THE EFFECT OF FEMALE EDUCATION ON FERTILITY IN KENYA

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DECLARATION

This thesis is my original work and has not been presented for degree award in any other university.

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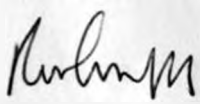
This thesis has been submitted for examination with our approval as university supervisors.



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DEDICATION

I humbly dedicate this my Thesis to mother and father, brothers and sisters, the family whose great aspirations and ability is the reflection of this work.

ACKNOWLEDGEMENTS

Thesis writing is never an easy task and I would not boast that this work has been purely an individual effort. But the burden was at least lightened by the many people who assisted in one way or another. Without their assistance this thesis would possibly not have been what it is. I wish to take this chance to acknowledge those whose contribution enabled me to put the pieces together into such a magnificent scholarly document, -the successful completion of this work. It's however not possible to mention all of them by their names here but a few names will serve as representatives.

Top on the list are my parents Mr. and Mrs. Francis Mugo Karuri together with all family members who have borne the financial burden of financing my studies following my failure to secure a sponsorship thus enabling me to pursue this course. Not to underrate their moral support which has been unfailing.

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ABSTRACT

There had been at first some reluctance to accept the reality of fertility decline in Kenya until the early 1980's when the country a record fertility decline of more than 20%. This decline whose evidence has been shown from more sophisticated cohort analysis and comparison between two or more surveys exceeded by far the 10% decline that has come to be conventionally accepted as indicating the onset of irreversible fertility transition. With this acknowledgement there is need now more than at any other time before to undertake ever intensified more focused studies aimed at isolating the key determinants of fertility which can be used for the formulation and implementation of appropriate population policies in the country.

This is one of the chief aims of this study which aimed at investigating the effects of changing levels of formal education among women (female education) among other social-economic and demographic factors on the key proximate determinants of fertility amongst Kenyan women.

The unit of analysis in this study was individual woman while the fertility measurement is children ever born (CEB). A micro-level analysis was chosen because it offers a better chance of gaining greater insights on the likely impact of female education on fertility by overcoming some of the shortcomings encountered in macro-level analysis type of studies.

The study utilised the 1993 KDHS data a National Survey that utilised a woman's questionnaire to collect data on the women's characteristics. To analyze the data, Linear Regression and Correlation methods of statistical analysis were used i.e. cross-tabulations, simple linear regression and multiple regression with the aid of the SPSS computer package.

The general findings of the study shows that female education is negatively related to fertility. The most significant finding and possibly the contribution of this study is that education influences fertility largely by interfering with or altering the demographic characteristics of the individual woman.

The study is organised in four chapters. Chapter One deals with the introduction to the study as well as the definition or isolation of the study problem. It includes the introduction and background to the study, statement of the problem, objectives of the study, scope and limitations of the study as well as the justification of the study.

Chapter Two deals with the presentation of literature readings on findings from earlier studies in the same field. It also presents the relevant theoretical framework adopted for the analytical purposes in this study as well as the explanation of it's

operationalization which includes the statement of the operational hypotheses both diagrammatically and formally.

Chapter Three focuses on data and methodologies used for analysis. It examines the source and quality of data as well as the statistical methods used to study the interrelationships between fertility and its determinants.

Chapter Four deals with the statistical analysis of data and the results. The relationship of fertility (CEB) with Education alongside some selected social-economic and demographic variables through the selected proximate determinants is examined and the results as well as the explanations for them given.

Chapter Five deals with the summary conclusion and recommendations. To begin with a small summary of the major findings is given followed by the conclusion of the study. Female education is central to fertility decline such that no fertility reducing models and policies can afford to ignore it. Lastly recommendations based upon the foundations of the study are postulated and put forth aimed at both the policy makers and future researchers.

