the two time periods and whether these changes in the determinants could explain the decline and stall in fertility experienced in Kenya in the five year periods before the 1993 and 2003 KDHS. These determinants were established for those birth orders identified to have been responsible for rapid decline in fertility in the five-year period before 1993 KDHS and those responsible for a stall in fertility in the five-year period before 2003 KDHS. The birth orders that contributed to both rapid decline and stall in fertility in the two time periods were: 3, 4, 5 and 6 and above. The results are briefly presented again below.

The multivariate results of the determinants of the above parity transition are presented below. The results of the objective on socio-economic, cultural and demographic determinants of parity transitions in Kenya show that, the effect educational attainment was parity specific and this was contrary to earlier generalizations about the effect of education on parity transitions. Secondary and above level of educational attainment was significantly associated with lower risk of transition to parity 3, 4 5 and parity 6 and above for women in 2003 while for 1993 secondary and above level of educational attainment was only associated with lower risk of transition to parity 5 and parity 6 and

above. Women with primary incomplete and complete primary level of educational attainment were associated with increased risk of transition to parity 3 in 1993 and not 2003. Women with primary complete level of educational attainment were associated with lower risk of transition to parity 3 and 5 and above in 1993 while in 2003 these women were associated with lower risk of transition to parity 3 and 6 and above. However, the results also indicate that educational attainment levels were not significantly associated with the transitions to parities 4 for both 1993 and 2003.

Evidence from 2003 KDHS results showed that overall fertility increased for women with no education and those who had primary incomplete level of educational attainment but it remained the same for those who had completed primary level of education. The results also showed that fertility continued to declined for women who had secondary and above level of educational attainment. The findings from this study therefore imply that the continued decline in fertility for this group of women in the five year period before 2003 KDHS could have been attributed to the lower risks associated with transition to parities 3, 4, 5 and 6 and above for women in 2003. It is also possible that the decline in fertility for this group of women could be attributed to the increase in the proportion of women sampled in 2003 compared to those included in the KDHS of 1993.

Other studies done in Kenya also support the view that fertility decline continued for women with secondary and above level of education (Askew et al., 2009; Westoff and Cross, 2006; CBS et al., 2004). Given the relatively small proportion of women secondary and above level of education relative to other women in Kenya in 2003; it is

unlikely that this category of women may have played such an important role in stall in fertility observed in the country in 2003.

The findings showed that the risk of transition to parities 3, 4, 5 and 6 and above were lower for rural women in 2003 compared to 1993. The findings thus, imply that the risks associated with transitions to parities 3, 4, 5 and 6 and above in both 1993 and 2003 were associated with increase in fertility. The proportion of women in these parities was also much lower in 2003 compared to 1993 and these differences in compositional effects may also have contributed to the increase in the risk of transition to these parities. Moreover, infant mortality was also higher in rural areas in 2003 compared to 1993 and the increased risk to these parities may have been as a result of the insurance effect where women responding to the need to replace their dead infant (NCPD et al., 1994). Hence, the effect of residence in both 1993 and 2003 was to increase the risk of transition to parities 3, 4, 5 and 6 and above and hence residence may not have contributed directly to the stalling fertility observed in 2003.

Furthermore, the findings indicate that there were differentials in the risks of transition to parities 3, 4, 5, 6 and above for women in both 1993 and 2003 by region of residence and that these risks were parity specific. Generally, the risks to these transitions were lower for women in 2003 compared to 1993 for women particularly living in Nairobi, Central, Coast, Eastern and Nyanza provinces for specific parities. For instance, the risks of transition to parity 3 and 4 were lower for women living in Nairobi province in 2003 compared to 1993. Women resident in Central province were also associated with lower

risks of transition to parities 3, 4, and 5 in 2003 compared 1993. The risk of transition to the higher parities (6 and above) were slightly higher for women in 2003 compared to 1993 in this province. Available evidence shows that women living in Central province were noted to have continued to experience a decline in overall fertility in 2003 when the country was experiencing a stall in fertility (CBS et al., 2004). The lower risks of transition to parities 3, 4 and 5 are consistent with fertility decline for women in Central province.

Women living in Coast province were associated with lower risk of transition to parity 4 in 2003 compared to 1993 but these same group of women were associated with slightly lower risk of transition to parity 6 and above in 1993 compared to 2003. The lower risk associated with transition to parity 4 were not consistent with the stall in fertility associated with women from Coast province in 2003 (CBS et al., 2004). Women living in Eastern province were only associated with lower risk of transition to parity 6 and above for women in 1993 and not in 2003 and this was also not consistent with the overall fertility in the province that stalled in 2003. Women living in Nyanza province were significantly associated with lower risk of transition to parity 6 and above in 1993 and not in 2003. Women in this province were also noted to have experienced an increase in overall fertility in 2003 and the lower risks of transition to parity 6 and above are not consistent with this trend in overall fertility.

The findings did not establish any significant association between women living in Rift Valley province and transition to any of the parities considered. Women in Rift Valley

province were associated with a stall in fertility preference and it is likely that they may have contributed to the increase in fertility reported in 2003 (CBS et al., 2004).

