

DETERMINANTS OF FERTILITY IN KENYA: A COMPARATIVE ANALYSIS  
OF URBAN – RURAL AREAS

BY

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This is a research project submitted to the Department of Economics, University of Nairobi in partial fulfillment of the requirements for the award of the degree of the Masters of Arts in Economics of The University of Nairobi.

October 2004.

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# DECLARATION

This research project is my original work and has not been presented for any degree award in any University.

Signed:  ..... Date: 30/10/04

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This research project has been submitted for examination with our approval as University supervisors.

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## DEDICATION

To my mum and dad

Joan and Joel

You took me to school and encouraged me to read.

This was your vision and desire.



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## ABSTRACT

*Fertility is a major determinant of population growth in the world and therefore there is need for effective and efficient population policies in order to reduce fertility. Despite the observed fertility declines in Kenya over the years, rural areas still lag behind in the fertility transition as compared to urban areas. The high fertility rates pose diverse challenges to the government in regards to the provision of basic needs and social services such as: health, education, food and employment.*

*This paper examines fertility in Kenya with special attention to urban-rural difference. The study used data sets from the Kenya Demographic and Health Survey of 1998 with demographically enriched information to estimate a reduced form fertility model using Ordinary Least Squares technique. We found that place of residence matters; women in rural areas have higher fertility rates than their urban counterparts. Educational level for both female and male was found to be significant and negatively related to fertility in both rural and urban areas. Ethnicity was found to be an important variable in rural areas and it affects fertility in different unique ways. Child survival rate and contraceptive use were also found to exert a significant negative effect on fertility.*

*We conclude that, in order to bridge the gap in urban-rural fertility, it is important for government policy to ensure sustainability of female education, health care, family planning programs, equitable distribution of resources to improve the living standards of women and hence triggering a decline in fertility via favorable impacts on perceptions of ideal family size and fertility preference in both rural and urban areas.*

# CHAPTER ONE

## 1.0 INTRODUCTION

Population growth is clearly an important issue for the long-term development of individual nations and the world as a whole. Less Developed Countries (LCD's) are attempting to reduce the rates at which their populations are growing. It is evident that the design of effective and efficient population policies requires knowledge of the determinants of fertility.

Up through the end of 1980's, sub-Saharan Africa was seen as the only major world region in which fertility transition at the level of national population had not yet begun (Lesthaeghe, 1989). During the past decade, however, this situation has changed considerably. A few countries have shown strong evidence of fertility decline, and a number of other countries appear to be at various early stages of fertility transition (Tabutin, 1997). Even prior to the emergence of fertility decline at the national level, however, there were clear signs of fertility decline in urban areas (Jolly and Gribble, 1993), with fertility being especially low in urban areas as compared to rural areas (Cohen, 1993).

Fertility has been and still is a major determinant of population growth in Kenya. During the 1960's and 1970's fertility increased rapidly and a Total Fertility Rate (TFR) of 8.0 was recorded in 1979 (GoK, 1980; 1982)<sup>1</sup>. The rapid increase in fertility is attributed to improvement in the living standards and health care facilities, low contraceptive prevalence rate, low age at marriage and high value accorded to children (Dow and Linda, 1983). Thereafter fertility started falling, though it still remains high compared to developed countries. The momentum of fertility decline in the country varies significantly between regions and population sub-groups, (GoK, 2002). The intercensal population growth rates also increased from 3.3% annually during the 1962-69 to 3.45% annually during both the 1969-79 and 1979-89 decades before taking a down turn to 2.9% annually during the 1989-99 decade. The total population size corresponding with

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<sup>1</sup> Total fertility rate is defined as the number of children a woman would have by the end of her child bearing years if she were to pass through those years bearing children at the currently age specific rates.

these growth rate also showed dramatic population increases from 10.6 million in 1969 to 15.3 million in 1989 and 28.7 million in 1999 (GoK, 2001).

The observed demographic trends pose diverse challenges to the government in regards to the provision of basic needs and services such as: health, education, food, employment and housing. Moreover, rapid urbanization and environmental degradation began to emerge as development issues associated with rapid population growth. The introduction of the structural Adjustment Programs (SAPS) in the course of 1980's compounded the above-mentioned challenges (GoK, 2002).

The government of Kenya, in realizing the adverse socio economic consequences of the rapid population growth rate, formulated an integrated population policy in 1984 (NCPD, 1984), which prioritized the reduction of fertility as development strategy<sup>2</sup>. The family planning program was enhanced and integrated in the district focus for Rural Development Strategy. Evidence of fertility decline was noted in 1989 (NCPD, 1989; Kelly and Nobbe, 1990; Cross et al., 1991). This decline has been generally attributed to the increase in modern contraceptive prevalence rate and modernization.

Table 1.1 below shows a decline in total fertility from 8.02 children per woman in 1977 to 6.67 children in 1989, to 5.4 children in 1993 and then to 4.70 children in 1998. With respect to education, the World Fertility Survey (WFS) shows that women with primary schooling had higher fertility than their counterparts with no schooling and those with secondary education had the lowest fertility rate. This means that fertility did not decline for those women who acquired primary education only but, instead, it increased. However, for those women who acquired secondary education, their fertility declined. In the subsequent Kenya Demographic and Health Surveys (KDHS's), however, both primary education and secondary education led to a decline in fertility. Thus, the observed decline in fertility may be attributed to the improvement in education especially above the primary level as reflected by the proportions of women who acquired additional education. With respect to the place of residence, we observe that in the period

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<sup>2</sup> NCPD stands for National Council of Population and Development.

1977/78 women in the urban areas had higher fertility rate than their rural counterparts. This may be as a result of urban women's ability to take care of more children since they were most likely to be educated and therefore employed and earn more income leading to improved standards of living. However, in the KDHS surveys the converse is true, women in urban areas had lower fertility compared to their rural counterparts. This may be attributed to their ability to acquire information regarding family planning measures aimed at reducing fertility.

**Table 1.1 Trends in Total Fertility in Kenya 1977-1998**

CHARACTERISTICS	1977/78 WFS		1989 KDHS		1993 KDHS		1998 KDHS	
	PROPORTION %	TFR	PROPORTION %	TFR	PROPORTION %	TFR	PROPORTION %	TFR
<b>Place of Residence</b>								
Urban	19.9	8.22	26.8	4.5	15.4	3.44	18.6	3.12
Rural	80.1	6.06	73.2	7.1	84.6	5.80	81.4	5.16
<b>Education</b>								
No formal education	42.2	8.02	23.8	7.46	17.2	6.03	12.8	5.80
Primary only	46.6	8.62	53.6	6.88	59.0	5.69	59.9	5.03
Secondary & higher	11.6	5.79	22.6	4.87	23.8	4.03	27.5	3.53
<b>Age Group</b>								
15-19	24.1	0.83	20.9	0.77	20.7	0.55	23.5	0.56
20-24	18.8	1.70	18.5	1.02	19.6	1.29	19.6	1.24
25-29	18.9	1.78	18.7	1.50	19.0	1.21	17.1	1.09
30-34	12.4	1.48	13.7	1.22	14.1	0.99	12.4	0.94
35-39	11.1	1.19	12.6	0.92	11.6	0.77	12.7	0.54
40-44	7.4	0.72	9.4	0.50	9.0	0.35	8.2	0.25
45-49	7.4	0.30	6.2	0.14	6.0	0.25	6.7	0.68
<b>Fertility:</b>								
MCEB	3.8		3.7		3.2		2.9	
TFR	8.02		6.67		5.4		4.70	

Source: Various Kenya Demographic and Health Surveys (KDHS's).

**LEGEND**

MCEB - Mean number of children ever born

TFR - Total fertility rate

WFS- World fertility survey

Table 1.2 shows reported average parities or the 1979, 1989 and 1999 census by both rural and urban areas. It also shows the Age Specific Fertility Rates (ASFRs) for the 1979-89 and 1989-99 decades. Comparison of average parities indicates lower fertility for women in urban areas compared to women in rural areas for all age groups in 1979, 1989 and 1999. The ASFRs based on the hypothetical cohorts average parities for the period 1979-89 showed a higher TFR in the rural areas, (7.0), compared with a lower figure of 4.5 for urban areas. The TFR of 3.9 for urban areas was lower than the 5.9 for rural areas in 1989-99. This pattern was observed in all the age groups, as age specific rates for urban women were consistently lower than those of rural women for the two-intercensal periods.