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CHAPTER ONE

GENERAL INTRODUCTION

It has been widely recognised that education particularly for the woman is not only a pre-requisite to full participation in a modern society but also basic tool for improvement of the status of women as well as the fulfilment of their roles as members of the society. Therefore, the extent to which girls and women have access to formal education/schooling is an important determinant of the current and potential role of women in the whole process of society transformation, UN (1986). Besides it's role as a developmental strategy, education has been recognised as a crucial factor in reproductive behaviour and there are theoretical as well as empirical reasons to expect the education of women to have a greater effect on fertility than mens' education, UN (1995).

Studies of fertility conditions and change have consistently pointed to education as an important factor in accounting for fertility differences within populations. As such education now occupies an important place in investigative research work both as regards differential fertility by social-economic status and more fundamentally in the search for causal explanations of fertility levels and fertility change.

Formal schooling takes women out of the home and away from traditional female roles/activities for a portion of their lives thus exposing them to new ways of thinking about the world and

themselves, as well as delaying their entry into the world of marriage and reproduction, UN (1985). As child-bearing and child-care are considered the sole preserve of women in many societies in Kenya and else where, so is contraceptive use of which most of the methods widely used are pre-dominantly "female methods" such as hormonal pill, intra-uterine devise, female sterilization, injection, tubal-ligation plus other female vaginal methods.

Although contraceptive use undoubtedly depends on the husband's characteristics as well as those of the extended members of the family, it's the individual woman herself who must know where, when, why and how to acquire and use these methods and particularly be willing to do so. Due to its' close link to child survival, child spacing, attitudinal change to reproduction and child rearing; female education appears to have an effect independent of either family income or husband's education on the woman's own fertility behaviour, UN (1987).

Over the past decades, the need to promote female education for demographic purposes has been advocated for in all International forums such as the United Nations Decade for Peace, Equality, Development and Peace, UN (1976-85), The World Population Plan of Action, Bucharest (1974), The Forward Looking Strategies for the Advancement of Women to the Year 2000 (Nairobi 1985); The International Conference on Population and Development, Cairo (1994) and The United Nations World Conference on Women, Beijing (1995) among others.

The linkage between female education and fertility however presents a great confusion both for the researcher and policy maker despite an acknowledgement that probably no other socio-

economic factor affects human fertility so strongly as does education. Education is hypothesised to affect fertility both directly and indirectly through various mechanisms most of which have not been subjected to adequate empirical test, Ridker (1976).

Education shapes the biological, psychological and behavioural context of child bearing. The enhanced knowledge of, access to and use of modern contraceptives; increased husband-wife communication; influencing women's attitude towards family size and reproduction as well as their tastes and preferences for non-family occupations as alternative sources of fulfilment and satisfaction is all dependent on education, UN (1995). Indeed previous studies, Pollum (1993), UN (1981, 1983, 1987, 1995) among others have shown an inverse relationship between education attainment and fertility performance.

A strong belief in the universality and invariancy of the education-fertility relationship has heavily invested in increasing female education as the single major socio-economic factor amenable to policy formulation that can help solve the fertility problem in developing countries, since education is a policy-responsive variable that can be manipulated to influence fertility behaviour once the mechanisms through which education-fertility relationship operates are firmly established.

From Malthus to the present, most literature on the relationship of fertility to several facets of socio-economic structure has placed great faith in increased female education as the only sure hope of solving fertility problem: a faith that has gained great support from recent empirical

evidence shown by researches conducted on this area using WFS and DHS data among other data sets.

This study analyses education differentials among Kenyan women by two of the major proximate determinants of fertility namely marital duration and contraceptive use. Other socio-economic and demographic factors that influence fertility jointly with education such as place of residence, ethnicity, income, age, marital status, age at first marriage, age at first birth were also included in the analysis since they are shown to be associated with education and may confound its independent effect on fertility.