Generally, these findings imply that the lower risks associated with transition to these parities for women in Nairobi, Central, Coast and Nyanza provinces imply a reduction in fertility in both 1993 and 2003 and therefore region of residence may not have played a direct role in the stall in fertility experienced in the country in 2003. These findings also support the view that the socio-economic and socio-cultural differences of the various regions in Kenya could have been responsible for the differential patterns of fertility transition in the country and also to the overall stall in fertility at national level (Ekisa, 2008; Ojakaa, 2008; Westoff and Cross, 2006). In conclusion, we note that, unlike in 1993 when all provinces in the country experienced fertility declines, the situation was slightly different in 2003. Some provinces such as Nyanza and Rift Valley experienced an increase in fertility while for others such as Coast, Eastern, Nairobi and Western experienced a stall in fertility. Central province continued to experience a decline in fertility and all provinces experienced a stall in fertility preferences (CBS et al., 2004).

The findings further indicate that age cohort was significantly associated with higher risks of transition to parities 3, 4, and 5 in Kenya for women in both 1993 and 2003. The risks to these parities were noted to be consistently higher for women in the middle and older age cohorts in 2003 compared to 1993. But, for parity 6 and above, women in the older age cohort were associated with increased risk of transition in 1993 while in 2003 this same group of women were associated with lower risk of transition to this higher parity. These findings were contrary to those observed in the bivariate analysis which

indicated that the risks associated with the transitions to these births were lower for women in 2003 compared to 1993. This suggests that the effect of age cohort in both 1993 and 2003 was associated with increase in fertility and may not have played a direct role in the stalling fertility experienced in the country in 2003.

Furthermore, age at the start of the interval was consistently associated with slightly lower risks of transition to all the parities considered for women aged 25 years and above in 2003 compared to 1993. Hence, age at the start of the interval may not have played a role in the observed fertility stall experienced in the country in 2003.

Exposure status was significantly associated with lower risks of transition to the parities considered for women in 2003 compared to 1993. There is evidence that fertility preferences and wanted fertility among married women stalled during the five years before KDHS 2003 (Askew, 2009; Westoff and Cross, 2006; CBS et al., 2004). These findings imply that exposure status was associated with fertility increase in both 1993 and 2003 and was therefore unlikely to have had a direct role in the fertility stall experienced in 2003. The results also show that in the presence of other control factors, religion was only significantly associated with increased risk of transition to parity 4 for women professing Muslim/other faiths in 2003. This implies that religion may not have played any direct role in the stall in fertility observed in the country in 2003.

The results show that infant mortality may have played a major role in the stall in fertility experienced in the five year period before the 2003 KDHS. The desire for women to

replace dead infants could be attributed to the high infant and child mortality prevailing in the country 2003 (Magadi and Agwanda, 2010; Westoff and Cross, 2006). Death of an infant may result to the shortening of a birth interval which occurs as a result of cessation of breastfeeding following a child death. Consequently, this shortens the period of post partum amenorrhea hence increasing the probability of conception. It could also have resulted from the desire by women to replace dead infants in anticipation that some may die. This has been alluded to by researchers (Askew et al., 2009; Magadi & Agwanda, 2007; Westoff, 2006; Van de Walle, 1992). A study in Tanzania found that an increase in child mortality increases fertility and this is consistent with the situation experienced in Kenya in 2003 (Gyimah and Rajulton, 2004, 2002; Gyimah, 2002, 2000). These results strongly suggest that infant mortality may have played an important role in the stall in fertility experienced in the five year period before KDHS 2003.

The findings also showed that desire for additional children was significantly associated with lower risks of transition to parities 3, 4 and 5 for women in both 1993 and 2003. But, women in 2003 were associated with higher risk of transition for parity 6 and above, while the same group of women were associated with lower risk of transition to this parity in 1993. Thus, the results imply that transition to parity 6 and above was associated with increase in fertility for women in 2003. Hence, desire for additional children may not have played a direct role in the stall in fertility experienced in the country in 2003. These findings seem to support evidence from literature which has noted a close relationship between fertility and fertility preferences (White et al., 2006; Bongaarts, 2006; Bongaarts and Watkins, 1996).

6.4 Conclusions

The findings show that the first objective of this study on fertility trends in Kenya was achieved. The findings show evidence of rapid fertility decline and fertility stall in the five-year periods before the 1993 and 2003 KDHS. The rapid decline in fertility observed in the five-year period before the 1993 KDHS was attributed to rapid declines in the proportions of women experiencing births of orders 3, 4, 5 and 6 and above. On the other hand, the evidence of a stall in fertility observed in the five-year period before the 2003 KDHS was attributed to a stall in the proportions of women having births of orders 3, 4, 5 and 6 and above. These findings imply that fertility decline continued in the five year period before KDHS 2003 albeit at a much slower pace. These findings are consistent with other studies (Machiyama, 2010; Shapiro and Gebresellassie, 2008; Garenne, 2007; Westoff et al., 2006; Bongaarts, 2005).

The second objective of this study on the effect of socio-economic, socio-cultural, and demographic factors on parity transition in Kenya was tested using the multivariate Cox Proportional hazard regression model. For the most part, socio-economic factors particularly educational attainment, place of residence and region of residence were confirmed to have partially played a role in parity transitions in Kenya during the period when the country was experiencing rapid fertility decline and during the period when a stall in fertility was experienced but were not found to have played a direct role in the stall in fertility transition experienced in the country in 2003. Socio-cultural factors particularly exposure status was also found to have influenced parity transitions in

Kenya during the two time periods but was not found to have directly influenced stall in fertility in 2003.