**Table 1.2: Reported Average Parities and Age Specific Fertility Rates (ASFR) by Place of Residence**

Age group	Reported average parities						ASFRs			
	1979 census		1989 census		1999		1979-89		1989-99	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
15-19	0.319	0.330	0.265	0.262	0.287	0.265	0.165	0.135	0.160	0.108
20-24	1.936	1.537	1.660	1.213	1.471	1.030	0.360	0.246	0.322	0.217
25-29	3.796	3.053	3.470	2.496	2.863	1.925	0.346	0.217	0.291	0.195
30-34	5.567	4.430	5.163	3.721	4.477	3.082	0.266	0.160	0.212	0.142
35-39	6.644	5.322	6.322	4.635	5.724	4.031	0.174	0.102	0.137	0.088
40-44	7.197	5.674	7.108	5.240	6.714	4.70	0.070	0.040	0.050	0.033
45-49	7.326	5.793	7.397	5.530	7.229	5.202	0.007	0.004	0.005	0.003
TFR							7.0	4.5	5.9	3.9

Source: GoK, 2002 PP. 39

Women in urban areas has been associated with low levels of fertility and this is so because generally, urban women marry late, tend to be more educated and thus, they are more prone to social change, including more use of contraception, especially, the more effective ones (Hill et al., 1994). Education is one of the most important socio-economic factors that influence fertility. Extended formal education has been found to be one of the

main reasons for the postponement of marriage among educated women (Kpedkepo, 1982). This means therefore that one of the main reasons for the urban-rural difference in fertility is the concentration of women with secondary and higher levels of education in urban areas. Women who have completed primary education or who have some secondary education and above, have been noted to have a lower total fertility rate than women without any education (Ainsworth et al., 1995).

### **1.1 Problem Statement**

Rapid population growth is exacerbating Africa's development problems and making it more difficult to raise the average levels of welfare. Rapid population growth due to high fertility rate coupled with slow growth in incomes is likely to raise the number of mouths to feed, increase the dependency ratio and hence straining the meager resources leading to more misery and poverty, (World Bank, 1990).

There is high fertility and demand for children in sub-Saharan Africa as compared to developed countries. This is reflected in the rapid rate of population growth in the region. Recent demographic surveys reveal that women's "ideal family size" ranges from six to nine children, despite important advance in the provision of family planning and implementation of population policies in most countries (Ainsworth et al., 1995). This can be explained by cultural norms, psychological factors, and low education in the sub-Saharan Africa countries. Also, the "replacement effects" and "insurance effects" in the presence of high mortality rate is also argued to lead to high fertility rate in the region, Schultz and Mwabu (2003).

An observation of the natural increase (birth rate minus death rate) indicates that Kenya experienced a rising trend in the rate of natural increase from 1948, reaching a peak in 1975-79, and thereafter, started to decline (Brass and Jolly, 1993). Appendix tables 1 and 2, portray this trend. High birth rates create large numbers of children relative to the number of the working adults hence savings that might otherwise be invested in the country's infrastructure and development, instead, must be diverted to meeting immediate food, healthcare, housing and education needs of the growing numbers of children and



adolescents. This prevents countries and families from making the long-term investments needed to help lift them out of poverty.

Economic growth in Kenya has lagged behind the population growth. In the period 1963 to 2003, the Gross National Product (GNP) per capita grew by less than 1.8 percent annually while population growth grew at the rate of more than 2.9 percent. This means therefore, the average income per capita has been and is still low and therefore the levels of human capital in the form of schooling and other forms of training has been adversely affected. Changing this scenario will require policies that help restore and enable families to have fewer children and invest more in the quality of each child. Unrestrained population increase is seen as the major crisis facing human kind today. It is regarded as the cause of poverty, low levels of living, malnutrition, ill health, environmental degradation and a wide array of other social problems. High population growth intensifies and exacerbates the economic, social and psychological problem associated with the condition of under development. Population growth is not only, the primary source of low living standards eroding self esteem, and limited freedom in the third world nations but a serious intensifier and multiplier of integral components of under-development. This is so when the additional population is poor in human capital given that resources in less developed countries are limited and therefore increase in population over strains the available scarce resource and hence its mostly likely that the capacity building will be declining as the population increases.

Despite the confirmation of the fertility transition in some countries in sub Saharan Africa, the bulk of the continent still have very high levels of fertility, such that questions about the prospects of fertility decline still remain germane. On a continent where barely two decades ago, transition was considered unlikely because of the socio-cultural context was deemed to support, if not promote high fertility (Bongaarts et al., 1984, Caldwell and Caldwell, 1987, 1990), it stands to reason that the success stories, spotted as they be, may provide considerable insight into facilitating transition elsewhere on the continent and Kenya as such, Schultz and Mwabu (2003).

## 1.2 Objectives of the Study

The main objective of this study is to examine the determinants of fertility in Kenya. The study seeks to pursue the following specific objectives:

- a) Examine the nature and trends of fertility in Kenya.
- b) Estimate a reduced form model of urban-rural fertility.
- c) Examine the socio-economic determinants of fertility.
- d) Make policy recommendations based on the findings above.

## 1.3 Justification of the Study

The assessment of Kenya's fertility dynamics has been an important objective of the National Demographic and Health Surveys since they were initiated in 1970's. The focus on fertility is due to its important role in determining Kenya's population growth. There has been debate in literature relating to the exact causes of fertility on the country before 1980's. Doubts have been expressed as to whether the increase in fertility in the 1960s and 1970s was due to improved birth reporting or was as implied in the application of parity progression ratio (PPR) to 1969 and 1979 fertility data (Brass and Jolly, 1993). Further examination of fertility data of this period suggest that fertility increases during this period was real. Brass and Jolly (1993) quoting a study by Blacker states that the main causes of fertility increase between 1970's and 1980's was primarily due to bio-social factors such as shorter birth intervals, attributed to declines in breastfeeding and post-partum abstinence along with lengthening reproductive lives (increase in the average life expectancy). Others attribute the noted increase in fertility to better nutrition and prenatal health care and reduced foetal mortality (Brass and Jolly, 1993).

Despite the fact that the total fertility rate in Kenya has been declining as depicted in appendix table 2, the Kenya's projection goals of achieving a total fertility rate of 2.5 children per woman is far from being achieved. This, therefore, calls for an urgent need to establish the role played by urban areas in the reduction of fertility in order for Kenya to achieve its goals and targets by the year 2010 as per its projections. A comparative study is useful in determining the policy approach that would be more appropriate in attaining a continued downward trend in fertility. Urban and rural place of residence

differs in both the socio economic and demographic aspects and hence it has a broad appeal to policy makers as 'it offers mechanisms susceptible to manipulation of government policy. Therefore, this study examines the socio-economic determinants of fertility in urban and rural areas in Kenya, in order to bridge this gap.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

Fertility studies already undertaken could be broadly classified into two groups: first, the policy oriented studies aimed at investigating how best to influence the levels and trends of fertility to conform to the broad national development objective. Second, the category of social sciences oriented studies aimed at examining the determinants of fertility levels and trends as well as their determinants. Brass and Jolly (1993) have identified policy studies as focusing on social dynamics of adolescent fertility, factors affecting contraceptive use and the effects of mortality and child survival and general health. On the other hand, social science research has centered on levels and trends of fertility, the proximate determinants of fertility, and the link between demographic variables, socio-economic variables and fertility.

#### **2.1 Theoretical Literature**

The vast collection of literature on determinants of fertility begins with the works of Leibstein (1957) and Becker (1960) and was formalized into a theoretical framework by Willis (1973) who introduced 'new home economics' methodology where children are viewed analogously to consumer goods. Numerous developments have followed, ranging from the use of simple static models (Nerlove and Razin, 1981) to the use of optimal control theory (Mcffit and McCollock, 1984). The new home economics provide the basis for the UK time series studies.