1.1 STATEMENT OF PROBLEM

The relationship between female education and fertility behaviour has been a recurrent theme in demographic literature. Most studies conducted on the female education and fertility behaviour have found a negative relationship, Mason (1984,1986); Cochrane (1983), Cleland and Rodrigues (1987). However, several studies relating education to fertility shows that the relationship is not as uniform as is generally assumed, Henin (1979), Lesthaeghe et al (1993). Many studies have shown either no significant relationship, mixed evidence of significant inverse relationship and simply a significant direct relationship (Cochrane 1979).

These contradicting empirical findings suggest that the relationship between education and fertility is more complex than was previously believed Part of the reason the type of data utilised by many of the earlier studies. Most of the earlier data sets such as the contraceptive

prevalence survey as well as the fertility survey suffered from widespread errors while other data sets collected and analyzed by individuals were based on too small sample sizes to warrant the drawing of generalised conclusions. Besides many of these studies used indirect methodologies for data analyses due to the poor quality of the data used .Such methodologies though widely acknowledged are mainly based on rough estimation of the relationships. This has called for the need to undertake more focused and more accurate analysis onto the underlying mechanisms through which education operates to shape/influence the biological, psychological and social context of childbearing using new methods and more accurate and complete data.

In Kenya studies on the female Education-Fertility relationship are not many or were done within the general education fertility relationship context. Anker and Knowles found initial positive effects of education of fertility (Ankes and Knowles 1975, 1980). However, higher levels of female education were found to have negative effects on fertility. A study by Castro and Wamucii foung female education to highly and positively affect contraception use hence negatively affecting fertility.

This finding is confirmed by studies on adolescent / teenage fertility/pregnancies which attributed higher fertility among school girls to a rise in their education upto a certain level (Nyaga 1989, Mugwe 1989, Aggrawal and Mati 1983).

In a study by Lesthaeghe (Lesthaeghe 1993), it was evident that though female education had mutually led to substancial increase in marital fertility in Kenya the trend was being reversed – a similar few noted from the 1993 KDHS surver report.

The foregoing indicates a lack of explicit focus in that female education has not been treated (isolated) as the point of focus or the variable of interest, rather it has been treated just like one among other core factors of fertility . This is because female education has often been dealt with within the wider context of general (male and female) education. This means the explicit effect of female education vis a vi other factors are never fully captured.

There is also a lack of clear demarcation between positive and negative effects studies do agree that a rise in fertility and later to a decline in fertility. At exactly what level and why the initial positive effects translates into negative is not clear both for academic and policy purposes.

As such a new set of Demographic and Health Survey (DHS) Data in many developing countries during the late 1980's and early 1990's has provided an exceptional opportunity to re-examine the education fertility relationship from a cross-national perspective, UN (1995).

This study will utilise the 1993 Kenya Demographic and Health Survey (KDHS) data which is of higher quality to analyze some of the ways in which female education influences fertility indirectly through other intermediate factors from a national perspective. The Boongarts flamework (model) for analysis will be adopted in this study while regression analysis which

apart from being a direct methodology and therefore less based on generalised estimations is simple and mere accurate will be used for data analysis.

1.2 OBJECTIVES OF THE STUDY

1.2.1 Main Objective.

The main objective of this study is to examine the role of female educational attainment in determining a woman's fertility performance.

1.2.2 Specific Objectives

1. To investigate how a woman's level of education attainment affects her knowledge of, access to and use of contraceptive thus influencing her family size.

2. Establish whether a woman's education attainment affects her duration of marriage thereby influencing her family size.

1.3 JUSTIFICATION OF THE STUDY

Over the past decades, female education both for its own sake and as a means of women empowerment particularly in matters relating to reproduction has taken a central position at the world stage i.e. from Bucharest to Beijing as a pre-requisite to solving the world population problem especially in the developing countries. This calls for a need to investigate the role of female education in fertility behaviour hence the need for this study.

And as already noted in the introduction studies on the female education-fertility relationship have yielded inconsistent findings. Further research in this area of interest is therefore needed to better our understanding of the circumstances in which an inverse, positive or neutral relationship arises hence the need for this study.