Demographic factors such as age cohort and age at the start of the interval were also found to have been associated with parity transitions in Kenya during the two time periods although they were not directly linked to the stall in fertility stall observed in the country in 2003. The results are presented briefly below. The effect of educational attainment was parity specific and this was contrary to earlier generalizations about the effect of education on parity transitions. Secondary and above level of educational attainment was significantly associated with lower risk of transition to parity 3, 4 5 and parity 6 and above for women in 2003 while for 1993 secondary and above level of educational attainment was only associated with lower risk of transition to parity 5 and parity 6 and above. Women with primary incomplete and complete primary level of educational attainment were associated with increased risk of transition to parity 3 in 1993 and not 2003. Women with primary complete level of educational attainment were associated with lower risk of transition to parity 3 and 5 and above in 1993 while in 2003 these women were associated with lower risk of transition to parity 3 and 6 and above.

Evidence from other studies done in Kenya also support the view that fertility decline continued for women with secondary and above level of education (Askew et al., 2009; Westoff and Cross, 2006; CBS et al., 2004). Given the relatively small proportion of women with secondary and above level of education relative to other women in Kenya in

2003; it is unlikely that this category of women may have played such an important role in the stall in fertility observed in the country in 2003.

For place of residence, the findings showed that the risk of transition to parities 3, 4, 5 and 6 and above were lower for women in 2003 compared to 1993. These results imply that the risks to these transitions were much lower for rural women in 2003 compared to 1993. The findings thus imply that the risks associated with transitions to parities 3, 4, 5 and 6 and above in both 1993 and 2003 were associated with increase in fertility. Thus the effect of residence in both 1993 and 2003 was to increase the risk of transition to parities 3, 4, 5 and 6 and above and hence residence may not have contributed directly to the stalling fertility observed in 2003.

Moreover, the findings show that there were differentials in the risks of transition to parities 3, 4, 5, 6 and above for women in both 1993 and 2003 by region of residence and that these risks were parity specific. Generally, the risks to these transitions were lower for women in 2003 compared to 1993 for women particularly living in Nairobi, Central, Coast, Eastern and Nyanza provinces for specific parities. For example, the risks of transition to parity 3 and 4 were lower for women living in Nairobi province in 2003 compared to 1993. Generally, these findings suggest that the lower risks associated with transition to these parities for women in Nairobi, Central, Coast and Nyanza provinces imply a reduction in fertility in both 1993 and 2003 and therefore region of residence may not have played a direct role in the stall in fertility experienced in the country in 2003. The results also support the hypothesis that the socio-economic and socio-cultural

differences of the various regions in Kenya could have been responsible for the differential patterns of fertility transition in the country and also to the overall stall in fertility at national level (Ekisa, 2008; Ojakaa, 2008; Westoff and Cross, 2006).

Age cohort was also significantly associated with parity transition in Kenya for both 1993 and 2003. Generally, women in the middle and older age cohorts were associated with higher risks of transition to these parities in both 1993 and 2003 but the risks were higher for women in 2003 compared to 1993. Thus, age cohort may not have played a direct role in the stalling fertility experienced in the country in 2003 because it was associated with fertility increase in both time periods. Age at the start of the interval was consistently associated with slightly lower risks of transition to all the parities considered for women in 2003 compared to 1993. Hence, age at the start of the interval may not have played a direct role in the observed fertility stall experienced in the country in 2003.

Generally, women who were currently in union were associated with higher risks of transition to these parities in 1993 compared to 2003. These findings imply that that exposure status was associated with fertility increase in both 1993 and 2003 and was therefore unlikely to have had a direct role in the fertility stall experienced in 2003. There is evidence that, fertility preferences and wanted fertility among married women stalled during the five years before KDHS 2003 (Askew, 2009; Westoff and Cross, 2006; CBS et al., 2004). The findings show that in the presence of other control factors, religion was not significantly associated with parity transition in Kenya in both 1993 and 2003.

This implies that religion did not play a direct role in the stall in fertility observed in the country in 2003.

The findings with respect to the third objective of the on role of infant mortality on parity transitions show that it was significantly associated with parity transition for women in Kenya in 2003 and not in 1993. Generally, the risk of transition to the next parity was higher in situations where a woman had lost an infant in all the parities considered for women in 2003 and not in 1993. The results imply that infant mortality may have played a major role in the stall in fertility experienced in the five year period before KDHS 2003. The desire for women to replace dead infants could be attributed to the high infant and child mortality prevailing in the country 2003 (Magadi and Agwanda, 2010; Westoff and Cross, 2006). These findings also support the view held by other researchers that death of an infant triggers a behavioural response from women to want to replace the dead infant (Askew et al., 2009; Magadi and Agwanda, 2010; Westoff and Cross, 2006; Van de Walle, 1992). Thus, the findings also support the view that infant mortality may have played an important role in the stall in fertility experienced in the five year period before KDHS 2003. Some researchers have also attributed the failure by many countries in Sub-Saharan Africa to achieve real fertility transition to the inherently high levels of child mortality that have consistently been observed in the region (Gymah, 2002; Hirschman and Young, 1998; Mason, 1997; Lloyd & Ivanov, 1988).

6.5 Contribution of the study

This study has made substantial contribution to knowledge in two areas. One, the study did confirm that rapid fertility decline and stall in fertility had occurred in Kenya in the five year periods before the 1993 and 2003 KDHS. The decline in fertility observed in the five-year period before the 1993 KDHS was attributed to rapid declines in the proportions of women experiencing births of orders 3, 4, 5 and 6 and above births. There was also a slower decline in the proportion of women experiencing births of lower parities (1-2). On the other hand, the stall in fertility observed in the five-year period before the 2003 KDHS was attributed to a stall in the proportions of women having births of orders 3, 4, 5 and 6 and above and a slower decline in the proportion of women making a transition to parities 1-2. An examination of Total Fertility Rate (TFR) by single calendar years for the five year periods before 1993 and 2003 KDHS also showed evidence of a rapid fertility decline in 1993 and a stall in fertility in 2003. These findings are consistent with other studies.