The household's theory of fertility decision was stated by Becker (1960) who developed an economic theory of the family. In line with the neoclassical theory, he suggests that children can be viewed as durable good, yielding primarily psychic income to parents. Household fertility decisions are determined by female wage and family income, which are supposed to measure time costs of raising children and earning potentials. It is assumed that fertility decision is reflected by the time cost of raising children and quantity-quality interaction as developed by Becker (1960), Becker and Lewis (1973) and Becker (1981).

Demand theories of fertility focus on changes in the balance of costs and benefits of children and low shifts in this 'balance relate to changes in costs of fertility regulations. The reason why fertility decline has generally accompanied economic growth and social development is that those processes induce shifts in the balance of the costs-benefits ratio for children. Some of these shifts are by-products of other changes associated with social and economic structure, for example, migration from rural to urban areas which raises the costs of housing or breaks down traditional mechanisms for support of parents in old age as part of familial inheritance arrangements. Others may be as a result of public policies that may not have explicit population objective for example, compulsory education which reduces labor value of children and raises their costs through school fees, books, clothing and transportation. Education also affects the demand for children by affecting reproductive attitudes and by increasing the value of women's time and thus raising opportunity costs of children (World Bank, 1994).

The household fertility decisions theories by Becker (1981), Becker and Lewis (1973) have shortcomings in that their formulations and testing were done in developed countries particularly United States and UK and therefore its application in Africa may not be practical since it assumes that children are viewed analogously with consumer durable goods while in African context children are viewed as both consumer goods and investment goods and at times as security for parents in old age especially where there is no government programs to take care of the old people.

High fertility reflects cultural and social norms supportive of larger families as well as high levels of infant and child mortality that require additional birth to ensure that desired number of children survive to adulthood. The costs of child rearing are low in such settings; those include both direct costs (food, clothing, housing and others) as well as indirect and opportunity costs such as the time that mothers or older sisters devote to childcare. Benefits of large families include added labor, particularly in rural settings, support for parents in old age, as well as other claims or entitlements (for example, to land holdings) based on the number of individuals in a household (World Bank, 1994).

Regulation of fertility is subject to social control, for example customs that determined when, whom and even whether individuals can marry and bear children and through traditional practices such as post-partum abstinence, separation of spouses, and breastfeeding. In addition to its direct purpose of nourishing newborn babies, breastfeeding may or may not be intended as a means of spacing births.

### *2.1.1 Mechanisms Underlying Levels and Trends in African Fertility*

In an attempt to understand the high levels of fertility in sub Saharan Africa, researchers have constructed two strands of arguments. The first strand considers the role of the cultural factors, which interact in important ways with the socioeconomic factors considered in the conventional transition literature. The second suggest that contraceptive distribution has been defective in Africa and that there has been a lack of political will and administrative capacity to implement family planning programs and satisfy the existing demand. It is generally acknowledged that African resistance to contraceptive use is more relevant in the area of family limitation, and that it does not extend to birth spacing and the control of childbearing in the extra-marital relation.

Caldwell (1977) suggested that high fertility is economically rational in traditional African economies where land is held by the lineage and increasing human numbers provide the best form of investment available to control the land and its products. Economic conditions may also affect the economic costs and benefits of children by changing the levels of schooling, nutrition, and health care that these children are provided. This perspective arises in the quantity-quality model discussed by Becker (1991), increases in the returns to education, for example, and may cause parents to provide their children with more education. This change increase the costs of each child as a result of school fees and the decreased availability of children for work and thus unless parents can borrow against the future income of their children will induce parents to choose smaller families.

Caldwell and Caldwell (1987) have summarized the particular difficulties encountered by family planning programs in sub Saharan Africa by reviewing ways in which cultural

factors affects both supply and demand of contraception. They characterized ancestor worship and the horror of infertility as the fundamental characteristics of African reproductive systems. They claim that even where imported monotheistic religions; a substantial portion of the population has adopted Christianity and Islam; sub Saharan Africans retain fundamental belief in the power of the ancestral forces, which encourage high fertility and disapprove of anything that limit fecundity. Barrenness is considered a punishment from gods or a characteristic of witches whom society casts out. Infant death, pregnancy wastage, sterilization, intrauterine devices (IUD) and contraception in general are identified with barrenness. Only women who continue to bear children are considered to be of good moral and social standing. There are however, serious questions about their theory. There is little direct evidence that ancestor cults are still uniformly important in sub-Saharan African region, which has maintained high fertility. African women are prompt to invoke the will of gods as when they say that their desired number of children is "as many as god will send".

African family structure typically places reproductive decision making in the hands of the husband and the economic burden mainly in the shoulders of the wife. Nothing could be more conducive to the maintaining of high fertility. The wife's isolation in an economic, and often social, unit with her children makes her increasingly dependent on those children and often loath to limit their number.

### *2.1.2 Urban-Rural Difference in Fertility*

Urban-rural difference in fertility and contraceptive use favor urban areas. Even in Kenya, where fertility transition is reported to have occurred simultaneously across the urban-rural divide (albeit at different rates), fertility remains considerably higher in rural areas (African population policy research center, 1998). Theoretical explanations for urban-rural difference derive from both supply and demand perspectives. On the demand side, there are numerous reasons why fertility demand would be high in rural areas. Cultural explanations include higher mortality, and the attendant need to replace society; prestige associated with large families; the need to have children for farm labor and risk aversion reasons; Cultural demand for sons; and the economic value of children

(Boserup, 1981; Cain, 1981; weeks, 1994a). Each of these is arguably, more urgent in the rural setting. In fact, in urban areas wage labor, the monetized economy, the cost of living, changing roles of women; all contribute to altering assessments of the value of children.

At the same time, supply side explanation of urban-rural variance in fertility posit that contraceptive outcomes and fertility are related to differences in the availability of, and access to, contraceptive and health service (Bongaarts, 1994; Njogu, 1991). Some supply side proponents argue that family planning programs can actually influence the level of demand. Even when an inclination to reduce fertility exists within a population, availability of, and access to, contraception, facilitates the realization of the reproductive goals. Historically, political biases favor urban areas and lead to skewed patterns of development, which exacerbate the population problems accelerating rural to urban migration (Gordon, 1996; Weeks, 1994b). The same political favor has disproportionately, located health and family planning facilities in urban areas (Davis, 1967). Thus, even if demand were to be uniform across rural and urban contexts fertility world probably be lower in the latter.

Despite, considerable debate about the relative merits of supply side and demand side explanations of fertility change, even proponents of supply argument, although resolute about the contribution of family planning programs to fertility change in the past, acknowledge that future change will be largely dependent on alterations in demand (Bongaarts, 1995). This appears to be increasingly necessary given the diminishing global resources allocated to family planning, and, especially to Africa. Particularly in African context, fertility demand traditionally measured as a function of female reproductive preference requires the consideration (Dodoo and Van Landewijk, 1996).

## **2.2 Empirical Literature**

Anker and Knowles (1982) analyzed the determinants of fertility in developing countries, the case of Kenya. They use econometric methods in the analysis and found that mothers' education of 0 – 4 years schooling were not significant while those with more than 4



years of schooling were significant and had a negative correlation with fertility. They also used husbands' education and land ownership as proxies to control for household permanent income. They found that husbands' education and the amount of land owned had a positive correlation but the urban residence had negative correlation with fertility. This study had a drawback since it included endogenous regressors like desired level of schooling for children, women labor force participation. The inclusion of endogenous regressors may lead to biased result. The study also used samples of household with currently married women that may lead to selection bias.

Anker (1985) examining the problem of interpretation and specification in analyzing fertility differentials used mothers' education as a continuous variable and found that it had a negative influence on fertility. He also added household income and found a negative relationship for urban areas. The child mortality had a positive influence on fertility. He used non-linear specification of Women's age and schooling to separate estimates for all women, urban, rural and for selected tribes. In this study, there is also the problem of endogenous regressors.

