FEMALE EDUCATION LEVELS AND FERTILITY IN KENYA.

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DECLARATION

This Research Project is my original work and has not been presented for a Degree award in any other University.

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This Research Project is submitted in partial fulfillment for award of a Master of Arts Degree in Population Studies and Research with our approval as University Supervisors:

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DEDICATION

To my parents, my late brother Kidwoli and Rodgers, Dr Erick, Sisters Christine and Sylvia, my fiancée Merine, my in-laws Euphemia and Joan, my nephews Collins, Fidelis and David and nice Gladys, Cecilia, Nancy and all my family members wherever they are. Also my dedications to Mr. Ronald Wanyama and his family, Mr. Peter Sigadah and his family Mr. Joash Manyasa, Mr. Wafula Kuucha and many more: Thank you for the support, steadfast belief in my capabilities and unfailing Love.

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ABSTRACT

The main aim of the study was to investigate the effect of female educational levels on fertility in Kenya. To realize this goal, other variables were introduced as confounding variables since education has both direct and indirect effect on fertility. Univariate, bivariate and multivariate analysis tools were used. The study realized the goal, as intended where the higher educated a woman is the fewer the number of children she will give birth to.

The unit of analysis for the study was individual woman and the aim was to find out the relationship between fertility measured as children ever born and educational level of a woman.

The data used for the study was the Kenyan Demographic and Health Survey, 2003 data set as collected by the Central Bureau of Statistics. This was a national survey that covered the whole nation.

The findings of the study show that education is a very important determinant of fertility. Also, the study shown that education alters or interferes with the demographic variables such as age to influence fertility. Increase in level of education results in increased use of contraceptives and also, early marriages leads to longer duration of marriage indicating lower level of education and more children ever born. Also number of children (family size) is surprisingly homogeneous throughout the educational spectrum when all other factors are controlled for. While the least educated and the better educated share the small family norms, the gap between the two groups in contraceptive use is large. Better-educated women have broader knowledge, higher socio-economic status and less fatalistic attitudes towards reproduction than the less educated women

meaning that the better educated have fewer children (less than 3) whereas the less educated have many children. The study recommended that more research is needed in this area particularly by redefining and giving female education a new look to enable conclusions from future researches to show the aspect/ component of female education that causes fertility decline. Also proper laws should be put in place to ensure that the girl child stays in school beyond primary level and female education to form a core value for any planning which will ensure that all their needs education wise is met.

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ABBREVIATIONS

CBC: - central Bureau of Statistics

HIV/AIDS: - human Immuno-deficiency syndrome

UN: - United Nations

MDG: - Millennium Development Goals

WFS: - World Fertility Survey

DHS: - Demographic Health Survey

KDHS: - Kenya Demographic and Health Survey

TFR: - Total Fertility Rate

ES: - Economic Survey

NLS: - national Literacy Survey

UNESCO: - United Nations Educational, Social and Cultural Organization

UNICEF: - United Nations Children Educational Fund

KENPOP: Kenya Population Journal

FPE: - Free Primary Education

SMAM: - Singulate Mean Age at Marriage

WB: - World Bank

CEB: - Children Ever Born

NCPD: - National Council of Population and Development

SPSS: - Special Package for Social Scientists

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CHAPTER ONE: INTRODUCTION AND PROBLEM STATEMENT

1.1 Background information

The second half of the twentieth century in particular has seen immense transformations in both the educational and reproductive expectations of young people in the developing world. As of the end of world war II, women in Latin America, Asia, and Africa had few opportunities to attend school and little access to what is commonly referred to as modern methods of fertility control (Jennifer et al., 1999). Today, after two decades of dramatic rise in literacy and gross enrollment ratio (Craig, 1981; Hill and King, 1993; United Nations, 1995), formal western education enjoys a position of global prestige. This is because it has been widely recognized that female education is not only a prerequisite for full participation in modern society but also as a basic tool for improvement of status of women as well as fulfillment of their roles as members of the society (Mugo, 1998).

According to United Nations (1986), the extent to which girls and women have direct access to formal education has the direct impact on how women contribute to the whole process of society transformation. Due to this, education has been recognized as crucial factor in reproductive behavior, which has been supported by theoretical as well as empirical reasons.

Many studies on the fertility points out to education as an important factor in accounting for fertility differences. This is because the increase in the education for women and girls contributes to greater empowerment of women and to a postponement of the age at marriage leading to a reduction in the size of families (United Nations,

1994). Thus education to play a very important role in study seeking causal explanations of fertility levels, fertility change and differentials by socio-economic status.

The past two decades, has seen the raising of more need to promote and encourage female education for attaining the set demographic targets of reduction in fertility. The need to promote female education for demographic purposes has been the main issue of policy advocacy and dialogue that has been advocated for in all international forums such as: millennium declarations of the millennium summit (MDG) September 2000, The world population plan of action, Bucharest (1974), United Nations Decade for Peace, Equality, and development, UN (1976-85), The United Nations World Conference on Women, Beijing (1995), The Forward Looking Strategies for The Advancement of Women to the year 2000 (Nairobi, 1985), ICPD +10 (Cairo, 1992) and many more.

From the classical theories of fertility to present (past 20 years), a large amount of both theoretical and empirical literature shows that the relationship between education and fertility is much complex (Diamond et al., 1999). However, from much of the work of people like Malthus to the current, the relationship of fertility and education can be explained by basing on the various socio-economic and demographic structures, which recognizes that education has the only sure way of solving fertility problems. This argument is supported by recent researches conducted by the education-fertility linkage using World Fertility Survey (WFS) and Demographic Health Survey (DHS) data.

Muhuri et al (1994) demonstrated a positive relationship between fertility and small levels of education in Saharan African countries in the demographic and health surveys contacted between 1985-1992.

Throughout 1980's and 1990's a large number of studies, often based on the data from World Fertility Survey (WFS) and Demographic Health Survey (DHS), have addressed this issue of female education on fertility behavior. Many of these studies on this matter tried to explain the impact of education on fertility through the proximate determinants of fertility, most notably by quantifying education's relationship with age at marriage and use of contraception (Diamond et al., 1999). These studies typically show, not surprising result that educated women tend to marry later and are more likely to use modern methods of contraception

Studies in Kenya reveal a strong empirical relationship between educational attainment and fertility behavior. A fundamental question that has largely been neglected is the change in this relationship across cohorts resulting from differential improvement in educational opportunities over time and how it relates to fertility transition. Some of the studies that show strong relationship between education and fertility behavior are those done on maternal education that found it to have a significant effect on fertility behavior and its effect in lowering the number of children a woman desires (Caldwell, 1980; 1997; United Nations; Jejeebhoy, 1995; Uchudi, 2001). Studies further demonstrate that female education associates with lower fertility even after controlling for other factors that could mediate this relationship (United Nations, 1987; Weinberger et al., 1989; Jejeebhoy, 1995; Caldwell, 1997; and Kirk and pillet, 1998).

Other studies on female education- fertility relationship such as that by Anker and Knowles also found initial positive effects of education on fertility (Anker and Knowles 1975, 1980). However, higher levels of female education were found to have negative

effects on fertility. Castro and Wamucii (1994) found female education to highly and positively affect contraception use hence negatively affecting fertility.

The above confirms findings of other studies done by (Nyaga; 1989; Mugwe 1989; and Aggrawal and Mati, 1983), on adolescent/teenage fertility, which attributed the declining of higher fertility among schoolgirls to the raising their education up to a certain level. It was evident that although female education had mutually led to substantial increase in marital fertility in Kenya (Lesthaeghe 1993), the trend was being reversed i.e. fertility of late has started increasing.

Thus the study endeavored in analyzing educational differentials among the Kenyan women by the two of the key intermediate/ proximate determinants of fertility i.e. marital duration and contraceptive use.

1.2 Problem statement

In the past 20 years, several researches have investigated the relationship between women's education and fertility. Most of the results of these studies suggest that, the relationship between education and fertility is complex. Most studies show a negative relationship (Mason, 1984; 1986; Cochrane, 1983; Cleland and Rodriquez, 1987). Other studies on the other hand show that the relationship between education and fertility is not uniform as generally assumed (Jejeebhoy, 1995; Lesthaeghe et. al., 1993; Henin, 1979), as demonstrated in a study in sub-Saharan Africa.

According to Cleland and Kaufmann (1993), educated women generally have a lower desired family size and after controlling for age and family size, educational differentials in desired family size are relatively modest and much smaller than the actual

fertility differences. Thus the key questions to be addressed are why more educated women are more likely to act on their reproductive preference, rather than why they want a smaller number of children. Cleland and Kaufmann (1993), also argue that attempts to explain the education fertility relationship should focus more on identifying the determinants of reproductive health decision-making.

Mason (1984) suggests that women's education may affect fertility only through other factors such as age, place of residence and ethnicity. However, studies undertaken at individual- level have typically found that schooling has an impact on fertility even after controlling for many other socio-economic and behavioral factors (Rodriquez and Cleland, 1980; United Nations, 1867; Cleland and Rodriquez, 1988; Rodriquez and Aravena, 1991; Castro Martin and Juarez, 1995; United Nations, 1995).

However, linkage between female education and fertility is still unclear despite an acknowledgement that probably no any other socio-economic factors affect fertility behavior more strongly as education does. This is because the empirical records available do not support the idea that such a simple causal process operates everywhere. Thus understanding the nature and strength of the relationship between education and fertility remains a central challenge both to scholars seeking to explain the socio-demographic changes and policy makers who make crucial decisions on how best to allocate the-scarce resources (Bledsoe et al. 1999).

These confusing and contradicting empirical findings suggests that the relationship between education and fertility lack uniformity and it is complex than it is widely believed to be. Therefore, this indicates a lack of explicit focus in that female education has not been treated as the focus point or as a variable of interest in most of the earlier

studies, rather it has been treated just like one of the core factors of fertility in the context of general (male and female) education. This means that the explicit effect of female education verses other factors are never fully captured.

According to many of the findings of the earlier studies, there is also lack of a clear boundary between the positive and negative effects of female education on fertility. Thus, at exactly what level and why the positive effects translates into negative is not clear both to academic and policy purposes.