Secondly, the study established that infant mortality played an important role in the stall in fertility experienced in the five year period before the 2003 KDHS. The findings showed that across all parities considered, the death of an infant increased the risk of transition to the next parity for women in 2003 and not in 1993. The desire for women to replace dead infants could have been attributed to the high infant and child mortality prevailing in the country then. This may have triggered women to replace dead infants in anticipation that some of them may die. These finding have also been confirmed by other studies.

6.6 Recommendations for future research

This study experienced a number of limitations. One is the limitation on the use of the variable on desire for additional children in the proportional hazard model. It has been established that measures of fertility preferences such as desire for additional children suffer from biases when used as proxies for wanted fertility. The inclusion of such variables into regression models thus, tends to bias the estimates of the parameter coefficients. Thus, the variable was only included for exploration during the bivariate Cox Proportional hazard regression analysis and the results should be interpreted in that context.

The other limitation pertains to the use of the Complementary Log-Log discrete –time survival model. The study originally set out to use this model to establish determinants of parity transitions in 1993 and 2003 in Kenya. The model would have facilitated the calculation of Parity Progression Ratios (PPRs), Total Fertility Rate (TFR) and inclusion of both time varying predictors and time-varying effects of the predictor variables. This did not succeed. Future research can focus on the same.

Thirdly, in trying to establish determinants associated with transitions from second birth to third birth, third birth to fourth birth and so on, turned out to be such a broad areas of study. It would have been more appropriate to take a more specific focus such as effect of education level or infant mortality on birth transitions.

Thus, results from this study indicate the need for further research in five areas. First, further research is needed on the determinants of parity transitions using the Complementary Log-Log discrete survival model. This would enable Parity Progression Ratios (PPRs), Total Fertility Rate (TFR) and covariates of party transitions to be modelled together in the same model. Secondly, future research should focus on specific predictors such as the effect of infant mortality on parity transitions. Thirdly, future studies should also focus on determinants of parity transitions using several pooled datasets and other regression methods such as piecewise regression. This will enable us to establish and compare the total risks of transition, and not just relative hazards. Fourthly, future research should also focus on the parental perception of child survival risks and how these perceptions relate to behavioural decisions in reproduction. Fifthly, research is also needed on the link between birth intervals and completed family size.

6.7 Recommendations for Policy

In view of the findings above, this study recommends that infant and child survival programmes should be integrated as part of an overall strategy to lower fertility in Kenya. There is also need to improve the socio-economic conditions in the country by increasing GDP per capita and increasing the proportion of women with secondary and above level of education. This is due to the fact that higher education is strongly associated with lower fertility. This is because education plays a key role in changing attitude and behaviour towards reproduction. An improved GDP per capita will provide more opportunities for employment, better health care and alternative investments besides children. This will ultimately impact on the desired family size and in the end lead to a decline in the actual fertility.

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APPENDICES

Table 5.1a: Distribution of births of parity 2-3 by key background characteristics for 1993

Variable	Percent	Number of cases
Educational attainment		
No education	25. 39	1,130
Primary incomplete	37.09	1,651
Primary complete	18.96	844
Secondary plus	18.56	826
Residence		
Urban	12.15	541
Rural	87.85	3,910
Region		
Western	12.63	562
Nairobi	3.48	155
Central	14.18	631
Coast	13.37	595
Eastern	15.10	672
Nyanza	17.50	779
Rift valley	23.75	1,057
Age cohort		
1969-1978	16.15	719
1959-1968	44.89	1,998
1944-1958	38.96	1,734
Exposure status		
Other	15.50	690
In union	84.50	3,761
Religion		
Catholic	30.64	1,361
Protestant	60.49	2,687
Muslim/Other	8.87	394

Source: Analysis of KDHS, 1993

Table 5.1b: Distribution of births of parity 3-4 by key background characteristics for 1993

Variable	Percent	Number of cases
Educational attainment		
No education	28.41	1,025
Primary incomplete	37.25	1,344
Primary complete	18.49	667
Secondary plus	15.85	572
Residence		
Urban	10.17	367
Rural	89.83	3,241
Region		
Western	12.94	467
Nairobi	2.83	102
Central	13.80	498
Coast	13.08	472
Eastern	15.24	550
Nyanza	18.18	656
Rift valley	23.92	863
Age cohort		
1969-1978	7.93	286
1959-1968	46.23	1,668
1944-1958	45.84	1,654
Exposure status		
Other	13.19	476
In union	86.81	3,132
Religion		
Catholic	30.17	1,086
Protestant	61.31	2,207
Muslim/Other	8.53	307

Source: Analysis of KDHS, 1993

Table 5.1c: Distribution of births of parity 4-5 by key background characteristics for 1993

Variable	Percent	Number of cases
Educational attainment		
No education	31.99	930
Primary incomplete	38.18	1,110
Primary complete	17.27	502
Secondary plus	12.56	365
Residence		
Urban	8.26	240
Rural	91.74	2,667
Region		
Western	13.21	384
Nairobi	2.24	65
Central	13.18	383
Coast	12.45	362
Eastern	15.41	448
Nyanza	19.26	560
Rift valley	24.25	705
Age cohort		
1969-1978	3.30	88
1959-1968	42.76	1,243
1944-1958	54.21	1,576
Exposure status		
Other	13.07	380
In union	86.93	2,527
Religion		
Catholic	31.27	907
Protestant	60.32	1,750
Muslim/Other	8.41	244