Cleland and Rodriguez (1988) undertook a comparative analysis of the relationship between education (both male and female) and marital fertility in a cross section of World Fertility Survey countries using individual level data. Although they found a substantial variation in the pattern observed in different regions of the world, they found little variation among within an given region. Thus although there was a clear negative relationship between education and fertility in Latin America, the relationship in Asia and Africa was less clear with the highest marital fertility often found among women with few years of schooling. Using indices of natural and controlled fertility Cleland and Rodriguez showed that the non-linear pattern arises from a combination of two opposing effects. These effect of education on an index of fertility control is monotonic tending to lower fertility among educated women, although " in Africa this takes the form of a threshold: not until the husband has completed primary school is fertility control practiced to an appreciable extent" the relationship between education and an index of natural fertility in Asia and Africa was also monotonic but acts in an opposite direction, a

pattern that is attributed to declines in traditional birth spacing restraints. Nonetheless, there is evidence that the relationship between education and fertility differs substantially according to urbanization. For example, Cleland and Rodriguez presented results consistent with a complex story in which the level of urbanization, in combination with government family planning effort, determines the relationship between education and fertility. In predominantly rural countries, increased education tends to raise fertility and government programs have little effect; in urban countries, however, increased education tend to lower fertility, with government programs reducing the educational differential to some extent. While the authors dismiss the importance of urbanization in favor of less defined cultural factors, the evidence is intriguing.

Njogu (1991) used the world fertility surveys of 1977-78 and 1989 KDHS to analyze the trends and contraceptive used in Kenya. The study found that woman's years of schooling and urban residence had a positive relationship with contraceptive use. Njogu used ordinary least squares regression methods for his analysis. He examined both the modern and traditional methods of fertility regulations. Njogu concluded that the impact of education on fertility rise, with its level. This study also had the endogeneity problem.

Schultz (1994), examining human capital, family planning and their effects on population growth observed that evidence at the household level suggests that fertility and child mortality are related to such factors as women's education and family planning. In such a model of family resource allocation and behavior women's educational attainment, family planning programs are seen to result in reductions in fertility as well as in child mortality. He pointed out that fertility within the household is determined by the dynamic interaction between its supply of and demand for births and variation in births across households reflect exogenous inter-couple variation in both supply of birth and prices, income and preferences for children or demand.

Ainsworth et al., (1995) examined the impact of female schooling on fertility and contraceptive use in fourteen sub-Saharan Africa countries. They used data drawn from the Demographic and Health Surveys (DHS), which were conducted since mid 1980s.

They found that average levels of schooling among women of reproductive age were very low, from less than two years to six years. Controlling for background variables, the last years of female primary schooling had a negative relation with fertility in about half the countries considered, while secondary schooling was associated with substantially lower fertility in all countries. Female schooling had a positive relationship with contraceptive use at all levels. Among the ever-married women, they found that husband's schooling exerts a smaller effect than does female schooling on contraceptive use and, in almost all cases, on fertility. They argued that although results suggest commonalities among the sub-Saharan countries, there were intriguing international differences in the impact of female schooling, which might reflect differences in the quality of schooling, labor markets, and family planning programs. Multivariate analysis of the determinant of fertility and contraceptive use allowed for a precise exploration of their relationship with women's schooling, while controlling for variables like age, area of residence, wealth, ethnicity, and religious affiliation. Results across the countries, for both national and sub national samples were compared and formed the basis for the explanation for the international differences. This study used sample of ever married women, which introduces the potential problem of selection bias, where married women are likely to have higher fertility rate compared to single and unmarried women.

Yiapan (1996) used cross sectional analysis method to assess the impact of public programs on fertility and education. She used district level data in which the number of surviving children was taken as an indicator of fertility level. Education was proxied by the enrolment levels, while public programs captured were those providing basic needs. Both direct and cross effects were analyzed, the analysis were extended to assess the impact of female education on fertility. The findings of the study suggested that, while some of the programs had desired effects and thus government provision was called for, the case of fertility and family planning program difficult to conclude because of the many factors influencing fertility decisions. She concludes that education was a crucial determinant and reducing fertility. The study was driven by the hypothesis that the public programs related to health; schooling and family planning had a positive effect on

people's response to education and a negative effect on fertility. Yiapan recommended for the girls child education and the provision of subsidies for the reduction of fertility.

Lam and Duryea (1998), using data sets from the Brazilian economy and analyzing the effects of schooling and fertility, labor supply, and investment in children observed that the impact of schooling on the relevant variables could empirically be conceived of as being driven by trade-offs along two margins. In the first of these margins is the race between home productivity and labor market productivity, which invariably gives direction to the extent to which better-educated women are drawn into labor force by higher wages. The second margin revolves around the adjustment that has to be made in terms of child quantity and quality that result from the effect of schooling on productivity. The study found that women's first eight years of schooling exerts a strong negative impact on fertility.

Dodoo et al., (1998) Writing on rural-urban difference in the resolution of fertility goals in Kenya explored the significance of the rural-urban divide as a social force that circumscribes the gendered nature of a reproductive decision making in Kenya. They examined how the relative influence of female and male preference on the productive decisions making differs between rural and urban areas and the reasons for such variations. They employ logit estimation techniques and found that whereas gendered reproductive preferences effects on the contraceptive behavior are completely explained by factors such as female education in urban areas, in rural areas, male preferences continue to dominate female preferences in reproductive outcomes. Their findings suggested the need to pay closer attention to rural areas where it appeared that females were less able, than their male counterparts to convert their preferences to behavior. They suggested that programs that target rural areas to empower women via educational or professional means should be intensified but specific attention must be paid to specific empowerment of women in the reproductive decision-making. This study is well researched, but it lays much emphasis on genders difference rather than urban – rural difference, hence, does not capture the intricate factors leading to urban – rural difference in fertility.

Wasao (1998) examined some socioeconomic correlates of fertility in Kenya; they highlighted some key social and economic factors that are associated with fertility in Kenya and their policy implications. The objective of the study was to document the trends in selected key socioeconomic indicators and ascertain their role in the ongoing fertility transition. Data from various governmental sources were analyzed using both bivariate and multivariate regression procedures to examine the nature of the relationship between fertility and selected socio economic variable. He found that lower fertility was significantly associated with higher educational attainment and wage employment. He found also that the level of urbanization and contraceptive use were significant determinants of lower fertility. The paper underscored the importance of these socio economic factors in understanding fertility change in Kenya.

Chepng'eno (1999) examined the factors that had contributed to the differentials in fertility in three provinces: Central, Nyanza and Western provinces. The study used the KDHS data of 1993. She used both ordinary least squares and maximum likelihood estimation methods to determine whether demographic variables had led to the fertility differentials in the three provinces. She argued that Kenya was one of the countries in sub-Saharan Africa, which was experiencing a decline in fertility. She attributed the decline to the increased contraceptive use, rapid social change, which included increased formal education for women, effective family planning methods. The decline in fertility was seen to affect both geographical and social categories of the population in a similar way, however, not in the same extent. The study found out that the differential in fertility between central, Nyanza and Western provinces could have been due to the fact that women were desiring smaller families, more years of schooling leads to more exposure to mass media and hence they were more likely to be exposed to family planning information, modern ideas that competed with the traditional norms of marriage and child bearing. The low child and infant mortality could also be a contributory factor to smaller family size goal since the households were able to achieve their desired family size without having to give birth to many children. The study found that marital duration greatly influence fertility as it leads to longer period of exposure to the risk of conception. Education was also found to be closely associated with the various aspect of fertility such

as desired family size, contraception, and potential supply of surviving children high proportion of child loss greatly influenced the variation in fertility in the three provinces because of the replacement effect and assurance effect of child loss. She recommended for policies, which aimed at rapid socio-economic development stressing education, health and equitable distribution of resources to improve the standards of living, which triggers a decline in fertility. This study analyzed the fertility differentials in regions; therefore it did not capture the fertility differentials in urban and rural areas.

Bauni et al., (2000) examining ethnicity, modernity, and fertility in Kenya, argued that, ethnicity was a powerful factor in Africa that affects all aspects of life for the individual. He argues further that, for most Africans, ethnic belonging is definitely a more powerful reference than the wider national identity. It is not a surprise that ethnic variation in reproductive outcomes in developing countries including Africa have recently captured the interest of scholars and policy makers. They also argue that, this was partly because societies are structured among other characteristics, by ethnic groups from which individuals derive their fundamental identities and values. The individual cultural attachment and identity determines behavior including reproduction. Kenya, like most African countries, has many ethnic groups, each of which has its own homeland and distinctive language, values, and culture; hence, the group variation in aspects of reproductive ideals and behavior. They hypothesized that; there exist ethnic differences in the reproductive behavior leading to differences in fertility outcomes. They used multiple regressions to analyze data from the demographic and health surveys and found that central Bantus comprising of Kikuyu, Embu, and Meru have smaller families than other groups. They postulate that, they achieved these by using more modern contraceptive compared to other ethnic groups. They argued that, these differences persist even where socio demographic factors such as place of residence, educational attainment and marital types are controlled for. In explaining the fertility differentials, they discussed the historical and contemporary events in Kenya, which may have predisposed the Kikuyu, Embu, and Meru to have more influence of modernity and placed them in a unique position relative to reproductive outcomes.