As such a new set of demographic and health survey (DHS) data in many developing countries has been developed that has provided an exceptional opportunity to re-examine the education- fertility relationship from a cross-national perspective, United Nations (1995).

1.3 Research question

Key research question is to examine how a woman's educational level influences her fertility behaviour.

1.3.1 Study objectives

1.3.1.1 General objective

The main objective of the study is to investigate how education acts through the proximate factors affect a woman's fertility level.

1.3.1.2 Specific objectives

- To examine the relationship between age at first birth and level of education and their effect on children ever born to a woman.
- To examine the association between age at first marriage and education levels of a woman and how they influence children born to a woman.

- To establish the relationship between children ever born and education level of a woman.
- To establish the link between uses of contraceptives and education levels and how this influences children ever born.

1.4 Justification of the study

Formal western education enjoys a position of global prestige because it's the most coveted type of preparation for adult female life (Bledsoe et al., 1999). The issue which has dominated most debates on world stage ranging from Bucharest (1974) to Beijing (1995) is its importance in reproduction and hence a prerequisite to solving world population problems particularly in developing countries.

Most of the studies lack explicit focus on female education and how it influences fertility behavior rather it has just been treated as one of the core factors of fertility. This indicates that female education has always been dealt with in the context of general (female and male) education. This implies that the explicit effects of female education verses other factors as they influence fertility are never fully captured. This leads to the fact that most of the mechanisms through which female education is hypothesized to influence fertility have not been thoroughly tested empirically.

Therefore, the study is important in two ways. One is that it will lead to generation of more knowledge which will increase our understanding of education fertility relationship and two, the study portends great policy implications thus important to policy makers to enable them plan properly towards the needs of the girl child to stay in school beyond secondary level.

1.5 Scope and limitation of the study

It was not feasible to investigate all the proposed paths through which female education is likely to influence fertility due to lack of appropriate data and the method applied in the analysis. Thus the study was confined to investigating the effect of female education on fertility behavior in Kenya directly and indirectly through contraceptive use and marriage duration.

The use of children ever born as my dependent variable does not allow us to link breastfeeding and contraception to specific paths, which is a major limitation of the study

Education that was covered in the investigation is formal academic schooling received by children and young people but not special adult education or training within work place, although they clearly have implication on fertility controls.

The 2003 KDHS data is subject to errors such as age heaping, digital preference, which are forms of misreporting of age errors that mostly results from response biases. Also the survey captured education in terms of level and years of schooling and since education is not homogenous, type and content will also influence a woman's behavior in relation to fertility.

CHAPTER TWO: LITERATURE REVIEW AND STUDY FRAMEWORK

2.1 Introduction

Over the past years, fertility has declined in Kenya and this decline has been heavily attributed to a strong component of fertility change operating equally across geographic and social groups in a more similar manner. Thus at the end of the study, we expect a continued reduction in fertility as one moves up the education ladder.

The socio-economic and demographic component that has brought about the change is education. Evidences available consistently show that a woman with less than primary schooling tends to have earlier age at marriage or first birth and higher subsequent fertility than those who have completed primary schooling (United Nations, 1995; Jejeebhoy, 1995; Ainsworth et al., 1996). Therefore this study was undertaken against a background of fertility decline and the rising female educational attainment.

Clamour for raising the status of the girl child not only Kenya but also the rest of developing world has of recent dominated debates. The way of reaching this goal has been through female education. Thus the introduction of free and compulsory primary education by the government in January 2003 was just a step forward towards this end. This trend if continued and sustained is likely to have critical role in shaping Kenyan's fertility levels in future.

2.2 Fertility trends and levels

Fertility is one of the three principal components of population dynamics, the others being mortality and migration (United Nations, 1973). There has been consistent and continued collection of such data through birth histories and other means that has recognized the important role fertility plays in balancing Kenyans overall population growth equation. The fact that fertility reduction becomes the thrust of the countries

population policy as early as 1967 underlines the deliberate efforts made by the government to contain it (CBS, 2003). Differentials in fertility levels by urban-rural residence, province, education level and work status show that regional disparities are still large i.e. fertility is lowest in Nairobi province (2.7 children per woman) and highest in north- eastern (7.0 children per woman). It also show that education of women is strongly associated with lower fertility i.e. TFR decreases dramatically from 6.7 for women with no education to 3.2 for women with at least some secondary education (KDHS, 2003).

Fertility trends shows that the TFR declined dramatically during the last two decades from a high of 8.1 children per woman in the late 1970s, to 6.7 in late 1980s and to 4.7 during the last half of 1990s and this decline was heavily attributed to education. However, this decline appears to have stalled and instead has started rising, albeit marginally, from 1998, reaching a TFR of 4.9 children per woman during the period from mid-2000 to mid-2003. This upturn in birth rates has especially affected age groups 25-39. The stagnation in fertility decline is one of the most surprising finding from KDHS 2003, since fertility decline was first observed 15 years ago.

Currently, a large number of people in Kenya have not gone beyond primary level of education. Generally, younger persons have attained higher levels of schooling than older people, and the same applies to urban population as compared to rural areas i.e. 48percent of women in urban area have attended at least secondary education as compared to 23 percent in rural areas. Among the provinces, Nairobi and Central have the largest proportion of women and men who have attended secondary education and above. The educational level of women in North Eastern province is as low 93 percent of

them reported not to have gone to school at all and less than 1 percent have secondary education (The Economic Survey, 2004).

2.3 Educational trends

Despite the low level of education among women in sub-Saharan Africa, Kenya is one of the several exceptional countries in the region including Botswana, Namibia, Ghana, South Africa, Tanzania, Zambia, and Zimbabwe that have witnessed a significant growth in female education. Since independence in 1963, the government and its international development partners have supported women's educational attainment both to improve women's status and to foster national development. Additionally, the reduction of fertility through the promotion of the use of modern contraception and improvement of child health is a major player in these development initiatives (Bledsoe, Johnson-Kuhn and Haaga, 1999).

This marked improvement in female education and school enrolment is shown from the past statistics although the general situation is that female education is still low and lags behind male education.

Other studies done in Kenya, using the percent age 15 - 19 that have completed more than four years of primary education as a measure of mass schooling, shows that Kenya has seen the percent completing grade four grow from 42 percent in 1960 to 91 percent by 1998 with no gender differences in this measure (Lloyd, Kaufman and Hewett, 2000). Similarly, the population of literate females as percentage of total adult population rose from 42.6 percent in 1970 to 73.5 percent in 1998 (UNESCO, 2000).

The available enrolment statistics shows that female primary enrolment rates is fast growing such that it rose from 34 percent in 1963 to 47 percent in1977 and at 2003, it

was at 80.3 percent as compared to 80.2 percent of males. The same trend was found to be true for secondary education where though the pace was lower, the proportion of female rose from 32 percent in 1963 to 38 percent in 1977 and by 2003, the situation was approximately at about 71.3 percent for females as compared to around 80.1 percent for males.

By 1990, already 40 percent of girls in Kenya were enrolled in primary school, UNICEF (1989) and by 1993 over 96 percent of Kenyan girls were estimated to have undergone some form of primary school education with over 42 percent of all secondary school enrolment being females and insignificant improvement at post secondary level. (Brass and jolly, 1993).

2.3.1 Levels of education and fertility differentials

In almost all countries, secondary education is associated with low number of children ever born than are found among those with no education. Although as noted earlier, a positive relationship has been observed in some countries particularly for two to three years of primary education (Sigh and Casterline, 1985). The relationship between primary education and family size on the other hand is almost universally negative, whether or not primary education is completed (Jejeebhoy, 1995). Both incomplete and complete primary education also tends to be associated with late age at marriage and increased contraceptive use (Westoff et al., 1994).

In contrast with primary education, most studies reported by (Jejeebhoy, 1995) show a marked decline in children ever born for a woman with secondary education. The difference in total fertility rate (TFR) between women with secondary education and with no education is more than 50 percent in Latin America. In Asia the difference is small

because the TFR among women with no education is relatively lower (3.36 with no education verses 2.52 with secondary education in Indonesia and 3.64, respectively in Pakistan). In many sub-Saharan African countries the differential is smaller. Women in the region with secondary plus education have higher fertility than do women with no education in Asia.

The relationship between higher education and fertility i.e. secondary plus is undoubtedly negative. Jejeebhoy's (1995) data shows that higher education is associated with large reductions in complete family size (percentage reduction over no schooling range almost from 20 to over 70 percent) and substantially lower desired family size and higher age at marriage. All these studies show an inverse relationship between female education and fertility.

The higher a woman is in terms of education, the lower the fertility, although the differential is not very clear 1-6 years of schooling where TFR remains constant at 7.5 births per woman (KDHS, 2003).

The possible explanation for the decline in TFR places the country among the forerunners of demographic transition in Sub-Saharan Africa. The most cited explanation lies in increase in female education attainment and the national family planning programmes, which increase the acceptability and use of contraceptives. In addition, the general economic development has not only raised the standards of living but also increased the health status of the society thereby enhancing the survival status of the children thus inversely influencing fertility.

2.4 The general education - fertility relationship

There is a strong empirical relationship between educational attainment and fertility behaviour. Several studies have shown education as an important factor accounting for fertility change. Among the many researches that have been done, the education fertility relationship is one of the most widely documented in demographic literature in developed world, which is associated with smaller family size.

Formal education is an important measure of social change that helps in influencing attitudes and behaviour change. Many studies in sub-Saharan Africa have analyzed fertility behaviour considering the effect of education on age (Cochrane, Khan and Osheba, 1990; Pleneba- Sakyi and Takyi, 1997; Uchudi, 2001).

Several studies has shown that maternal education is the most significant determinant of fertility behaviour in lowering the number of children a woman desires observed in a variety of settings (Caldwell, 1980; 1997; UN, 1987l Jejeebhoy, 1995; Uchudi, 2001; Wain Berger et al., 1989). Studies further demonstrate that female education is associated with lower fertility even after controlling for other factors that could mediate this relationship (United Nations, 1987; Weinberger, Lloyd and Blanc, 1989; Jejeebhoy, 1995; Caldwell, 1997; Kirk and Pillet, 1998).