Source: Analysis of KDHS, 1993

Table 5.1d: Distribution of births of parity 6 and above by key background characteristics for 1993

Variable	Percent	Number of cases
Educational attainment		
No education	42.50	3,086
Primary incomplete	39.31	2,855
Primary complete	11.58	841
Secondary plus	6.61	480
Residence		
Urban	5.63	409
Rural	94.37	6,853
Region		
Western	15.31	1,112
Nairobi	1.24	90
Central	11.20	813
Coast	11.29	820
Eastern	15.06	1,094
Nyanza	19.50	1,416
Rift valley	26.40	1,917
Age cohort		
1969-1978	0.29	21
1959-1968	23.63	1,716
1944-1958	76.08	5,525
Exposure status		
Other	11.83	859
In union	88.17	6,403
Religion		
Catholic	33.13	2,403
Protestant	59.00	4,279
Muslim/Other	7.87	571

Source: Analysis of KDHS, 1993

Table 5.1e: Distribution of births of parity 2-3 by key background characteristics for 2003

Variable	Percent	Number of cases
Educational attainment		
No education	21.58	962
Primary incomplete	29.59	1,319
Primary complete	24.02	1,071
Secondary plus	24.81	1,106
Residence		
Urban	27.01	1,204
Rural	72.99	3,254
Region		
Western	13.35	556
Nairobi	10.25	427
Central	16.97	707
Coast	12.77	532
Eastern	12.87	536
Nyanza	14.21	592
Rift valley	19.57	815
Age cohort		
1969-1978	14.47	645
1959-1968	42.58	1,898
1944-1958	42.96	1,915
Exposure status		
Other	16.31	727
In union	83.69	3,731
Religion		
Catholic	22.32	994
Protestant	60.69	2,703
Muslim/Other	17.00	757

Source: Analysis of KDHS, 2003

Table 5.1f: Distribution of births of parity 3-4 by key background characteristics for 2003

Variable	Percent	Number of cases
Educational attainment		
No education	25.40	864
Primary incomplete	30.39	1,034
Primary complete	23.31	793
Secondary plus	20.90	711
Residence		
Urban	23.60	803
Rural	76.40	2,599
Region		
Western	13.85	433
Nairobi	7.99	250
Central	15.70	491
Coast	12.86	402
Eastern	13.27	415
Nyanza	15.13	473
Rift valley	21.20	663
Age cohort		
1969-1978	6.79	231
1959-1968	42.00	1,429
1944-1958	51.21	1,742
Exposure status		
Other	15.40	524
In union	84.60	2,878
Religion		
Catholic	22.12	752
Protestant	59.11	2,009
Muslim/Other	18.77	638

Source: Analysis of KDHS, 2003

Table 5.1g: Distribution of births of parity 4-5 by key background characteristics for 2003

Variable	Percent	Number of cases
Educational attainment		
No education	29.67	738
Primary incomplete	31.56	785
Primary complete	21.75	541
Secondary plus	17.01	423
Residence		
Urban	20.91	520
Rural	79.09	1,967
Region		
Western	14.91	336
Nairobi	6.35	143
Central	14.11	318
Coast	13.27	299
Eastern	13.23	298
Nyanza	16.16	364
Rift valley	21.97	495
Age cohort		
1969-1978	2.37	59
1959-1968	37.72	938
1944-1958	59.91	1,490
Exposure status		
Other	15.52	386
In union	84.48	2,101
Religion		
Catholic	21.33	530
Protestant	58.11	1,444
Muslim/Other	20.56	511

Source: Analysis of KDHS, 2003

Table 5.1h: Distribution of births of parity 6 and above by key background characteristics for 2003

Variable	Percent	Number of cases
Educational attainment		
No education	41.15	2,101
Primary incomplete	31.69	1,618
Primary complete	16.88	862
Secondary plus	10.28	525
Residence		
Urban	15.80	807
Rural	84.20	4,299
Region		
Western	16.38	722
Nairobi	3.20	141
Central	8.96	395
Coast	13.84	610
Eastern	12.75	562
Nyanza	20.00	882
Rift valley	24.88	1,097
Age cohort		
1969-1978	0.29	15
1959-1968	21.58	1,102
1944-1958	78.12	3,989
Exposure status		
Other	14.96	764
In union	85.04	4,342
Religion		
Catholic	20.88	1,066
Protestant	54.63	2,789
Muslim/Other	24.49	1,250

Source: Analysis of KDHS, 2003

Table 5.2a: Bivariate Cox Proportional hazard regression results for transition from second birth to third birth: KDHS 1993

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	1.051	0.050	0.299
Primary complete	0.947	0.054	0.334
Secondary plus	0.739	0.045	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.608	0.103	0.000
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.574	0.073	0.000
Central	0.799	0.059	0.003
Coast	0.804	0.061	0.004
Eastern	0.922	0.067	0.264
Nyanza	0.977	0.068	0.744
Rift Valley	0.905	0.060	0.132
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	1.598	0.118	0.000
1944-1958	1.845	0.137	0.000
Age at start of interval	0.896	0.005	0.000
Infant mortality (previous infant death)			
Alive (Reference)	-	-	-
Dead	1.103	0.106	0.308
Desire for additional children			
Wants no more(Ref.)	-	-	-
Wants more children	0.687	0.031	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.515	0.087	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	1.044	0.044	0.311
Muslim/Other	0.874	0.066	0.073