Shapiro and Tambashe (2000) writing on fertility transition in urban and rural areas of Sub-Saharan Africa provided 'an overview and analysis of the role of urban areas in fertility transition in sub-Saharan Africa. The study used data from 40 demographic and health surveys carried out in 25 different countries to examine fertility level and trends, separately for urban and rural areas. The paper also provided evidence to the extent to which urban-rural differentials in fertility are linked to difference in women's schooling, age, at marriage, contraceptive use, and infant and child mortality. The analyses indicated that urban areas play a key role in the process of fertility transition that is presently unfolding in sub-Saharan Africa. It was also found that there may be a three stage transition pattern, with fertility initially declining in urban areas while remaining stable in rural areas, then fertility falling in both settings but more rapidly in urban areas, and finally with fertility declining more in rural areas than urban areas. The paper utilized multivariate analysis to quantify the importance of the various factors in contributing to the differentials in fertility.

Ezeh and Dodo (2002) examined the key elements underlying fertility transition in sub-Saharan Africa with special attention to Kenya. Notwithstanding the contribution of family planning services and programs, they argued that significant part of the sustained decline in fertility observed in Kenya, and probably other African countries, derives from fundamental shifts in the educational, economic, family and marriage institutions in the regions. They argue that change occurring in these institutions maintain an independent effect on fertility. The study was driven by the objective to examine the extent to which fertility change in Kenya and how it can be linked to changes in core societal institutions. They used data from the demographic and health surveys, and world fertility surveys to evaluate the role of shifts in the institutional arrangement of Kenya society on the acclaimed decline in the country's fertility. They employed regression decomposition techniques to evaluate the net contribution of each variable and found that the contributions of marriage and education are particularly significant. They postulate that, as these institutional changes becomes more manifest in other sub Saharan Africa countries, similar effects may be observed in their fertility patterns, even in settings where family planning environment remains weak. This paper put more emphasis on the



institutional arrangement rather than the urban-rural differentials; hence, it differs with my study.

Sackey (2002), writing on female labor force participation and fertility in Ghana, used the Ghana living standard surveys to estimate the reduced form female labor force participation and fertility models. The study was driven by the objective to analyze the trends in participation rates, educational enrolment as well as fertility trends in Ghana. The study found that female schooling matters, both female primary and post primary schooling levels exert significantly positive impact in their labor force participation, and have a negative effect on fertility. He concludes that the government should ensure female education sustainability because it was the key mechanism for enhancing female human capital and productive employment with favorable impacts on perception of ideal family size and fertility preference.

Schultz and Mwabu (2003) examining the consequences of fertility in contemporary Kenya posited that lower fertility was associated with higher economic welfare leading many to view policies which foster lower fertility as a benefit to families. They examined household survey evidence from Kenya collected in 1994 and 1997. They utilized ordinary least squares and two stage least squares techniques to assess whether multiple sources of family income affected fertility differently or whether fertility variation due to random shifts in the reproductive supply of births was associated with the same or different consequences for the family welfare as variation in fertility related to the observed factors which drive a couple's demands for births. They hypothesized that some sources of family income encourage, and other sources discourage, fertility, because different sources of income affect not only the economic opportunities available to families but they also affected differently the economic opportunities. Their findings suggested that the consequences of economics development on fertility depend on the composition as well as level of family economic resources. Family incomes from returns on physical capital, such as land holdings, increase family consumption and raise fertility, whereas family income from returns on women's human capital increase family consumption and lower fertility. Unanticipated increases in the reproductive endowment



of women, as well as reflected in twins, increase their fertility, increase the probability that they practice more reliable methods of contraception, and reduce their children's health. The welfare costs of such unanticipated birth interaction effect between supply and demand factors on family outcomes. They recommended that family planning programs, which reduce the costs of birth control exogenously to the family, should benefit families most who demand the fewest births in a similar way, as would a reduction in the incidence of twins. This paper focused only on the relationship between fertility and welfare at the societal level. In most African societies, children are viewed as communal investment goods and in most cases relative contribute in rearing of children. The study was also driven by the objective of assessing how family income from different sources affect fertility and the unanticipated increases in the reproductive endowment as reflected in births of twins and hence it differs with my study.

### **2.3 Overview of Literature Review**

Studies of broad spectrum of developing countries have provided strong support for the economic theory of fertility. High female employment opportunities outside home, better health care, modernization and greater female school attendance, particularly at the primary and secondary school levels and above are associated with significantly lower levels of fertility. As a woman becomes better educated, they tend to earn larger share of the household income and tend to produce fewer children.

It is also evident from the empirical literature review that most studies have included endogenous regressors, which may lead to biased results. Some studies have used samples for currently married women and by conditioning marriage; they have not captured the full effects of socio economic variables on fertility (through delayed marriage) or contraceptive use (before marriage). Further, since marriage and child bearing could be thought of as a joint decision, studies that used married samples have introduced a potential selection bias in favor of women with higher demand for children.

This study will seek to avoid these pitfalls by using a common set of exogenous regressors on samples of all women, regardless of marital status.

## **CHAPTER THREE**

### **3.0 METHODOLOGY**

To achieve the objectives of the study this section provides the theoretical framework of the study, model specifications, estimation procedure, data sources and method of analysis.

#### **3.1 Theoretical Model**

This study follows closely the studies by Ainsworth et al (1995) and Sackey (2002). The study by Ainsworth et al (1995) used multivariate analysis method to assess the impact of female schooling on fertility and contraceptive use in fourteen sub-Saharan African countries. They use children ever-born as the dependent variable, the independent variables were: women's age, women's years of schooling, urban residence, woman's ethnic group, woman's region of residence, woman's religion and a group of variables proxying household income or wealth. They found that primary schooling had a negative relation with fertility while the secondary schooling was associated with substantially lower fertility. Among the ever-married women, husband's schooling exerted a smaller effect than does female schooling on contraceptive use and on fertility. Female schooling had a positive relationship with contraceptive use at all levels. The study by Sackey (2002) on the other hand used ordinary least squares to analyze the female labor force participation and fertility in Ghana. He used the total number of children born as the dependent variable and the independent variables were: level of schooling completed, woman's age, household assets, child survival rate, woman's residence, ethnicity, religion, and husbands education. The study found that the primary and post primary schooling levels exert significantly positive impact in their labor force participation and have a negative impact on fertility. Hence the adoption of both studies in developing the methodology will therefore help in analyzing clearly the urban-rural fertility differential in Kenya. This study includes contraceptive use.

The theoretical framework on fertility is grounded in Sackey (2002) who in examining female force participation and fertility used a one period static life cycle model initially applied by McCabe and Rosenzweig (1976), Ben-Porath (1973) and Willis (1973). In this

study we adopt a one period static optimization model where the woman's utility is a function of the number of children which has been adjusted for quality consumption of market goods, leisure and taste. The woman is assumed to maximize a well-behaved twice-differentiable utility function subject to a time allocation and income budget constraints. It is assumed that there is no uncertainty and the woman has the prerogative in deciding on fertility issues. Also theory indicates that in terms of fertility, demand for birth is predicted by various socio- economic factors<sup>3</sup>.

To achieve the objective of our study we specify a reduced form model for fertility because the reduced form equation has no inherent simultaneity problems and explanatory variables are assumed to be not correlated with the error term and therefore the model will be estimated using ordinary least squares techniques. Our theoretical fertility model is as follows:

$$F = G(A, A^2, ED, PR, E, Sr, R, HED, MS, CON) \dots\dots\dots(1)$$

Where:

F is the total number of children ever born.

A = Woman's age

A<sup>2</sup> = Age squared (to control for biological factors affecting the supply of births)

ED = woman's level of schooling in various specifications.

PR = woman's place of residence.