Notwithstanding the wealth of empirical evidence that female education influences fertility negatively, the negative effect of education in fertility is less pronounced in sub-Saharan Africa and the results are often inconsistent (Cochrane and Farid, 1986; 1990; Cleland and Rodriquez, 1988; Rodriquez and Aravena, 1991; Van de Walle and Foster, 1990). The lack of strong correlation between education and fertility in sub-Saharan

Africa as compared to other developing region is attributed to the large family desires even among educated and urban women (Uchudi, 2001).

Education provides choices and opportunities available for women of diverse educational background, which in turn shapes them towards different patterns of marriage, family formation, working as well as living arrangements. In particular, more educated women have alternatives for personal development other than those associated with reproduction and child care (United Nations, 1987).

According to the United Nation population reports 1985, women with low education bear more children than those with high education. This difference is especially significant in those countries where fertility has declined and has been declining substantially such as Latin America (4-5 children per woman) and has been pronounced in Africa, the Caribbean and Asia (1-2 children per woman). However earlier investigations in Kenya had shown education as having initial positive effects on fertility, (Henin 1979; Anker and Knowles, 1980).

Finally, it must be noted that education does not work in isolation to affect/influence fertility. There will probably be a certain degree of direct influence, but in many ways, education will also serve as proxy for other factors i.e. increased education rarely occurs without concomitant changes to a society, such as increased health facilities, enhanced communication and better infrastructure.

2.4.1 Female education and fertility

Although there is little evidence or agreement on the mechanisms through which formal education affects fertility, there is considerable empirical evidence that associates higher female education with lower fertility (Kasarda, 1986; Cochrane, 1990; Toroitich-

Ruto, 2001). Kasarda et al (1986) have argued that theories linking education and fertility fit within a status- enhancement rubric, while a specification of the variables involved in the relationship could encompass a full range of social, economics, cultural and proximate factors usually hypothesized to play a causal role in reproductive behaviour.

Existing literature on fertility behaviour holds that formal education heightens a person's consciousness on the real and perceived costs and utilities of children (Easterlin, 1980; Kasarda et al, 1986; Kirk, 1996). Educated women will therefore be better equipped to ascertain the economic opportunity costs associated with having a child and would therefore be less inclined to leave the labour force to have a child.

Taha and Abdel- Ghany (1980) conducted a study of socio- economic differentials in fertility in Egypt using 1976 census data. They found fertility to be inversely related to education level of a woman for ever- married women in all duration of marriage. Stoechel (1978) studying differentials in fertility; family planning and practice and family size values in south Korea found that a woman with high education have lower mean number of children both in urban and rural areas.

Casterline (1980) studying fertility differentials in Pakistan using 1975 Pakistan fertility survey found out that women's educational attainment was associated with lower cumulative fertility with this negative effect being larger for women with post primary education. Asileptai (1933) carried out a study in Ghana on the determinants of family size preferences and found out that women with no education or schooling wanted seven children on average compared to four for women with eleven or more years of schooling.

Chaul (1977), in a study of women's work on fertility in India using evidence from the national sample survey of 1962; found that the total number of children born to a

woman was inversely related t her level of education. The complete size of a family of a woman with no education or with only primary education was 6.6 children on average. for women with matriculation education the number was 4.6 children and for women with some university education it was 2.0 children on average.

Henin (1979) revealed in the study on Kenya, that women with primary education have higher fertility than those with no education because they become more conscious of the importance of hygiene and other basic health requirements that prevents pregnancy wastage. Onguro (1987) found that the total fertility rates starts declining after 5 years of schooling and declines further after 9 years of education. United Nations (1987) research using World Fertility survey data found that women with seven years or more of schooling would bear 3.9 children on average compared to 6.9 children for women with no schooling. Lesthaeghe et al (1993) found that although female education had generally led to substantial increase in marital fertility in Kenya, the trend was being reversed.

Many studies provide a strong correlation between the educational status of a woman and her fertility, and on the other hand, education level of the man correlates less well with couple's (Cleland and Rodriquez 1988; Cochrane, 1979). This is consistent with the world fertility survey data, which also indicates a strong association between women's education status and marriage, age, desired family size and contraception in developing countries (United Nations, 1987).

The evidence of the importance of female education includes: - reduced family size, reduced infant and child mortality, reduced maternal mortality, enhanced family health and welfare, improved children education and increased agricultural productivity, earning

and overall economic productivity for women and the larger economy (Odaga, Adhiambo and Ward Henveld, 1995).

Some studies have however attempted to assess how education may influence women's personal attitudes and their roles in reproductive decision-making. Cochrane, Leslie and O'Hare (1992) found that education not only delayed the wife's age a marriage, but also increased husband wife communication and knowledge, and access to birth controls, all of which have negative impact on fertility. Dixon – Mueller (1993) also argued that women's education also influences attitudes and knowledge hence contraception behaviour.

2.4.2 Female education and income

Education both for men and women is the single most important proxy for economic empowerment. Women with high education attainment have access to formal employment consequently higher incomes and are likely to earn much more than women with little or no education who usually end up in agricultural and other low paying jobs (Castells and Porters, 1990).

Research on the effects of women's employment status has had two foci: implication of women's autonomy and the extent of incompatibility between women's role as mothers and as income earners. Employment outside the home has the potential to reduce women's dependence on others; provides alternative sources of social identity and support increase women's desire to delay marriage; motivate women to terminate unsatisfactory relationships and space or limit births (Dixon Mueller, 1978; Safilios-Rothchild, 1982).

Literature on fertility behaviour shows that formal education heightens a person's consciousness on the real and perceived costs and utilities of children (Easterlin, 1980, Kasarda et al., 1986; Kirk, 1996). Educated women will therefore be better equipped to stimulating the economic growth and other opportunity costs associated with having a child and would therefore, be less inclined to leave the labour force to have a child. Moreover, the norms and values of western family formation that are communicated in the work place tend to create a desire for fewer but quality children which leads to a greater investments on the children (Caldwell, 1980, 1982: Caldwell et al., 1985; Axinn, 1993). Women with higher education are therefore expected to desire smaller family size a desire for stoppage of child bearing which will be reflected in a higher use of modern contraception.

Studies carried out on female education- income relationship found it to be U-shaped. Thus women with higher education have higher incomes (standing, 1978). In Mexico, it was found that women with elementary education were more likely to be in formal employment than those who had not completed their elementary education (United Nations, 1993) and hence higher income.

2.4.3 Female education & autonomy

Female education has also been claimed to alter household power relations making women more autonomous and giving them greater control of various dimensions of their lives (Caldwell, 1986; Sathar, 1993). Consequently, such greater control of their lives could be reflected in the independent decision educated women take in adoption of family planning. Where they act independently in fertility matters, they will be less likely to feel that they are disobeying their husbands. Moreover, educated women are more

likely to relate with their husbands at an equal level (Mason, 1984; Le vine et al, 1991) and to discuss the decision to adopt family planning together.

An often-recurring theme in cultural studies of fertility in Sub-Saharan Africa is the role of patriarchy. Patriarchy grants husbands absolute decision making powers which forces wives to be subordinate to the interests of the husbands and it maintains a strong desire for large families (Caldwell and Caldwell, 1987; Frank and McNicoll, 1987). Consequently, although Sub-Saharan Africa women attend school and greater economic autonomy and freedom of mobility as compared to their counterparts in South and West Asia, they have lesser autonomy in fertility decisions including sexual partnership relationships (Kritz and Gurak; 1989).

Patriarchy is also claimed to constrain women from using family planning services as their husbands associate it with promiscuity (Bledsoe et al., 1994; Omondi – Odhiambo, 1997). However, when husband and wives' education are considered simultaneously, there is no conclusive evidence showing that patriarchy exerts such influence on woman's use of family planning services in Sub-Saharan Africa (Uchudi, 2001).

This is not a surprising finding because educated men in particular are likely to treat their wives with more equality as they themselves are moving or have moved away from traditional definitions of masculinity. Although educated men may still maintain the leadership role in their homes and retain the prerogative to make fertility decisions (Frank and McNicoll, 1987; Caldwell and Caldwell, 1987; Ezeh, 1993; Omondi- Odhiambo, 1997), they are more likely than uneducated men to promote adoption of family planning by their wives due to desire for quality life for their children.

As noted earlier, one way in which education is posited to influence fertility negatively is through it's role in family decisions and control over, or access to resources (Jejeebhoy, 1995). Exposing women to new ideas and allowing them to gain cash employments takes them out of the home and as such increases her position in society/ community, which increases her confidence and skills, thereby enhancing her negotiating power in the household, or gives her a degree of economic independence. Thus when women are more educated and autonomous, they are likely to have greater say in their choice of husband, which has been shown to contribute to improved communication between spouses and this in turn contributes to her control over fertility (Kabir et al., 1988).

2.4.4 Female education and ethnicity

A review of the existing literature indicates that there is a relationship between female education and ethnicity. Indeed for reasons ranging from pure historical accident, natural favourism to deliberate political and socio-economic negligence or marginalization, certain ethnic, racial or religious communities have had greater or lesser access to formal education than others.

In the United States for example, the white woman have had greater access to education than either black people, the people of minority groups and those of mixed blood due to long exploitation during the era of slavery and racialism while in Israel, the Jewish women have had greater access to educate than women of Arab origin. The aborigines of Australia have had lesser access to not only education but in most spheres of social well- being than their white counterparts while in South Africa the White and

Afrikaner women who experienced massive economic prosperity under the apartheid rule have had far greater access to education than both the black and the coloured women.

The Baganda women whose ethnic community in Uganda had come into contact with the Muslims and Christian missionaries for a long period had taken over the leadership of the country under the Kabakas have had greater access to education than women from other ethnic communities. In Kenya here, the Kikuyu women have greater access to education than other ethnic groups partly because of their early contact with Christian missionaries who established schools in Kikuyu land, and also partly due to the economic well-being of the society arising from agricultural productivity and proximity to urban centers.