Source: Analysis of KDHS, 1993

Table 5.2b: Bivariate Cox Proportional hazard regression results for transition from third birth to fourth birth: KDHS 1993

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.977	0.050	0.645
Primary complete	0.798	0.051	0.000
Secondary plus	0.639	0.045	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.791	0.142	0.000
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.494	0.075	0.000
Central	0.766	0.063	0.001
Coast	0.723	0.062	0.000
Eastern	0.853	0.068	0.045
Nyanza	0.962	0.073	0.605
Rift Valley	0.923	0.067	0.269
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	1.659	0.206	0.000
1944-1958	2.160	0.266	0.000
Age at start of interval	0.893	0.005	0.000
Infant mortality (previous infant death)			
Alive (Reference)	-	-	-
Dead	1.053	0.121	0.652
Desire for additional children			
Wants no more(Ref.)	-	-	-
Wants more children	0.695	0.038	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.230	0.080	0.001
Religion			
Catholic(Reference)	-	-	-
Protestant	0.911	0.043	0.047
Muslim/Other	0.800	0.067	0.008

Source: Analysis of KDHS, 1993

Table 5.2c: Bivariate Cox Proportional hazard regression results for transition from fourth birth to fifth birth: KDHS 1993

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.957	0.053	0.426
Primary complete	0.853	0.061	0.026
Secondary plus	0.632	0.054	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.374	0.129	0.001
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.489	0.096	0.000
Central	0.711	0.066	0.000
Coast	0.894	0.084	0.230
Eastern	0.929	0.081	0.401
Nyanza	0.962	0.081	0.647
Rift Valley	0.941	0.075	0.444
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	1.921	0.519	0.016
1944-1958	2.363	0.636	0.001
Age at start of interval	0.891	0.005	0.000
Infant mortality (previous infant death)			
Alive (Reference)	-	-	-
Dead	1.117	0.146	0.398
Desire for additional children			
Wants no more(Ref.)	-	-	-
Wants more children	0.765	0.050	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.384	0.102	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	0.981	0.052	0.710
Muslim/Other	0.996	0.094	0.962

Source: Analysis of KDHS, 1993

Table 5.2d: Bivariate Cox Proportional hazard regression results for transition from fifth birth to sixth and above birth: KDHS 1993

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	1.029	0.031	0.335
Primary complete	0.942	0.042	0.183
Secondary plus	0.943	0.053	0.292
Residence			
Urban(Reference)	-	-	-
Rural	1.247	0.072	0.000
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.669	0.081	0.001
Central	0.774	0.040	0.000
Coast	0.822	0.043	0.000
Eastern	0.876	0.043	0.007
Nyanza	0.926	0.043	0.096
Rift Valley	0.987	0.043	0.762
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968			
1944-1958	0.720	0.024	0.000
Age at start of interval	0.918	0.002	0.000
Infant mortality (previous infant death)			
Alive (Reference)	-	-	-
Dead	0.923	0.055	0.180
Desire for additional children			
Wants no more(Ref.)	-	-	-
Wants more children	0.829	0.049	0.001
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.241	0.051	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	0.994	0.029	0.835
Muslim/Other	0.968	0.052	0.547

Source: Analysis of KDHS, 1993

Table 5.2e: Bivariate Cox Proportional hazard regression results for transition from second birth to third birth: KDHS 2003

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.916	0.039	0.039
Primary complete	0.802	0.036	0.000
Secondary plus	0.645	0.029	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.256	0.043	0.000
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.650	0.042	0.000
Central	0.713	0.041	0.000
Coast	0.898	0.055	0.070
Eastern	0.826	0.050	0.002
Nyanza	0.974	0.058	0.660
Rift Valley	0.948	0.052	0.335
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	0.618	0.029	0.000
1944-1958	0.661	0.030	0.000
Age at start of interval	0.887	0.004	0.000
Infant mortality (previous infant death)			
Alive (Reference)	-	-	-
Dead	1.627	0.098	0.000
Desire for additional children			
Wants no more(Ref.)	-	-	-
Wants more children	0.769	0.028	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.215	0.049	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	0.998	0.037	0.955
Muslim/Other	1.129	0.055	0.012

Source: Analysis of KDHS, 1993

Table 5.2f: Bivariate Cox Proportional hazard regression results for transition from third birth to fourth birth: KDHS 2003

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.906	0.042	0.032
Primary complete	0.806	0.040	0.000
Secondary plus	0.666	0.034	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.222	0.050	0.000
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.664	0.053	0.000
Central	0.691	0.046	0.000
Coast	0.834	0.058	0.009
Eastern	0.858	0.059	0.027
Nyanza	0.943	0.063	0.374
Rift Valley	0.955	0.059	0.456
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	0.603	0.043	0.000
1944-1958	0.547	0.039	0.000
Age at start of interval	0.896	0.004	0.000
Infant mortality (previous infant death			
Alive (Reference)	-	-	-
Dead	1.568	0.105	0.000
Desire for additional children			
Wants no more(Ref.)	-	-	-
Wants more children	0.868	0.039	0.002
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.214	0.058	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	0.996	0.043	0.928
Muslim/Other	1.219	0.066	0.000

Source: Analysis of KDHS, 1993

Table 5.2g: Bivariate Cox Proportional hazard regression results for transition from fourth birth to fifth birth: KDHS 2003