E = ethnicity (selected tribes)

Sr = Child survival rate

R = religion.

HED = Husband's Education in years.

MS = Marital status.

CON = contraceptives use

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<sup>3</sup> See Benefo and Schultz (1996).

### 3.2 Model Specification

The study estimated separately the urban and rural fertility model.

The urban fertility model was estimated as follows:

$$F_U = \alpha_0 + \alpha_1 A + \alpha_2 A^2 + \alpha_3 ED + \alpha_4 E + \alpha_5 S + \alpha_6 HED + \alpha_7 R + \alpha_8 CON + \alpha_9 MS + \varepsilon \dots\dots\dots(2)$$

The rural fertility model was estimated as follows:

$$F_R = \beta_0 + \alpha_1 A + \beta_2 A^2 + \beta_3 ED + \beta_4 E + \beta_5 S + \beta_6 HED + \beta_7 R + \beta_8 CON + \beta_9 MS + \mu \dots\dots\dots(3)$$

$F_U$  and  $F_R$  are urban and rural total number of children ever born respectively and other variables are as defined before.

### 3.3 Data Sources and Types

The study utilized cross sectional secondary data mostly drawn from the Kenya Demographic and Health Survey (KDHS), 1998. The KDHS 1998 is a nationally representative survey of 7,881 women age 15-49 and 3,407 men age 15-54 it is implemented by the NCPD and Central Bureau of Statistics (CBS), with significant and logistical support provided by the Ministry of Health and various other governmental and non-governmental organizations in Kenya. The KDHS is designed to provide information on the level and trends of fertility, family planning knowledge and use of contraceptives, infant and child mortality, and maternal and child health indicators. The 1998 KDHS was in general intended to provide policy makers and program managers with a comprehensive look at the levels and trends in key health and demographic parameters. Other sources of data include population census data, economic surveys.

### 3.4 Definition of Variables and Expectations

Age and education captures the woman's individual characteristics while place of residence, ethnicity, and religion captures the social environment. Child survival rate captures the health environment.

### *Educational Level*

Cochrane (1979) demonstrated that the effects of individuals education on fertility are likely to work through multiple channel: "education through literacy gives people access to more sources of information and a wider perspective on their own culture. Education is also a socializing process and inculcates social values. Exposure to these values would depend on the years of schooling. Education is widely believed to provide economic skills, the level of those skills, jobs are often rationed on the basis of credentials such as education certificates". Improved educational opportunities and higher returns to schooling can also induce parents to have fewer children and invest more on each child. Therefore, Woman's education is expected to reduce the number of children born per woman. Educational level is a dummy variable of women with no education (ne), primary education (pe), secondary education (se) and higher education (he). It takes the value 1 if applicable and zero if otherwise. Husband's education is measured in years of schooling.

### *Region of Residence*

Place of residence is a dummy variable of urban and rural areas, it takes the value of 1 if applicable and zero if otherwise. Urban residence is believed to be associated with a reduction in fertility. Urban women are expected to have a lower fertility than their rural counterparts. Women in urban areas are more knowledgeable about contraceptives and have easy access to family planning clinics and health facilities. Rural women are likely to be influenced by their cultural and religious affiliations and attitudes that they should have as many children as they could and they should not use contraceptives, which are likely to a high success rate than the traditional methods.

### *Ethnicity*

Ethnicity is a dummy variable of selected tribes (Kikuyu, luo, Kalenjin, Kamba, other tribes), it takes the value 1 if applicable and Zero if otherwise. The effect of ethnicity on fertility may be ambiguous.

### *Religion*

Religion is a dummy variable, of Protestant (pro), catholic (ca), Muslim (mu), and other religions, it takes the value 1 if applicable and zero if otherwise. The effect of religion on fertility may be ambiguous.

### *Contraceptive Use*

Contraceptive use is a dummy variable and it takes the value of 1 for any modern contraceptive use and zero otherwise. The contraceptive use is expected to reduce fertility. Some knowledge of method of family planning lowers fertility whereby can space and limit the number of children within a given time period.

### *Child Survival Rate*

The child survival rate is defined as the ratio of children ever born to number of living children. Child survival rate captures the health factors. The improvement in child survival rate implies a reduction in child mortality rate and therefore expected to reduce fertility.

### *Marital Status*

Marital status is a dummy variable, which takes the value 1 if married and zero otherwise. Marital status is expected to have a positive relationship with fertility.

**Table 3.1: Summary of expectations**

<b>Variable</b>	<b>Expectation</b>
Education (ED)	Negative
Place of Residence (PR)	Negative for urban areas
Contraceptive Use (CON)	Negative
Child Survival Rate (S)	Negative
Husband education (HED)	Negative
Marital status (MS)	Positive

## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSION**

This section provides the descriptive statistics and the empirical results of the reduced form fertility model.

#### **4.1 Descriptive Statistics**

Table 4.1 provides the descriptive statistics of some of the main variables in our data sets. The main focus is on the females aged 15-49 years. The descriptive statistics provides measures such as the mean and the standard deviation values of the covariates. From the table it is evident that most women tend to be middle aged with mean age of 27 years. The regional age difference is quite small with rural women having a mean age of 28 years while the urban women have a mean age of 26 years.

The mean number of Children Ever Born (CEB) measures the cumulative fertility of women at specific ages at the time of the survey. The mean number of children ever born for the overall sample is 3.71 children. This implies that fertility in Kenya is still relatively very high as compared to those of developed countries. The total number of children ever born in rural areas is higher than urban areas meaning that fertility of women in rural areas is higher than their counterparts in urban areas. The mean number of children ever born in rural areas is 3.89 children per woman while in urban areas it is 2.69 children per woman. The child survival rate in rural areas is lower than the child survival rate in urban areas with a mean of 0.90 in rural areas and 0.93 in urban areas. The low child survival rate in rural areas implies that particular families will tend to have more children due to the "insurance and replacement effects" whereby in the presence of low child survival rate, parents may have more children or births than they would otherwise have had in order to insure themselves against child loss due to death.

**Table 4.1: Descriptive Statistics of Women Age 15-49 Years**

Variable	Overall sample		Rural sample		Urban sample	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Women's age	27.287	6.537	27.596	6.684	25.533	5.295
Women's age squared	787.293	385.049	806.214	396.459	679.922	290.300
Ethnicity						
Kikuyu	0.128	0.335	0.122	0.327	0.164	0.371
Luo	0.137	0.344	0.125	0.330	0.202	0.402
Kalenjin	0.196	0.397	0.225	0.417	0.028	0.166
Kamba	0.102	0.302	0.993	0.299	0.115	0.316
Others	0.426	0.495	0.425	0.495	0.427	0.495
Religion						
Protestants (Christians)	0.641	0.480	0.668	0.472	0.490	0.500
Catholic	0.267	0.443	0.265	0.441	0.283	0.451
Muslim	0.053	0.223	0.027	0.162	0.198	0.398
Others	0.035	0.183	0.038	0.192	0.133	0.115
Women's Education level						
No education	0.111	0.314	0.115	0.319	0.081	0.273
Primary education	0.643	0.479	0.665	0.471	0.514	0.500
Secondary education	0.221	0.415	0.196	0.397	0.364	0.481
Higher education	0.016	0.125	0.013	0.112	0.034	0.181
Fertility						
Children ever born	3.713	2.539	3.893	2.590	2.688	1.898
Child survival rate	0.907	0.190	0.904	0.190	0.926	0.187
Number of living children	3.289	2.212	3.437	2.260	2.452	1.687
Household assets	0.652	0.508	0.626	0.521	0.7946	0.404
Contraceptive use	0.298	0.457	0.267	0.442	0.467	0.499
Place of residence						
Rural	0.850	0.357				
Urban	0.150	0.357				
Sample size	3531		3002		529	

The average number of children ever born is positively related with age, and rises as we move from the younger age group to the older age group as shown in table 4.2. The age groups of 15-19 years have an average of about 1.32 children while the older age groups of 45-49 have an average of about 8.75 children. The age groups of 25-29 years tend to



act as the middle age group with an average number of about 3.36 children. It is also true for the urban and rural samples that fertility rises with age as expected from theory.