Closely linked to ethnicity is the issue of culture. Researches has also focused on the cultural effects of education reflected through exposure of women to new beliefs and values that are incompatible with the traditional roles of women and which consequently motivates them to desire smaller families. Formal education exposes women from various ethnic backgrounds to beliefs and values that place a high premium on individual advancement, creates awareness of alternative opportunities and life pursuits, and motivates them to develop and pursue interests other than child bearing (Caldwell, 1982; Cochrane, 1983; Westoff, 1992). As women from various ethnic backgrounds become more educated, they are likely to view childbearing as a limitation to individual career development and as they realize other ways of attaining status besides bearing children their desires for children will decrease and could result in their adopting modern contraception.

The ethnic group to which a woman belongs conditions her fertility behavior. Not only does the extent to which education affects fertility negatively but also the flexibility of the kinship structure, to allow educated women to exercise control over fertility decision that has traditionally been to preserve of male (Mason, 1993) but different ethnic groups have even differentially affected by the expansion in educational opportunities. Moreover, fertility behaviour such as nonuse of modern contraception, duration of postpartum abstinence, desire for a larger family are underpinned by ethnic traditional norms and values (Page and Lesthaeghe, 1981; Beneto, 1995; Ezeh, 1997), such as a greater preference for male children for old age security and for the sustenance of the lineage.

2.4.5 Female education and place of residence

The effect of woman's place of residence is examined because urban women have significantly lower fertility than rural women. Rural women have higher fertility than urban women (Cohen, 1993). Urban women have lower fertility because of superior educational attainment, working in modern economy and exposure to new ideas and values through the mass media and ease access to family planning service (Oheneba – Sakyi and Takyi, 1997; Diamond et al., 1999; Montgomery and Lloyd, 1999). In addition, in urban areas women are more aware of the cost of having large families and also have roles that are incompatible with child bearing.

These factors and conditions are likely to exert a greater influence on women to desire smaller families and adopt family planning. Fertility is higher in due to lower educational attainments and less use of modern contraception (Bledsoe et al., 1999; Thomas, 1999) as well as adherence to traditional behaviours that favours large families.

United Nation's (1993) also argue that higher education is more prevalent with urban residence compared with rural residence. Women in urban areas are more likely to be educated because of the high incomes compared to rural areas.

2.4.6 Female education and age at marriage

One of the mechanism through which education affects fertility behaviour is through delayed entrance into marriage. Age at first marriage is inversely related to the exposure to the risk of contraception and is an important proximate determinant of fertility (Davis and Blake, 1956: Westoff, 1992). Women who marry young are likely to have little or no education and to view childbearing as the mean to social acceptance and recognition. (Westoff et al., 1992).

Thus female education affects the probability of a woman marrying at each age as well as overall probability of her marrying. Female educational attainment has been found to be positively related to age at marriage and higher incident of never marrying for women. Delayed age at marriage gives women opportunities to develop their careers or personal interests, which compete with childbearing role. Such careers enhance the chances that the woman will use contraceptives for family planning purposes. Delayed marriage also reduces the period that a woman is exposed to risk of pregnancy through shortening her reproductive lifespan.

Several studies undertaken in developing countries have confirmed that generally female education increases the proportion of never marrying women and also that the age at first marriage rises with the level of a woman's education. Speare et al (1973) in a study in Taiwan found that increases in female education reduced the proportion of married women even when age, work experience and residence were controlled.

Similarly, Maurer et al., (1973) in a study in Thailand found that the women's level of education decreased the proportion of women married at all ages while age at marriage for those marrying rose with their education attainment.

Several other studies have also confirmed the positive relationship between female education and age at marriage (Koguts, 1974; Knowles and Anker; 1975; Ifamon, 1970; and Mott, 1976) in Western Nigeria established that only 70 percent of women aged 15-19 years and with no education got married within the age bracket compared to 33% of women in the same age group with some education who got married within the same age bracket United Nations (1986) has shown that the average percentage of women who never married increased with level of education.

Age at first marriage also increases with rising levels of education attainment. The singulate mean age at marriage (SMAM) for women with 7+ years of education was found to be almost 4 years higher or average than for women with no education. In some cases however e.g. in Costa Rica, the marriage age for women with no education was slightly higher than for women with few year of education. The average difference in the extreme education categories was found to be 5.2 years in Africa, 3.6 years in Asia and 3.1 years in Latin America. Comparisons among women of different age groups with no education and those with seven or more years of education showed a difference of 3.8 years for women age 40-49, 3.9 years for women aged 30-39 and 4.8 years for women age 20-29 which shows a modest widening of the educational differentials in marriage age over time

However, the number of children a married woman has is related to her age at marriage. In a high fertility country such as Kenya, women's entrance into marriage

signals the start of child bearing. Women who marry young are likely to have many children due to longer period of exposure to child bearing. Most analyses have demonstrated that the age of a woman at first marriage is significantly associated with fertility (Trussel and Bloom, 1983; Westoff, 1992; Shapiro, 1996). Early marriage may also be indicative of low educational attainment and growing in poor socio-economic household, both of which are likely to engender high fertility. Moreover, it could suggest that such women marry men of low socio-economic status and hence may not benefit from concomitant effects of education such as marrying more educated and richer men (Rosenzweig and Schultz, 1982; Ware, 1984).

2.4.7 Female education and age at first birth

Age at first birth just like age at first marriage is highly correlated to female educational attainment. A study carried out in Mexico in 1998 by the World Bank established that women with higher education starts to have children at later ages while those women who did not complete their elementary studies showed a lower age at first birth and those with no education showed the lowest age at first birth.

Age at first birth is closely associated with age at first marriage since marriage in many societies is regarded as the legitimate means of exposing a woman to a regular sexual union and hence signals the beginning of child bearing (Anker and Knowles, 1975). Since female education has been found to be positively related to age at first marriage, it is also implies education is positively related to age at first birth.

Women with higher education marry at a later age and are more likely to use contraceptives, which automatically rise their age at first birth while women with little or no education marry at relatively younger ages, and are less likely to use contraceptives

and therefore have their first birth while they are still relatively young (Millman et al., 1990). Women who have their first births in their younger ages are forced to drop out of school and are therefore unable to continue with further education and hence may explains the negative relationship between female education and age at first birth.

2.4.8 Female education and religion

In addition to a woman's ethnic group, her religion is another important socio-cultural factor that is likely to influence her fertility behaviour. Besides the school system, religion is perhaps the most influential social institutions that construct/establish the expected standards of behaviour, shapes altitudes and hence influences the manner in which individuals act and respond in their socially constructed institutions including the family.

Religious affiliations affect fertility behaviour through its teaching and practices, which shapes a woman's beliefs, norms, and value orientation including her attitudes towards reproduction and family size (Benefo, 1995; Gregson et al, 1999). In some societies, religious schooling provides such messages and teaching about traditional values that are inconsistent with widespread family planning.

2.4.9 Female education and fertility preference

Education affects a woman's tastes, preferences and desire for children by transforming their attitudes and orientations towards family size (United Nations, 1995). It also alters a woman's perception of the economic contribution of children, returns of social security in old age and gender preference (Bulatao and Kawate 1983: Cain, 1903).

Family size norms play a crucial role in shaping fertility behaviour (Lighborne, 1985b, Westoff, 1990). Other previous studies have shown that the desire for children

declines with rising levels of female education i.e. studies done in India by Pereak and Kothandapani (1969) showed an inverse relationship between female education and ideal family size.

Evidence from a number of other studies has shown an inverse relationship. Such studies includes: Khalifa (1973) in Egypt, Chung (1972) in Korea, Freedman et al (1965, 1973) in Taiwan, Khodel and Pitakepsombati (1973) in Thailand and Dow (1971) in Sierra Leone all showed an inverse relationship between women's education and ideal family size. Olusunya (1971) in Western Nigeria showed that the proportion of women who felt that fertility was up to God decreased from 90 percent for women with no education to below 10 percent for women with above primary education.

United Nations (1995) has established that although the relationship between education and fertility preference becomes weaker when adjusted by age and parity, there is still a large gap between uneducated and educated women regarding the number of children that they end up having. In most countries, desired family size was found to decline consistently with increasing education although this decrease varies from country to country and also between societies. In Sub-Saharan Africa where the difference is an average of 2 children, moderate in West Africa and below Chibly and quite model in Latin America.

2.4.10 Female education and contraception

Women's educational attainment influences her attitudes and knowledge and hence her contraception behaviour (Dixon – Mueller: 1993). Here, few scholars will take issue with the fact that female education influences contraception use and a woman's level of education has universally been found to be positively related to contraceptive knowledge,

access and use thus easy and less costly for educated women to assimilate and may make them effective and satisfying to them (World Bank, 1995).

The World Bank (1995) in a study conducted in 15 Sub-Saharan Africa countries formally observed that an increase in female education is associated with an increase in contraceptive use.

Mazur (1931) in a study in Poland found that contraceptive use increased with a woman's level of education. He established a higher contraceptive use among married women with 75 percent of women with secondary school education and above compared to 56 percent of intermediary level women and only 42 percent of women with elementary education used. In a similar study in Indonesia it was found that a woman's educational attainment is positively related to the use of contraceptives. Thirty eight percent of women with university level education were found to use compared to 36 percent of women with senior education and 31 percent of women with no education (Soeradfi et al., 1982).

Castro and Wamucii (1994), in their study established that female education exerts a more powerful influence on contraceptive use/behaviour than any other factor. The effect of a woman's education on contraception was found to be linear and that the likelihood of using contraceptive rises monotonically with increased educational attainment.

Ruhul et al., (1993) found that although primary and secondary plus level of education lead to increased contraceptive use, this pattern is much higher among post primary school education level. Abdulal et al (1984) in a comparative study of contraceptive use in the commonwealth Caribbean countries, found a positive

relationship between a woman's level of education and contraceptives use. Similarly, Imaer- Wahr (1981) established an association between the years of wife's education and the use of contraception among women aged 15-50 years of age bracket who were exposed to the risk of contraception in Sri Lanka.

Safulios and Mburungu (1986) on the other hand, found that a woman's level of educational attainment was not an important determinant of whether or not she was currently using contraceptives. Rather to them, the important issue was whether or not a woman was literate as none of the illiterate women was found to be using modern contraceptives.