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.865	0.044	0.005
Primary complete	0.789	0.045	0.000
Secondary plus	0.719	0.044	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.105	0.055	0.043
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.851	0.085	0.106
Central	0.712	0.056	0.000
Coast	1.020	0.081	0.802
Eastern	0.884	0.070	0.122
Nyanza	0.995	0.075	0.952
Rift Valley	1.006	0.071	0.927
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	0.580	0.078	0.000
1944-1958	0.467	0.062	0.000
Age at start of interval	0.898	0.004	0.000
Infant mortality (previous infant death)			
Alive (Reference)	-	-	-
Dead	1.284	0.105	0.002
Desire for additional children			
Wants no more(Ref.)	-	-	-
Wants more children	0.983	0.054	0.749
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.133	0.063	0.025
Religion			
Catholic(Reference)	-	-	-
Protestant	1.053	0.054	0.314
Muslim/Other	1.336	0.083	0.000

Source: Analysis of KDHS, 1993

Table 5.2h: Bivariate Cox Proportional hazard regression results for transition from fifth birth to sixth and above birth: KDHS 2003

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.980	0.032	0.551
Primary complete	0.861	0.035	0.000
Secondary plus	0.753	0.037	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.136	0.044	0.001
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.796	0.073	0.014
Central	0.804	0.050	0.000
Coast	0.973	0.054	0.619
Eastern	0.978	0.055	0.694
Nyanza	1.015	0.051	0.765
Rift Valley	1.063	0.051	0.205
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968			
1944-1958	0.676	0.023	0.000
Age at start of interval	0.923	0.002	0.000
Infant mortality (previous infant death)			
Alive (Reference)	-	-	-
Dead	1.350	0.068	0.000
Desire for additional children			
Wants no more(Ref.)	-	-	-
Wants more children	1.265	0.044	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.234	0.049	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	1.044	0.038	0.228
Muslim/Other	1.178	0.049	0.000

Source: Analysis of KDHS, 1993

Table 5.3a: Multivariate Cox Proportional hazard regression results for transition from second birth to third birth: KDHS 1993

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	1.170	0.059	0.002
Primary complete	1.130	0.069	0.046
Secondary plus	1.084	0.074	0.235
Residence			
Urban(Reference)	-	-	-
Rural	1.352	0.110	0.000
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.954	0.141	0.754
Central	0.874	0.066	0.073
Coast	0.976	0.085	0.779
Eastern	0.979	0.071	0.766
Nyanza	0.954	0.067	0.505
Rift Valley	0.940	0.063	0.361
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	2.299	0.174	0.000
1944-1958	2.723	0.211	0.000
Age at start of interval	0.882	0.005	0.000
<25 years (Ref.)	-	-	-
25+ years	0.425	0.020	0.000
Infant mortality (previous child)			
Alive (Reference)	-	-	-
Dead	1.003	0.098	0.974
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.404	0.081	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	1.016	0.044	0.711
Muslim/Other	0.938	0.083	0.469
Log likelihood=-20483.362 LR chi2(17)=587.362 Prob>chi2=0.0000 Number of failures=3363 Time at risk=7130			

Table 5.3b: Multivariate Cox Proportional hazard regression results for transition from second birth to third birth: KDHS 2003

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.931	0.051	0.192
Primary complete	0.884	0.052	0.036
Secondary plus	0.810	0.051	0.001
Residence			
Urban(Reference)	-	-	-
Rural	1.164	0.062	0.004
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.810	0.071	0.017
Central	0.775	0.052	0.000
Coast	0.936	0.073	0.394
Eastern	0.890	0.062	0.092
Nyanza	0.905	0.060	0.133
Rift Valley	0.950	0.059	0.411
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	2.419	0.189	0.000
1944-1958	3.344	0.258	0.000
Age at start of interval			
<25 years (Ref.)	-	-	-
25+ years	0.372	0.016	0.000
Infant mortality			
Alive (Reference)	-	-	-
Dead	1.683	0.117	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.226	0.059	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	0.992	0.042	0.842
Muslim/Other	0.883	0.067	0.101
Log likelihood=-24175.106 LR chi2(17)=1041.28 Prob>chi2=0.0000 Number of failures=3223 Time at risk=12090			

Table 5.3c: Multivariate Cox Proportional hazard regression results for transition from third birth to fourth birth: KDHS 1993

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	1.082	0.058	0.143
Primary complete	1.032	0.071	0.653
Secondary plus	0.871	0.068	0.076
Residence			
Urban(Reference)	-	-	-
Rural	1.505	0.151	0.000
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.800	0.144	0.214
Central	0.811	0.068	0.012
Coast	0.845	0.082	0.088
Eastern	0.863	0.069	0.065
Nyanza	0.918	0.071	0.265
Rift Valley	0.896	0.066	0.135
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	2.717	0.346	0.000
1944-1958	3.420	0.477	0.000
Age at start of interval			
<25 years (Ref.)	-	-	-
25+ years	0.494	0.024	0.000
Infant mortality			
Alive (Reference)	-	-	-
Dead	0.990	0.114	0.930
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.240	0.081	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	0.917	0.044	0.068
Muslim/Other	0.921	0.090	0.399
Log likelihood=-16144.699 LR chi2(17)=390.39 Prob>chi2=0.0000 Number of failures=2197 Time at risk=5883			

Table 5.3d: Multivariate Cox Proportional hazard regression results for transition from third birth to fourth birth: KDHS 2003