**Table 4.2: Mean Number of Children Ever Born by Age Group and Place of Residence**

Age Group	Overall sample		Rural sample		Urban sample	
	MCEB	Sample Size	MCEB	Sample Size	MCEB	Sample Size
15-19	1.32	357	1.33	300	1.25	57
20-24	2.02	1048	2.30	848	2.01	200
25-29	3.36	964	3.48	805	2.76	159
30-34	5.11	587	5.33	516	3.56	71
35-39	6.93	404	7.04	364	5.90	40
40-44	8.62	139	8.61	138	10	1
45-49	8.75	32	8.36	32	12	1
15-49	3.71	3531	3.89	3002	2.69	529

#### LEGEND

MCEB stands for Mean number of children ever born.

From table 4.2, the total fertility in rural areas is higher than the total fertility in urban areas, which conforms to the expectation. The level of education tends to play a very crucial role in fertility decisions in general, and the total number of children that would be obtained or given birth. The higher the educational level, the lower the fertility and hence the lower the total number of children born. This scenario can be explicitly seen in table 4.3, where women with no education have an average of 5.75 children while their counterpart with higher education have a lower average number of children ever born with mean of 2.45 children. This means therefore that fertility tends to fall with higher attainment of education. The primary educational level has a mean number of children ever born of 3.63 children. Most women tend to have attained primary school education level. From table 4.3, women education gives the sharpest and statistically significant difference in family size at 5% level of significance compared to place of residence.

**Table 4.3: Mean Number of Children Ever Born by Age Group, Educational Level and Place of Residence**

Age Group	Overall Sample				Rural Sample				Urban Sample				MCEB
	NE	PE	SE	HE	NE	PE	SE	HE	NE	PE	SE	HE	
5-19	1.64	1.32	1.11	-	1.45	1.34	1.15	-	2.4	1.17	1.00	-	1.32
20-24	2.25	2.13	1.69	1.43	2.16	2.12	1.70	1.25	2.50	2.16	1.67	1.67	2.02
25-29	3.88	3.66	2.66	2.00	3.96	3.73	2.80	2.18	3.50	3.19	2.27	1.00	3.36
30-34	6.10	5.45	4.16	2.62	6.38	5.57	4.33	3.09	3.50	3.92	3.54	2.1	5.11
35-39	7.20	7.32	5.67	4	7.27	7.37	5.95	4.5	6.38	7.16	4.00	2.5	6.93
40-44	9.10	8.29	7.94	-	9.17	8.26	7.94	-	-	10	-	-	8.62
45-49	8.69	8.9	12	-	8.36	8.14	12	-	-	12	-	-	8.75
MCEB	5.75	3.63	2.97	2.45	6.01	3.74	3.20	2.71	3.65	2.86	2.26	1.89	3.71

NB: MCEB stands for mean number of children ever born; NE: No Education; PE: Primary Education; SE: Secondary Education; HE: Higher Education

The overall data shows that women with higher education had a lower fertility with a mean number of children ever born of 2.45 compared to those women with no education with a mean of 5.75 children. It is also evident that the total fertility rate decreases with higher education attainment in both rural and urban areas. Moreover, the total number of children ever born in rural areas is higher than those in urban areas regardless of the educational status. Women with no education in both urban and rural areas have higher mean number of children compared to those with higher education. This suggests that fertility is negatively related with educational level. It appears, therefore, that with higher education attainment women tend to have smaller family sizes hence fewer children. Statistically significant and different mean number of children ever born at 5% level of significance is also evident in each educational category. From the overall sample, women with higher education level have the smallest family size of 2.45 children, followed by those with secondary education and primary education with 2.97 children and 3.63 children, respectively and those with no education have 5.75 children. This is also true for both urban and rural samples. Fertility differentials according to educational

level can partly be attributed to the fact that women with higher education are more likely to participate in the labor force and therefore, may opt to postpone marriage and concentrate on their careers or most likely that they space their children bearing periods.

### **4.3 Empirical Results**

This section present results obtained from estimating the reduced form fertility model using ordinary least squares. We modeled fertility as a function of woman's age, age squared, and educational level, place of residence, ethnicity, religion, household assets, contraceptive use and child survival rate. Table 4.4 presents the results of the Ordinary Least Squares (OLS) estimations. The empirical results from the overall sample show that 72.49% of the children ever born is explained by woman's age, woman's age squared, educational level, place of residence, ethnicity, child survival rate, religion, husband's education, marital status, and contraceptive use in the overall sample. These explanatory variables also explain 73.87% of children ever born in rural areas and 53.47% of the children ever born in urban areas. The F tests indicate an overall significance of the pooled and place of residence models at the 5% significance level. The coefficient for women's age for pooled and rural models are significant with a positive sign suggesting that the total number of children ever born increases with age as expected from theory. For the urban model, the coefficient for the woman's age is negative and non significant but the coefficient for the woman's age squared is positive and significant suggesting that the relationship between the total number of children ever born and age in urban areas is non-linear. The negative relationship between age and fertility in urban areas may be explained by the fact that couples or families in urban areas tend to stop bearing children at an early age and concentrate on their career development or labor force participation and hence there may be a trade off between having more children and labor force participation.

#### *Educational Level*

The coefficients on the educational levels are negative and significant implying that, women with primary, secondary and higher educational levels have fewer children compared to women with no education. This suggests that there is an inverse relationship

between fertility and higher attainment of educational level implies that as women attain higher levels of education, the total fertility rate decreases. The negative relationship between fertility and educational level was also found by Anker and Knowles, 1982; Ainsworth et al., 1995; Wasao, 1998; Sackey, 2002. The negative relationship may be explained by the fact that women with more education tend to participate in the labor force and hence tend to have smaller families. The husband's years of schooling has a negative significant coefficient for overall and rural samples but insignificant for urban sample implying that the husband's education has more effect in rural areas compared to urban areas.

### *Religion*

Protestant, Catholic and Muslim religions are insignificant for the pooled and rural samples implying that there is no significant difference in fertility between the three religions and the fertility of other religions. For the urban sample both catholic and Muslim variables have positive and significant coefficients suggesting that there a significant fertility difference between the two religions and other religions. The results differs with the expectations, we expected women who are in the traditional religion to have higher fertility compared to women in other religions since women in the traditional religion are more likely not to use modern family planning methods and effective and efficient contraceptives. The positive signs are also contradictory since we expected negative signs. The high fertility in the traditional society is seen as a rational response to an economic system that thrive under unregulated regimes, a religious system that rewarded pronatalism and penalized infertility (by equating fertility with divine blessing and infertility with divine curse) Ezeh and Dadoo (2002).

### *Ethnicity*

Ethnicity is a significant factor that affects all aspects of life for an individual; this affects individual's attachment and identity that determines her reproductive behavior. Ethnic variations in reproductive outcomes are partly because societies are structured among other characteristics from which individuals derive their fundamental identities and values (Bauni et al., 2000). The ethnicity variable is significant for some tribes (Kikuyu, Luo, Kalenjin) but with different signs. The positive significant coefficient for the

Kalenjin and Luo tribes imply that they have higher fertility compared to other tribes (Luhya, Mjikenda) while the negative significant coefficient for the kikuyu tribe implies that the kikuyu tribe has lower fertility compared to other tribes not included in the model. The different signs on the ethnicity coefficients suggests that different tribes have different cultures which affect fertility in different unique ways and hence ethnicity plays a significant role in fertility and more so in rural areas where cultural values and traditional norms are still being practiced. It also shows that ethnicity is deeply embedded in the social structures of a society, the networks of status or positions that people occupy in relation to each other as individuals or groups. It is therefore, a powerful factor in Kenya, which affects all aspects of life for the individual. Reproductive outcomes also tend to follow certain ethnic patterns, arising from cultural values and behavior regarding fertility.

#### *Contraceptive Use*

The contraceptive use variable has a negative coefficient in the three models but not significant in the urban model. The inverse relationship between fertility and contraceptive use conforms to theoretical expectations. Contraceptive use is seen as a measure of family planning regulation and hence increased use of contraceptive use means increased family planning and hence the number of children ever born tends to decrease since contraceptive use prevents pregnancy from occurring. The contraceptive use is captured by the prevalence rate of any modern contraceptive use and takes the value of 1 if applicable and zero otherwise. The negative relationship is consistent with Njogu (1991) and Ainsworth et al., (1991) findings.