According to (CBS), 2004, the current contraceptive prevalence rate (CPR) currently is at 39 percent for currently married women in age group 15-49 years. The contraceptive use rises with level of education from 12 percent among married women with no education to a peak at 62 percent for those with secondary and above level of education.

2.5 Summary of literature review

From the above reviewed literature, it's evident that exposure of women and girls to education has great influences to fertility behaviours of a given society. Thus from the above literature, the following can be observed: -

(a) Education influences fertility by determining age at first birth and at marriage which in turn determines the number of women who marry, the length of exposure to marital union thus exposure to pregnancy risk

(b) Female education enhances female autonomy and economic status which in turn has great bearing on reproductive health rights i.e. decision making and ideal family size

(c) Levels of education influences a woman' ideal family size which in turn influences the background and proximate variables that affect fertility

(d) Female educational attainment influences contraception behaviour which either delays or postpones the incidence and risks of getting pregnancy thus affecting fertility behaviour.

In conclusion, this study envisaged female education as an important policy issue which has great impact on children ever born, although most of the previous studies on the same has shown how ignorant we are of the mechanisms through which female education influences fertility. It's therefore on this basis that the study shed more light on this gap by helping us understand clearly the female education and fertility behavior operation mechanism by bridging it.

2.6 Study Framework

Many studies on fertility behaviour have been carried out by employing various fertility theories encompassing sociological, economical and bio-medical disciplines. Of these, economic theories of fertility differentials dominated fertility studies for the better part of 1960's and 70's. Of late, the situation has changed where socio- cultural models have gained prominence in the 1980's and 1990's. Therefore, the study employed the conceptual framework that was developed by Davis and Blake, (1956) and later modified by Bongaarts (1982), that was used for analyzing traditional fertility. The framework distinguishes two types of factors i.e.

1. Proximate variables and
2. Socioeconomic and demographic (background) variables.

The background variable consists of social, cultural, economic, institutional, psychological, health and environmental variables and the proximate determinant consists of all biological and behavioral factors through which the background variables must operate to affect fertility (Davis and Blake, 1956; Bongaarts and Potter, 1983).

The principal characteristic of proximate determinants is its direct influence on fertility. In contrast, the background variables can affect fertility only indirectly by modifying the proximate determinants. The study made use of proximate variables because they improve the understanding of operation mechanisms of the background determinants on fertility behaviour.

2.7 Conceptual framework

Conceptual framework refers to descriptive categories that are constructed and placed in broad structure of explicit prepositions, statements of relationships between two or more empirical properties that are to be accepted or rejected. It's where the research conceptualized relationship between the study variables. Its major purpose was to enable us to quickly see the proposed relationship between variables i.e. between the background, proximate and the dependent variable as seen in the above theoretical framework by Bongaarts.

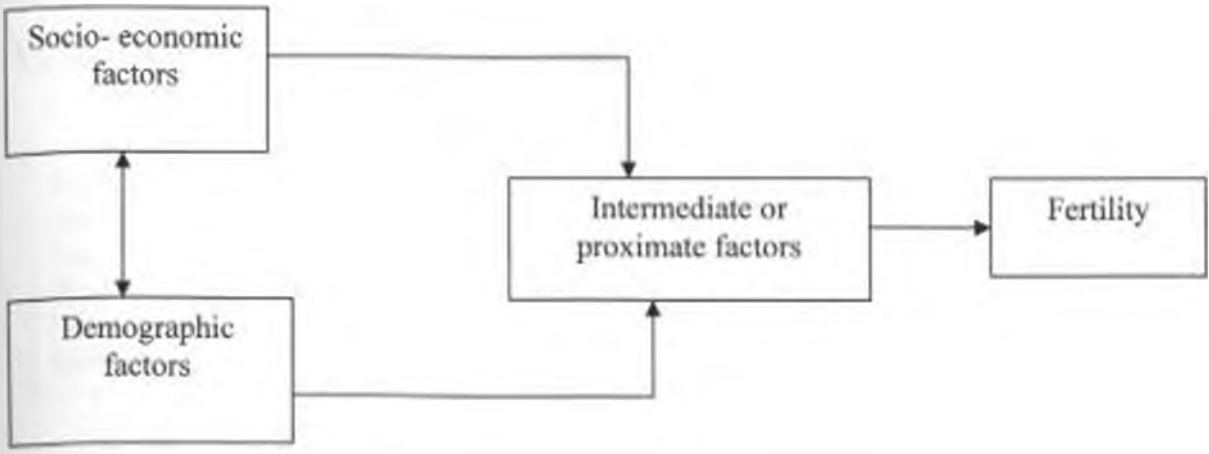
Conceptual Statement

Fertility behaviour of a given society is primarily determined by female education levels which independently or jointly with other socio- economic and demographic factors through the proximate determinants influences it.

Conceptual Model

For this study the conceptual model is the modified model of fertility analysis that was developed by Bongaarts (1982).

Figure 2: Conceptual Framework for the Study of relationship between female education and Children ever born.



(Source: Adopted and Modified from Bongaarts, 1982 fertility analysis model)

Conceptual hypotheses

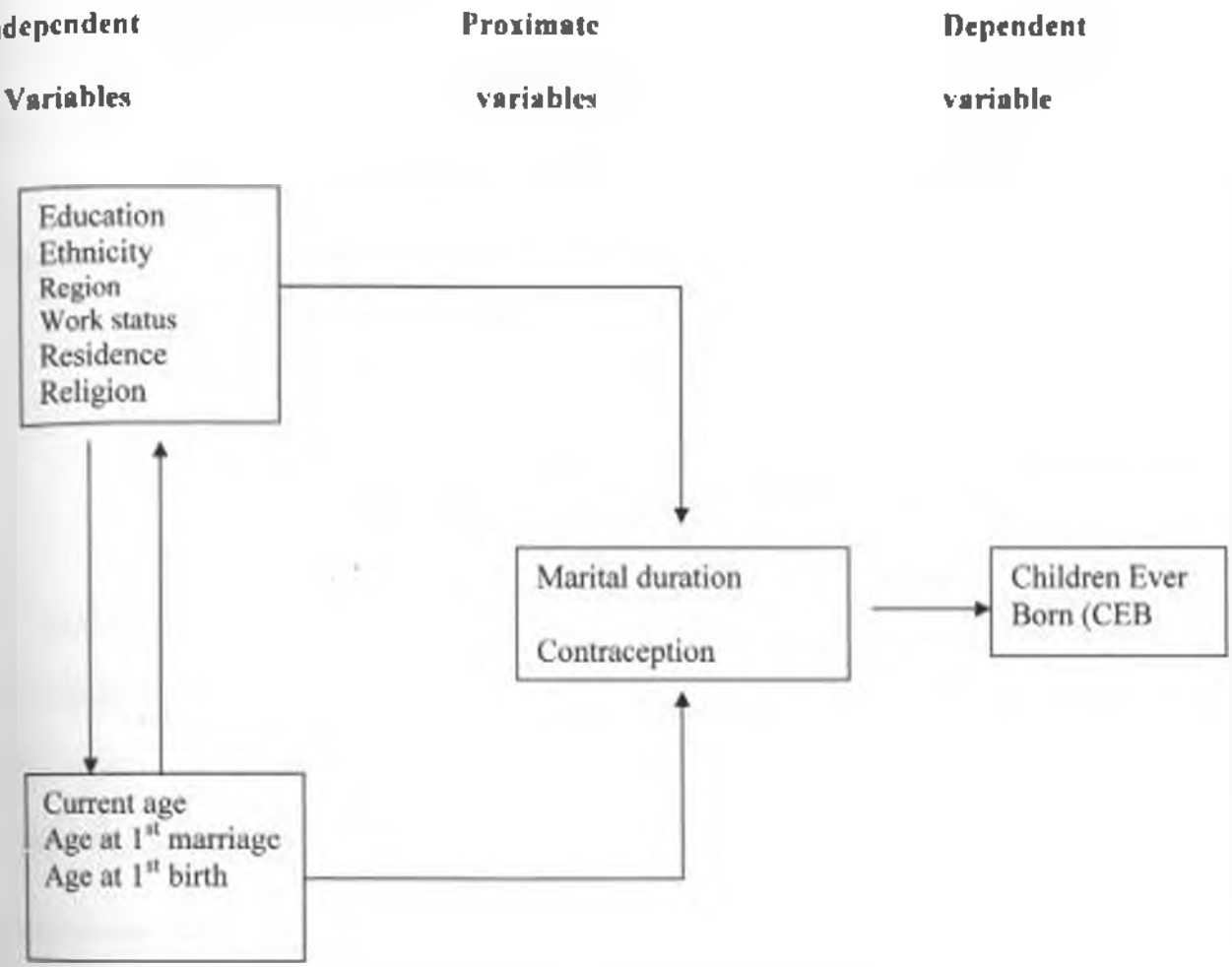
i) Education through the proximate variables influences fertility behavior of a woman as determined by her level of education.

ii) Demographic factors affect fertility behavior of a woman as influenced by her level of education.

Operational Model

Operational model in this study was built from the conceptual model above. Hence the conceptual model was operationalized by defining individual variables from each of the above categories of socio-economic, demographic and proximate determinants to enable in finding out whether the defined variables independently or jointly through the proximate variables influences fertility behaviour and also to find out the magnitude of that influence of each variable if it exists. The table presented below shows that the socio-economic and demographic variables operates through the proximate variables to influence fertility.

Figure 2: Operational Framework for the Study of relationship between female education and Children ever born.



(Source: Adopted and Modified from Bongaarts, 1982 fertility analysis model)

Operational hypotheses.

i) Female education level is negatively associated with children ever born.

ii) Female education level is positively associated with age at first marriage thus reducing children ever born

iii) Female education level is positively associated with contraceptive use thus affects children ever born.

iv) Female education level increases age at first marriage thus reduced children ever born.

vi) Increase in level of education among women leads to increased use of contraceptives.

2.8 Variables definition and their categories

Categorization of variables

The variables used in the study were categorized into three main groups as seen in the operational model.

(a) Independent variables/control variables composed of demographic and socio-economic variables.