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	1.000	0.060	0.987
Primary complete	0.959	0.064	0.531
Secondary plus	0.773	0.056	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.177	0.076	0.011
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.733	0.081	0.005
Central	0.718	0.057	0.000
Coast	0.755	0.068	0.002
Eastern	0.860	0.068	0.058
Nyanza	0.938	0.071	0.398
Rift Valley	0.918	0.065	0.229
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	3.779	0.609	0.000
1944-1958	5.309	0.849	0.000
Age at start of interval			
<25 years (Ref.)	-	-	-
25+ years	0.421	0.021	0.000
Infant mortality			
Alive (Reference)	-	-	-
Dead	1.620	0.129	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.221	0.070	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	1.084	0.055	0.111
Muslim/Other	1.234	0.110	0.018
Log likelihood=-17005.339 LR chi2(17)=601.16 Prob>chi2=0.0000 Number of failures=2339 Time at risk=9220			

Table 5.3e: Multivariate Cox Proportional hazard regression results for transition from fourth birth to fifth birth: KDHS 1993

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	1.044	0.061	0.459
Primary complete	1.016	0.077	0.836
Secondary plus	0.748	0.068	0.001
Residence			
Urban(Reference)	-	-	-
Rural	1.145	0.130	0.234
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.619	0.139	0.033
Central	0.785	0.074	0.010
Coast	0.927	0.099	0.478
Eastern	0.977	0.086	0.792
Nyanza	0.996	0.085	0.959
Rift Valley	0.972	0.079	0.731
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	3.278	0.903	0.000
1944-1958	4.159	1.146	0.000
Age at start of interval			
<25 years (Ref.)	-	-	-
25+ years	0.548	0.037	0.000
Infant mortality			
Alive (Reference)	-	-	-
Dead	1.003	0.132	0.983
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.413	0.106	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	1.000	0.053	1.000
Muslim/Other	1.020	0.113	0.086
Log likelihood=-12587.249 LR chi2(17)=179.66 Prob>chi2=0.0000 Number of failures=1750 Time at risk=5165			

Table 5.3f: Multivariate Cox Proportional hazard regression results for transition from fourth birth to fifth birth: KDHS 2003

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.890	0.061	0.087
Primary complete	0.814	0.063	0.007
Secondary plus	0.715	0.062	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.209	0.095	0.016
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.866	0.126	0.320
Central	0.675	0.065	0.000
Coast	0.906	0.099	0.364
Eastern	0.838	0.078	0.058
Nyanza	0.975	0.085	0.770
Rift Valley	0.959	0.078	0.605
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968	6.181	2.805	0.000
1944-1958	8.768	3.970	0.000
Age at start of interval			
<25 years (Ref.)	-	-	-
25+ years	0.430	0.030	0.000
Infant mortality			
Alive (Reference)	-	-	-
Dead	1.457	0.144	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.085	0.074	0.227
Religion			
Catholic(Reference)	-	-	-
Protestant	1.064	0.064	0.303
Muslim/Other	1.092	0.118	0.413
Log likelihood=-11497.899 LR chi2(17)=285.09 Prob>chi2=0.0000 Number of failures=1644 Time at risk=68114			

Table 5.3g: Multivariate Cox Proportional hazard regression results for transition from fifth birth to sixth and above birth: KDHS 1993

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.981	0.036	0.615
Primary complete	0.821	0.049	0.001
Secondary plus	0.722	0.058	0.000
Residence			
Urban(Reference)	-	-	-
Rural	1.282	0.120	0.008
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.875	0.166	0.481
Central	0.815	0.053	0.002
Coast	0.823	0.064	0.012
Eastern	0.871 .	0.052	0.022
Nyanza	0.917	0.053	0.132
Rift Valley	0.983	0.052	0.742
Age cohort of woman			
1959-1978(Reference)	-	-	-
1944-1958	1.140	0.051	0.003
Age at start of interval			
<25 years (Ref.)	-	-	-
25+ years	0.513	0.059	0.000
Infant mortality			
Alive (Reference)	-	-	-
Dead	0.935	0.070	0.371
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.212	0.063	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	0.966	0.035	0.345
Muslim/Other	0.979	0.081	0.797
Log likelihood=-29987.923 LR chi2(16)=125.62 Prob>chi2=0.0000 Number of failures=3652 Time at risk=14648			

Table 5.3h: Multivariate Cox Proportional hazard regression results for transition from fifth birth to sixth and birth: KDHS 2003

Variable	Hazard ratio	Standard error(S.E.)	P-value
Woman's educational attainment			
No education(Reference)	-	-	-
Primary incomplete	0.998	0.039	0.962
Primary complete	0.957	0.045	0.342
Secondary	0.842	0.046	0.002
Residence			
Urban(Reference)	-	-	-
Rural	1.137	0.058	0.012
Region of residence			
Western(Reference)	-	-	-
Nairobi	0.913	0.094	0.373
Central	0.853	0.054	0.013
Coast	0.935	0.059	0.286
Eastern	0.963	0.055	0.511
Nyanza	0.981	0.050	0.712
Rift Valley	1.025 .	0.050	0.609
Age cohort of woman			
1969-1978(Reference)	-	-	-
1959-1968			
1944-1958	0.690	0.027	0.000
Age at start of interval			
<25 years (Ref.)	-	-	-
25+ years	0.509	0.045	0.000
Infant mortality			
Alive (Reference)	-	-	-
Dead	1.304	0.072	0.000
Exposure status			
Other(Reference)	-	-	-
Currently in union	1.215	0.052	0.000
Religion			
Catholic(Reference)	-	-	-
Protestant	1.026	0.038	0.491
Muslim/Other	1.040	0.065	0.530
Log likelihood=-33323.836 LR chi2(16)=263.942 Prob>chi2=0.0000 Number of failures=4408 Time at risk=14081			