#### *Child Survival Rate*

The child survival rate that is assumed to be exogenous, as expected has a strong significant negative effect on fertility in the three models. This suggests that improvements in child survival rate imply a reduction in fertility rate since couples will no longer be worried about the high child mortality rates. The intuition behind this is that as the child survival rate goes up, there will be little inclination to maintain higher fertility levels as a safeguard measure against child mortality. Sackey (2002) also found the negative relationship between child survival rate and fertility. The increased survival

rate leading to a decline in fertility may be due to the improvement in health care facilities.

#### *Region of Residence*

The rural place of residence has a positive and significant coefficient suggesting that the rural women have a higher fertility than their urban counterparts. Empirical studies have consistently showed that women in urban areas have lower fertility than their counterparts in rural areas (for example, Dodoo, et al., 1998; Wasao, 1998; Shapiro and Tamashe, 2000). Urban areas are associated with lower demand for children partly because of lower preferences for many children. In urban areas, the cost of raising children is relatively higher and the labor value of children is lower as compared to rural areas. The basic inputs into child rearing (food, clothing, and schooling) are most expensive in urban areas compared to rural areas. Women in urban areas are exposed to modern ways of thinking and values and better opportunities for individual self-advancement, which may translate into changes in fertility desires and outcomes in favor of smaller families.

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Table 4.4 Ordinary Least Square (OLS) Regression Results.

Variable	Overall sample		Rural sample		Urban sample	
	Coefficient	t	Coefficient	t	Coefficient	t
Woman's age	0.2776	7.10*	0.3336	8.11*	-0.02732	-0.27
Woman's age squared	0.0043	0.61	-0.0004	-0.56	0.0050	2.52**
Woman's education <sup>a</sup>						
Primary	-0.2184	-2.28**	-0.1949	-1.94**	-0.2468	-0.85
Secondary	-0.9371	-8.77**	-0.9143	-7.98*	-0.9233	-3.20**
Higher	-2.1087	-12.25*	-1.8849	-11.07*	-2.2895	-6.33**
Religion <sup>b</sup>						
Protestant	0.2058	1.82***	0.1338	1.06	0.3955	1.61***
Catholic	0.2173	1.83***	0.1289	0.97	0.5394	2.31**
Muslim	0.1932	1.15	-0.0667	-0.29	0.6109	2.08**
Ethnicity <sup>c</sup>						
Kikuyu	-0.3723	-5.40*	-0.4360	-5.78*	-0.1076	-0.64
Luo	0.5508	7.54*	0.5550	6.75*	0.5120	3.00**
Kalenjin	0.3900	5.89*	0.3864	5.71*	0.1489	0.47
Kamba	-0.0934	-1.29	-0.1396	-2.42**	-0.0065	-0.04
Place of residence <sup>d</sup>						
Rural	0.2621	3.71**				
Husbands education	-0.0178	-2.61**	-0.0181	-2.44**	-0.0105	-0.73
Marital status	0.5867	8.71*	0.5967	8.00*	0.1863	1.21
Contraceptive use	-0.1599	-3.08**	-0.1396	-2.42**	-0.2286	-1.93***
Child survival rate	-1.4305	-10.15*	-1.4607	-9.58*	-1.0722	2.99**
Constant	-3.3457	-6.42*	-3.8708	-7.11*	0.9233	0.71
F test	456.53		471.84		22.33	
R <sup>2</sup>	0.7249		0.7387		0.5347	
Number of observations	3519		2992		526	

**LEGEND**

\*, \*\*, \*\*\* indicate the significance level at 1%, 5% and 10% respectively.

a: No education is the reference category

b: Other religion is the reference category

c: Other tribes is the reference category

d: Urban place of residence is the reference category

## **CHAPTER FIVE**

### **5.0 SUMMARY AND CONCLUSION**

This section gives a brief summary of the study, conclusion and policy implications and recommendations.

#### **5.1 Summary**

This paper examined fertility in Kenya with special reference to urban-rural difference.

The study was driven by fourfold objective: to examine the nature and trends of fertility in Kenya, to estimate a reduced form fertility model, to examine the socio-economic determinants of fertility and to make policy recommendations based on the findings. It was hypothesized that women in rural areas have higher fertility rate compared to their urban counterparts. The study used data sets from the 1998 Kenya demographic and health survey and employed ordinary least squares technique of estimation to explore the effects of some selected socio-economic determinants of fertility.

The study shows that fertility is negatively related to educational level, child survival rate, and contraceptive use in both rural and urban areas. However, fertility was found to be positively related to marital status though not significant in urban areas. It was also found ethnicity plays a very important role in determining fertility in rural areas.

#### **5.2 Conclusion, Policy Implication and Recommendation**

Fertility is a major determinant of population growth in Kenya and need not to be over-emphasized. Despite the observed fertility declines in Kenya over the recent years, high fertility still persists in rural areas in comparison to urban areas. The high fertility in rural areas is aggravated by the inability of women to control their own fertility, this can be associated with high levels of illiteracy, low child survival rate, persistence of traditional mentalities which hampers contraceptive use and family planning practices, and poor health care services. Women in rural areas are generally not in control of their own fertility because of the patriarchal society where a barren woman is seen as of no value while a fertile woman is seen as a garden whose sole purpose is to produce "fruit" children for the owner who is usually the man under marriage union. Sexuality is not freely discussed, it is a "taboo" and hence it remains the "black engine" behind the



socio economic disempowerment of women. A strong empowerment of women in fertility decision-making can break this grip of high fertility rates in rural areas.

Based on the findings it can be concluded that education plays a very important role in determining fertility by shaping the reproductive characteristics of women particularly their attitudes, social behavior and their fertility preferences. Education has a negative effect on fertility. It affects fertility by increasing both direct and indirect costs of raising children, creating new awareness and new avenues for self-advancement, especially for women. This, therefore, calls for the government to adopt a policy approach aimed at increasing opportunities in higher education for girls and particularly in rural areas where girl child discrimination may still be in practice. The government should seek to maintain and sustain the universal, free primary education.

Child survival rate was found to greatly influence the variation in the rate of fertility decline, probably because of the replacement effect and insurance effects of child loss due to low child survival rate. Investment in improving the quality of life is required if further reduction is to take place, public health measures and improvement of the living standards can improve the child survival rate and hence reducing mortality rate, this needs greater emphasis in the investment in child care, maternal care, and the general improvement in the quality of life.

The negative relationship between contraceptive use and fertility imply that with increased use contraception fertility declines and hence therefore, to maintain the downward trend in fertility, comprehensive family planning and health services should be provided as an integral part of reproductive health services. Availability of sufficient resources to permit the full extension of family planning information, services and supplies can make a significant difference in contraceptive use and fertility reduction. Couples should also avail themselves for family planning services through private practitioners. This will go along way in ensuring fertility decline as shown from the results of this study

In summary, the government should support a population program that has its main thrust on family development, aimed at strengthening the family unit. Great emphasis has to be placed on human resource development to have a quality population. Emphasis on increased political will, reproductive rights, and policies, which stresses rapid socio economic development particularly education, health, and equitable distribution of resources to improve the standards of living which will trigger a further decline in fertility in both urban and rural areas need to be put on the fore front for public debate.

### **5.3 Limitation of the Study**

The study is limited to the data collected during the survey. The choices of independent variables has been influenced by the availability of information in the data sets from the KDHS but unfortunately; there are no measures of household income or consumption in the KDHS data set. Child survival rate is arguably an endogenous variable but unfortunately the selection of the appropriate instruments is a difficult task and hence, it was assumed to be exogenous. The exogeneity property of child survival rate was supported by Sackey (2002). Despite of these limitations we achieved our study objectives.

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## APPENDIX

Table 1: Annual Intercensal Population Growth of 1948-99

Census year	% Population growth per year
1948	-
1962	3.34
1969	3.38
1979	3.37
1989	3.40
1999	2.9

Source: GoK 2002, PP. 9

Table 2: Measures of Fertility 1940-98

Period	TFR per woman
1940 - 1955	5.5
1958-1962	7.0
1965-1969	7.6
1975-1979	7.9
1985-1989	6.7
1993-1998	4.7

Source: GoK 2002, PP. 9