(b) Dependent variable (CEB)

(c) Proximate variables

In the study, fertility behavior was measured by children ever born (CEB) which is the dependent variable and the women educational attainment level was the main independent variable.

Dependent Variable

Children ever born (ceb)

This is the total number of children a woman had given birth to at the time the survey was conducted. Data on Children Ever Born (CEB) is in interval scale. In univariate and bivariate it was categorized into 0-2, 3-5 and 6+ children to enable us know how the variable is distributed through frequencies and the correlation between the various variables through cross tabulations.

Independent Variables

Female educational level (fmeduc)

Education was categorized into three categories namely: no education, primary education, and secondary/higher. The three categories were represented in the regression

equation by two dummies i.e. FM EDUC 2 (Primary education), FM EDUC 3 (Secondary/higher). The reference category is FM EDUC 1, which consists of respondents with no education.

Ethnicity (ethnic)

This variable was categories as: Kikuyu, kalenjin, kamba, luhya, luo, Mijikenda/Swahili, Somali and others which were represented in the regression equation by seven dummy variables. The reference category is other community.

Work status (work)

The variable work status refers to whether the respondent is currently working to earn some income or not currently working. This variable has two categories yes for those currently working and no for those not currently working. In the regression analysis, the variable is represented by only one dummy variable WORK2 while WORK1 is used as the reference category.

Place of residence (resid)

This refers to the classification of respondent on the basis of where they currently reside. This variable has two categories represented by a single dummy in the regression equation i.e RESID1 (rural) which takes the value one if the respondent is residing in an urban area and zero, otherwise, that is if the respondent in a rural area. The reference category is RESID 2 (urban), which consists of respondents who reside in urban area.

Religion (relgn)

This refers to spiritual affiliations of the respondent. Religion is categorized into catholic, protestant/other religion, Muslim and no religion others. This variable has four categories represented in the regression model by three dummy variables; i.e. RELGN1 (catholic), RELGN2 (protestant), and RELGN3 (Muslim), which takes the value one if

the respondent is a catholic, protestant and a Muslim and zero otherwise. No religion/others was the reference category.

Region (region)

This variable is represented by the following categories of the 8 provinces namely; Nairobi, Central, Coast, Eastern, Nyanza, Rift Valley, Western and North Eastern province. In the regression equation, Region 1, Region 2, Region 3, Region4, Region 5, Region6 and Region7 represent the variable while Region7, which represents North Eastern province, is the reference category.

Age of the mother (age)

This refers to age of the women, which is categorized in three age groups i.e.15-24 years, 25-34 years and 35 +years. This variable has three categories and it's represented in the regression equation by the dummy variables. These are AGE2 (25-34 years), and AGE 3 (35 + years) that take the value one for women whose ages are 25 -34 years and 35 plus and zero otherwise. The reference category then was AGE 1(15-24 years).

Age at first marriage (agmar)

This refers to the age at which a woman enters into a legal union/marriage. The variable is categorized into three groups namely <15 years, 15-19 years and 20 + years. The three categories of this variable are represented in the regression equation by the two dummy variables. These are AGMAR 2 (15-19 years) and AGMAR 3 (20 + years) that take the value one and zero otherwise. The reference category is AGMAR (below 15 years).

Age at first birth (agbrth)

The variable has three categories named: <15 years, 15-19 years and 20 + years. The variable has three categories and it's represented in the regression equation by two

dummy variables namely: AGBRTH 2 (15-19years) and AGBRTH 3 (20 + years), which will take the value one and zero otherwise. The reference category is AGBRTH 1 (below 15 years).

Marriage duration (mariag)

The variable will be categorized into three groups namely: 0-9 years, 10-19 and 20 + years. This variable will be represented in the regression equation by two dummy variables namely: MARIAG 2 (10-19 years) and MARIAG 3(20 + years), which will take the value one for 10-19 and 20 + years for couples duration of marriage and zero otherwise. The reference category for this variable is 0-9 years.

Contraception (conuse)

It has been categorized into two categories namely: never use (reference) and ever used any method. The variable is represented in the regression equation by one dummy variable

CHAPTER THREE: DATA AND METHODS

3.1 Introduction

The study used the KDHS, 2003 data that was collected by the Central Bureau of Statistics (CBS) in collaboration with the National agency for coordination of Population and Development (NACPD). The description of methods of analysis focused on the statistical tools and models applied for testing hypotheses on the relationship between female education and children ever born. In addition, the strengths and weakness of the methods and models used in this study are given.

3.2 Data source

The data used in the study was drawn from the Kenya Demographic and Health Survey (KDHS) of 2003. KDHS 2003 was a national survey. This survey collected data to explain the levels and trends of fertility, infant & child mortality, family planning knowledge and use, maternal and child health, malaria, Gender issues, nutrition and knowledge of HIV/AIDS. This study only uses data on children ever born and family planning knowledge. This was used to estimate parameters on use of contraceptives as a birth control measure, age at first birth, age at first marriage, ethnicity, place of residence, religion, marital status, marriage duration as they affects or are affected by female educational level to influence children ever born.

3.2.1 Sampling strategy and sample size

The 2003 KDHS used a two-stage sampling strategy. The first stage of sampling Involved selecting sample points from a national sample frame just like CBS did in the fourth National Sample Survey and Evaluation Programme (NASSEP IV) maintained by

generally non-sampling errors are impossible to avoid and difficulty to evaluate statistically.

On the other hand, sampling errors are measure of variability between all possible samples and can be estimated statistically from survey report. They are usually measured in terms of standards errors for a particular statistic. In general, the relative standard error for most of estimates at the national level was small; however, the 2003 KDHS sample is the result of multi-stage statistical design, and consequently, its necessary to use complex statistical procedures for they selected variable. Thus apart from the standards relative error of the whole country being small, there are exception i.e. the average relative standard error for the variable "want no more children" was 4.9 percent for the whole country and urban respectively (KDHS, 2003).

The 2003 KDHS was the first survey in demographic and Health Survey (DHS) programme to cover the whole country including North eastern province and other Northern districts that had been excluded from prior surveys i.e. Turkana, Samburu, Isiolo, Marsabit and Moyale. Due to this fact, KDHS 2003 data set is among the new high quality data sets ever to have been collected among the developing countries. This is because, it's recognized and recommended for use internationally by world bodies such as UNFPA and United Nations World population Council. As such, the quality of this data is unquestionable and holding inferences was drawn from its analysis.

3.4 Methodology and data analysis

A number of statistical tools were employed i.e. univariate analysis, bivariate analysis and multiple regression analysis. The dependent variable (CEB) was total

number of children born to a woman. Therefore, analysis involved all the children ever born to a woman whether living or dead.

3.4.1 Descriptive statistics

Descriptive measures such as frequency distribution and percentage were used. The aim was to condense data within manageable proportions. Descriptive statistics were used to examine the basic distribution characteristics of each of the variable and their differences.

3.4.2 Simple Linear Regression

The simple linear regression focused on measuring the association between each of the independent variables and the dependent variable. Simple linear relationship between the dependent variables and the independent variables as expressed in the equation below:

$Y = A + b_x + e$

Where

Y = the dependent variable

A= the intercept (constant of x and y)

B = the gradient/regression coefficient is gives the effect of x on y

E = error component in the model.

The simple regression analysis focused on the study of relationship between only two variables. For example, the education variable, simple linear regression involved fitting the various categories of education on children ever born.

3.4.3 Assumptions underlying simple linear regression

In the simple linear regression model two variables, X and Y, are of interest. The variable X is usually referred to as the independent variable, since frequently the

investigator controls it, the investigator may select i.e. the value of X and, corresponding to each pre-selected value of X, one or more values of Y are obtained. The other variable, Y accordingly, is called the depending variable. Thus when we speak of regression of Y on X, the following, assumptions are important:

(i) The values of independent variable X are said to be "fixed" this means that the values of X are pre-selected by the investigator so that in the collection of the data they are not allowed to vary from these pre-selected.

(ii) The variables X is measured without, errors. This implies that since no measuring procedure is perfect, the magnitude of the measurement error in x is negligible.

(iii) For each value of x there is a sub-population of Y values.

(iv) The variances of sub population of Y are all equal.

(v) The means of the sub populations of Y all lie on the same straight line. This is known as assumption of linearity.

(vi) The Y values are statistically independent i.e. in drawing the sample, it is assumed that the values of Y chosen at one value of X is no way depend on the values of Y chosen at another value of X.

(vii) The error (e) is normally and independently distributed with mean 0 and variance. 0_2.

3.4.4 Estimation of regression coefficient

The purpose of regression analysis is to estimate the regression coefficients a and b using the available data and estimation equation used assumes the form;

$Y = \hat{a} + b_x$

Two methods are used i.e.

Estimation of the coefficients was undertaken using the least square method using SPSS and the equation for estimating the coefficients is given by the formula;

$A = y - (B_1 X)$

$$B = \frac{\sum (x-x)(y-y)}{\sum (X-x)^2}$$

The fit of the overall model was determined using the R^2 and the significance of the overall model was undertaken using the F-test while individual dummies was undertaken using the T-test. The constant in the model gives the mean number of children ever born for the reference category. The coefficient of determination was determined using the formula;

$$R2 = \frac{\sum (x-x)(Y-Y)}{\sqrt{\sum (x-x)^2 \sum (Y-Y)^2}}$$

3.4.5 Evaluating the regression line

This is where the regression equation is tested as to whether or not it describes relationship between the two variables and sees whether or not it can effectively be used for estimation or prediction purposes. This is done using R^2, which is called the coefficient of determination. The sample coefficient of determination measures the closeness of fit of the sample regression equation, which is the observed values of Y; hence it gives the ratio of the explained variance to the total variance.

$$R^2 = \frac{\text{Explained variance}}{\text{Total variance}}$$

Coefficient of determination (R^2) is much useful and a better measure for interpreting the value of R. The largest value R^2 can assume is one that only occurs when

all of the variation in the y is explained by regression line. When R fall on the regression line. The lower limit of $R^2 = 0$. This Y coincidence in this situation, none of the variation in Y is explained by the regression.

When R^2 is large, then the regression has accounted for a large proportion of the total variability is the observed values of Y, thus we favour the regression equation. On the other hand, a small R^2, indicates a failure of the regression to account for a large proportion of the total variation in the observed values of Y, thus tends to cast doubt on the usefulness of the regression equation.

3.4.6 Testing for goodness of the fit of linear regression models

Where R^2 is large or small, the judgment to be for it or against it is normally reached after it has been subjected to an objective statistical test. This test is accomplished by means of analysis of variance, which enables us to test null hypothesis of no linear relation between x, and y, here t- test is employed.

Interpretation here is that, if the computed value of t is equal to or exceed the value of t tabulated at 0.05 significance level, then we reject the null hypothesis (H_o) that Y is not related to X and accept the alternative hypothesis (H_1) that Y is related to X.

3.5 Multiple regression

Multiple linear regression is an extension of simple linear regression, which expresses common relationship between the dependent variable and several independent variables. We assume that a linear relationship exists between some variables Y, which we call dependent variables and K independent variables X1, X2----X_k which are more than two. The independent variables are sometimes called explanatory variables because of their use in explaining the variation in Y, and predictor variables because of their use in predicting Y.

Multiple regressions in a linear model may be quantitative in nature that is the independent variables assume only value 1 and 0 and represent a classification and we called dummy variables

The multiple linear regression of studying such relationship p is denoted by the following equations; -

$Y = a + b_1 x_1 + b_2 x_2 + \text{----------} b_k x_k + e$

Where

Y = the dependent variable (values for sub-pop of Y)

a= the intercept/constant

b_1 = regressive coefficient/Gradient

X_1 x_2--- xr = particular independent variables

e= Error component in the model

The multiple regression models are just an extension of simple regression where now prediction is made on many variables instead of one to one.

The testing and fitting of regression model was undertaken in a similar manner as was done in simple linear regression.

3.5.1 Assumption of multiple linear regressions

(i) The x are non random (fixed) variables

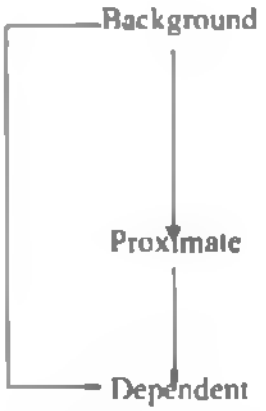
(ii) For each set of x values there is a sub population of Y values.

(iii) The variance of the population of Y and all equal.

(iv) The y values are independent is the values of Y selected for one set of x values do not dependent on the values of Y selected at another set of x values.

3.5.2 Fitting the regression model for the study

Four models were fitted to test the hypotheses of the study based on the operational model presented in earlier chapter of the study. Since the model for this study is in the form of:



The four models fitted involved the following:

1) The major independent variable (female education level) regressed on children ever born while controlling for other independent variables.
2) Female education levels and demographic variables on children ever born
3) Female education levels, demographic variables and socio-economic variables on children ever born.
4) Female education levels, demographic, socio-economic and proximate variables on children ever born.

CHAPTER FOUR: FEMALE EDUCATION AND FERTILITY

4.1 Introduction

The chapter presents the analysis and interpretations of the female education and fertility relationship using the various methods as described in chapter three. The analysis is based on a sample 4,876 of currently married women aged 15-49 years drawn from the total number of 8,195 respondents in the KDHS, 2003.

4.2 Variable distributions

This section examines the distribution of variables which are presented in Table1; Results in the table show that about 20 percent of women in Kenya are illiterate meaning one in every five women has no education while majority of women have primary education (53 percent). On the other hand, over 70 percent of respondents were aged 25 years and over meaning that majority of women in their reproductive age are aged 25 and over years. Over 60 percent of women reported their age at first marriage to be less than 20 years, which indicates, that the majority of the women marry while aged less than 20 years. Similar results are found with age at first birth.

As expected, nearly all the respondents reside in rural areas i.e. 72% while the rest live in urban areas. Distribution of respondents by ethnicity shows that 21.6 percent were kikuyus which is slightly less than a quarter of the total, 8.3 percent kalenjins, 14.9 percent Luhya, 9.2 percent kamba, 10.6 percent Luo, 7.6 percent Mijikenda/Swahili, 8.7 percent Somali and other ethnic groups constituted 19.1 percent of the total sample size. This is consistent with the ethnic distribution at the national level where the Kikuyu is the largest ethnic group while the Somali is the smallest. Over 60 percent of respondents were currently working, while the rest were not. The results in the table also show that

majority of the respondents were Christians while only 17 percent belongs to Muslim and no religion/other.

Regional distribution of respondents shows that, Rift Valley was the most sampled while North Eastern was the least sampled. Majority of respondent (79.2 percent) had been married for a period less than 20 years. Thus the majority of respondents appear to have been recently married. Finally, majority of respondents as expected have ever-used contraceptives (62.2 percent) while the rest never used.

Table 1: Percentage distribution of the study variables used in the analysis.

Variable	Percentages
Socio- economic	
Education level	
None	19.4
Primary	53.1
Secondary +	27.5
Demographic controls	
Current age of respondents	
15-24 years	26.2
25-34 years	40.1
35+ years	33.7
Age at 1st marriage	
Less than 15 years	9.5
15-19 years	52.3
20+ years	38.2
Age at 1st birth	
Less than 15 years	5.4
15-19 years	52.8
20 + years	41.8
Socio-economic controls	
Type of place of residence	
Urban	29.5
Rural	70.5
Region	
Nairobi	11.6
Central	14.8
Coast	11.8
Eastern	11.9
Nyanza	13.3
Rift Valley	17.8
Western	12.2
North Eastern	6.6

Table1: Percentage distribution of the study variables used in the analysis. Cont'd.

Ethnicity		
Kikuyu		21.6
Kalenjin		8.3
Kamba		9.2
Luhya		14.9
Luo		10.6
Mijikenda Swahili		7.6
Somali		8.7
Other ethnic groups		19.1
Religious affiliations		
Roman Catholics		22.2
Protestants/Other Christians		60.8
Muslim		13.9
No religion Others		3.1
Proximate variables		
Marital duration		
0-9 years		48.0
10-19 years		31.2
20+ years		20.8
Contraceptive use		
Never used a method		37.8
Ever used a method		62.2
Dependent variable		
Mean children ever born		
0-2 children		38.9
3-5 children		38.0
6+ children		23.1
Total	**N = 4,876**	**100 percent**

4.3 The relationship between independent variables and children ever born

Table 2 summarizes the simple linear regression models for each of the independent variables on children ever born in order to determine the nature of association between each of background variable on the dependent variable. The regression coefficients (b) represent the difference in the mean number of children born for the various categories.

Education variable for example, the constant represents the mean number of children born for those in the category of no education. The coefficients of other categories represent the net change in the mean number of children ever born. Thus, while those with no education have on average 5 children, those with primary had 4 children on average while those with secondary plus had two less. This is consistent with what is expected that women with secondary plus education have fewer children. This table also shows that these differences were statistically significant.

As expected the number of children ever born increases with age and for the variable, current age of the respondent, women aged 15-24 years are observed to have the least number of children while those aged 35 plus years have the largest number. Children ever born reduce with increase in age at first marriage where those women aged 20 plus years end up having fewer children compared to those aged between 15-19 years. Similar results are obtained with age at first birth. As expected, those respondents who had been in marriage for a longer period of time will have more children compared to those women in short marital duration as can be evidenced in table 2.

Table 2: Linear regression coefficients of independent variables on the dependent variable

Variable	Coefficients	Standard error
Socio-economic		
Education level		
None (constant)	5 088	0.082
Primary	-1.392***	0 082
Secondary+	-2 254***	0 108
Demographic controls		
Current age of respondent		
15-24 years (constant)	1.508	0.057
25-34 years	1 913***	0 074
35 plus years	4 315***	0.076
Age at 1st marriage		
Less than 15 years (constant)	5.151	0.120
15-19 years	-1.218***	0.130
20+ years	-2 055***	0.134
Age at 1st birth		
Less than 15 years (constant)	2.595	0.207
15-19 years	1.649***	0.148
20 plus years	0 807***	0.150
Socio-economic controls		
Type of place of residence		
Rural (constant)	4.118	0.068
Urban	-1 316***	0 081
Region		
North Eastern (constant)	5.084	0.143
Nairobi	-2.719***	0.179
Central	-1.912***	0.172
Coast	-1 409***	0.179
Eastern	-1 341***	0.178
Nyanza	-0.947***	0.175
Rift valley	-1.053***	0.167
Western	-0.957***	0.178

**P< 0.05 ***p< 0.01

Table 2: Linear regression coefficients of independent variables on the dependent variable cont'd.

Ethnicity		
Other ethnic groups (constant)	3.752	0.085
Kikuyu	-0.754***	0.117
Kalenjin	0.413	0.155
Kamba	-0.119	0.150
Luhya	0.168	0.129
Luo	-0.002	0.143
Mijikenda/Swahili	0.113	0.160
Somali	0.959***	0.153
Current work status		
Currently working (constant)	3.883	0.836
Not currently working	0.725***	0.837
Religious affiliation		
No religion/others (constant)	3.866	0.216
Catholic	-0.222	0.230
Protestant/Other Christians	-0.236	0.221
Muslim	0.407	0.239
Proximate		
Marital duration		
0-9 years (constant)	1.961	0.039
10-19 years	2.518***	0.062
20 plus years	4.726***	0.070
Contraceptive use		
Never used (constant)	3.884	0.062
Used any method	-0.250***	0.078

****P< 0.05 ***p< 0.01**

Rural women as expected, have more children ever born compared to those in urban areas who on average have one child less. North Eastern with (an average of 5 children per woman) has the highest fertility compared to the other provinces while Nairobi has the least with an average of two children per woman. Kikuyu ethnic group as expected

had the least fertility levels with an average of two children per woman while the Somali had the highest fertility with an average of five children per woman. Although, the other regions have lower mean children ever born than North Eastern, these are not statistically different.

Those women without work on average have 4 children as compared to those currently working with an average of 3 children and these differences were significant. This is consistent with expectations since employment in market economy influences fertility through exposure to knowledge on fertility regulations, increasing opportunity cost of women's time within marriage and increasing the costs of children as aspirations increases (Omariba. 2003). Finally, Christian women have on average fewer children compared to their Muslim counterparts. Christian women on average have a mean of 3 children while the Muslim had a mean of 4 children. The religious differences were found not to be statistically significant.

In conclusion, education and the other background variables influences children ever born as seen in Table 2 and these influences shows that the background variables are associated with the dependent variable with education having an inverse relationship with children ever born. Thus, this correlation between the variables requires that the analysis of education on children ever born be controlled in the study to see the effect of education on fertility.

4.4 The relationship between education and children ever born

The primary goal of the study was to investigate the influence of female education on children ever born. Four models were fitted. The first model involved simple linear regression of education variable, which is the primary variable of the study on the

dependent variable. Model two introduced the demographic controls and in model three, socio-economic controls were introduced while model four included all the variables. The results are summarized in table 3.

The amount of variation in the models measured by R^2 showed that in the first model, 8.2 percent of variation in children ever born was explained by education and introduction of demographic variables, increased R^2 to 55 percent. Introduction of socio-economic variables increased R^2 slightly to 58 percent, which was a slight increase from the previous one, and in the last model introduction of proximate variables increased R^2 to 62 percent as the variation in the dependent variable. All the models are statistically significant.

The improvement in the variations shown by R^2 with the introduction of the controls indicates that education has a stronger influence on fertility which is even better explained when other variables are controlled for.

Introduction of demographic variables reduced the net effect of education on children ever born greatly, which shows that children ever born are determined by the demographic variables e.g. age of the mother. For example, the introduction of demographic variables showed that the differences in primary and secondary levels of education reduced in relation to the dependent variable. This shows the closeness between demographic variables and fertility.

Table 3: Multiple regression coefficients of variable dummies indicating the effects on children ever born

VARIABLES	MODEL 1	MODEL 2	MODEL 3	MODEL 4
Constants	5.088	2.426	2.671	2.005
Education levels				
Primary	-1.392***	-0.691***	-0.397***	-0.298***
Secondary higher	-2.254***	-1.509***	-0.983***	-0.872***
Control variables				
Demographic				
Current age of respondent				
Age 25-34 years		1.500***	2.247***	1.477***
Age 35 plus years		4.500***	4.543***	2.387***
Age at 1st birth				
15-19 years		1.175***	1.128***	1.083***
20 plus years		0.515***	0.533***	0.564***
Age at 1st marriage				
15-19 years			0.914***	-0.528***
20 plus years			-1.572***	-0.694***
Socio-economic				
Work status				
Currently working			-0.108	- 0.147***
Place of residence				
Urban area			-0.539***	-0.529***
Region				
Nairobi			-0.902***	-0.798***
Central			-0.956***	-0.894***
Coast			-0.789***	-0.660***
Eastern			-0.950***	-0.789***
Nyanza			-0.331	-0.199
Rift Valley			-0.433	-0.261
Western			-0.231	-0.261
Religion				
Catholic			0.008	0.002
Protestant/other			0.159	0.003
Muslim			0.114	0.008

**P < 0.05 ***P < 0.01

Table 3: Multiple regression coefficients of variable dummies indicating the effects on children ever born Cont'd.

Ethnicity				
Kikuyu			-0.170	-0.145
Kalenjin			0.268***	0.319***
Kamba			0.405***	0.391***
Luhya			0.124	0.133
Luo			0.394***	0.437***
Mijikenda/Swahili			0.115	0.121
Somali			0.258	0.456
Proximate				
Marital duration				
10-19 years				1.261***
20 plus years				2.673***
Contraceptive use				
Ever use of contraceptives				0.197***
R^2	0.003	0.547	0.579	0.621
F- VALUE	219.608	733.915	246.790	265.146
F-significance	0.000	0.000	0.000	0.000

**P < 0.05 ***P < 0.01

With the introduction of socio-economic variables to education and demographic variables, the net effect of education on children ever born was further reduced. The differences in effect of primary and secondary levels of education on children ever born also decreased in relation to the dependent variable. This implies that socio-economic variables are also related to fertility though not as strong as the demographic variables.

Introduction of proximate variable shows a further reduction in the net effect of education on children ever born and the differences in effects of primary and secondary levels of education reduced further. This indicates that education works through the proximate variables to influence fertility.

The last model being the main model of the study showed overally, that the relationship of the dependent variable with education and other independent variables is as expected since in all the regressions, the association is very evident with education being inversely related to the children ever born.

The overall picture from the regression models in table 3, is that demographic variables when controlled with education has the greatest influence on children ever born meaning that fertility is closely associated with demographic variables. Also, all the models are significant implying that all the variables used in the study are important and not statistically independent of each other.

Also an important issue to note is that, as the net effect of education reduced with the introduction of controls in the different models, its influence remained significant implying that not all the factors in the education-fertility relationship were considered partly because of the nature of the model used which was determined by the dependent variable which in this case was children ever born e g. Breast feeding patterns.

The main objective of the study was to find out how education through the proximate factors affects a woman's fertility level. The aim was specifically to examine the relationship between age at first birth and marriage, mean number of children per woman, children ever born, marital duration and contraceptive behaviour. As expected, the study met all the objectives as can be seen in the analysis.

The final model of the study as presented in Table 3, when education and all the controls are fitted explains 62 percent of variation in the dependent variable, which is bigger enough thus, accepted. Thus the model is appropriate for this study.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The primary purpose of the study was to find out the effect of female education on fertility behaviour with the sole aim of filling the knowledge gaps that existed from the previous studies concerning the female education- fertility relationship.

5.2 Summary of the findings

The key findings of the study as presented in chapter four showed that most of the variables used in the analysis were related to children ever born. As expected, majority of women in Kenya have primary education and lives in rural areas. Also, majority of women in their reproductive age in Kenya are aged between 25-34 years. Many women in Kenya give birth to their first births while aged below 20 years, which is the case with age at first marriage while majority of women use contraceptives.

Results also, showed that increase in the level of education leads to a reduction in children ever born. For example, women with secondary and above education have fewer children compared to primary education holders. This influences age at first birth and marriage, which in turn has a direct effect on fertility. The results in the above analysis show that contraceptive use is inversely related to children ever born.

In the multiple linear regression, introduction of demographic, socio-economic and proximate variables in the education- fertility relationship resulted in the reduction of the effect education on fertility as expected, thus confirming that education acts either directly and indirectly to influence fertility thus importance of introduction of controls in education-fertility.

5.3 Conclusions

The study examined the effect of education on children ever born seeking primarily to assess the effects of education across cohorts of women in the reproductive age group. The results show that education greatly influences children ever born by reducing them directly or indirectly through other factors as shown in the regression analysis.

The major finding of the study was that, number of children (family size) is uniform throughout the educational spectrum when all other factors are controlled for i.e. number of children ever born reduces as ones level of education increases. While the least educated and the better educated share the small family norms, the gap between the two groups in contraceptive use is large. Better-educated women have broader knowledge, higher socio-economic status and less fatalistic attitudes towards reproduction than the less educated women meaning that the better educated have fewer children (less than 3) whereas the less educated have many children.

Results of regression analysis also indicate that the socio-economic, demographic and proximate variables mediate the influence of education/schooling on reproductive behaviour and partly explain the wide fertility gap between educational strata.

Another important finding of the study is that the expected inverse relationship between education and fertility is not always the case in many poor, mostly illiterate and rural societies. Instead, an inverted U-shaped relationship is found. But in most societies the relationship was found to be inverse i.e. increase in education level leads to consistent decrease in number of children ever born.

The results also show that women from ethnic groups in which there is strong conformity to traditional reproductive practices including the Somali, the kalenjins, the

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Luhya and other ethnic groups, are much less likely to use contraception and to desire family limitation compared to Kikuyu women. This findings also confirms the general believe that men in these communities possesses the absolute power in decision making in major family and community matters including family regulations and preferences than their wives.

Generally, female education greatly influences fertility by shaping and altering the key demographic attributes or characteristics of the respondents and other socio-economic characteristics in relation to her fertility performance. These attributes includes: age of the respondent at first birth, and at first marriage, marital duration, contraceptive behaviour, type of place of residence, work status and many others which are all geared towards fertility reduction.

The study also included religion variable that was not significant in all the models where its effects were controlled for, but for this study, the variable is an important socio-cultural factor that is likely to influence fertility behaviour of women. This is because besides the school system, religion is perhaps the most influential social institution that constructs the expected standards of behaviour, shapes attitudes, and hence influences the manner in which individuals act and respond in their socially constructed institutions including the family. Religion affects fertility through its teachings and practices, which shape a woman's beliefs, norms and value orientations including her attitudes towards reproduction and family size.

5.4 Recommendations

The primary objective of the study was to investigate the role of female education levels in shaping the fertility preferences and performance of women. The education-

fertility relationship operates through various mechanisms and as stated in study limitation, it is not possible to investigate all this in a single study; therefore the study recommends the following for future researcher:

1) More research is needed in this area to enable conclusions from future researches to show the aspect/ component of female education that causes fertility decline.

This will not only help researchers but also the public in knowing why women from various ethnic backgrounds and also from the same ethnic group will have different reproductive desires i.e. some will have many children and others few even after being exposed to same education levels as it was validated by this particular study and other previous ones.

2) Further studies are needed to increase the understanding of fertility-education relationship i.e. accumulation of more knowledge.

3) A re-examination of fertility models to determine the most suitable model for the effective analysis female education relationship where all controls can be used.

Since education is the single most important socio-economic variable that negatively influences fertility than any other variable, it has to be made more relevant and responsive to the current needs of women and as such the following recommendations are meant for the policy makers: -

1) Girls should be encouraged and motivated to stay in school beyond primary level of education by putting in place laws to regulate this.

Ultimately, promoting women's education to higher levels would empower them to make individual decisions and to act on those decisions. Therefore, the policy makers

should strive to make the necessary requirements available for the girl child to be encouraged to remain in school beyond primary education.

2) For both policy makers and planners, female education should form a core factor to be considered and incorporated into all future population policies geared towards fertility reduction.

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