Studies focusing exclusively on female education are needed if the full effect of a woman's education is to be captured hence the need for this study. The fact that most of the mechanisms through which female education is hypothesised to affect fertility have not been widely or thoroughly tested empirically necessities this study to that end.

Earlier studies in fertility education relationship have either tended to emphasize on male education or evaluated female education jointly with male education.

The study is beneficial to the policy requirements of policy makers on the educational priorities in relation to population policies and development in general. As such the study proposes recommendations for education needs for population policy formulations.

This study is a response to earlier recommendations for further research on the female education fertility relationship (UN 1986, 1987), as well as a points to further research in this areas at national or sub-national levels. Apart from trying to explore some of the areas left out in earlier studies it attempts to raise new questions or concerns which might require further clarification as regards fertility behaviour. The study is useful and timely as now, more than ever for the need to control population growth is most critical for the country under study and

such a study would naturally lead to better overall fertility regulation policies if its findings and recommendations were adopted.

1.4 SCOPE AND LIMITATIONS

1.4.0 Scope.

Due to the complex nature of the education fertility relationship, it's not possible or even feasible to investigate all the proposed mechanisms/paths through which female education is likely to influence fertility in a single study. This analyses is confined to investigating the effects of female education on fertility directly and indirectly through marriage and contraceptive use. It also examines its independent effects by controlling for the joint effects of place of residence, ethnicity, income, age, marital status, age at first marriage and age at first birth.

Although many studies have investigated the effects of education in general on fertility, only a few have tried to isolate female educational influence on fertility from that of male education. This analysis will attempt to isolate the effects of the female education on fertility irrespective of the male/husbands education. This is due to the fact that female education is hypothesized to have a greater effect on fertility than does male-education (Cochrane, 1979).

1.4.1 Limitations due to Data

Data limitations arises from the use of 1993 KDHS data which was collected for a more general purpose rather than a specific one and therefore did not include all the question (data) that would be required to carry out a more focused analysis on the female education-fertility relationship.

Also despite its being a national sample survey, the 1993 KDHS omitted some districts in North Eastern, Eastern and Rift Valley Provinces although this contained only about four percent of the population but which might have "unique" demographic characteristics thus generalisation of results must be done with maximum caution.

Like all survey data KDHS data is subject to such errors as misreporting of age such as digital preference, age heaping for purposes of exaggerating one's age or due to misunderstanding of the questions. Besides education is not a homogenous factor whose only attribute is level reached but has other important attributes such as type and contents which also influences a woman's behaviour in relation to fertility but which were never captured by the KDHS which captured only the level reached due to its easiness to measure and quantify.

1.4.2 Limitations due to Methodology

The methods of data analysis used in this study, though sufficient enough to produce the expected results are by no means the most sufficient and complete methods of research analysis as more and more new models and techniques of data analysis are being formulated or old ones revered and perfected throughout the academic research revolution that is still going on.

The evaluation of the quality of the data was done by those organizations that carried out the KDHS where in differences were found between sub-populations. As such the relative error estimate for CEB to women aged 15-45 years was 1.3% for the whole country, 4.3% for Urban areas and 7.9% for Nairobi.

1.4.3 Limitations due to other factors

Other limiting factors are time since this research is part of an academic project that has a time limit within which it should be completed. Thus the research has to be completed within the designated academic duration.

Another limitation is shortage of finances which means the research has to be accomplished with acute financial constraints. As a result this research could no hire special expertise in the sense of technology, manpower and skills.

CHAPTER TWO

LITERATURE REVIEW AND THE STUDY FRAMEWORK.

The near universality of fertility decline in Kenya across social economic and geographic populations indicates a strong central component of fertility change operating equally across geographic and social categories in a similar though not necessarily to the same extent.

The fact that this decline has taken place at the same time and almost at the same pace cannot be dismissed as being mere coincidence or chance, rather its more sensible to suppose that education has played a major role in this scenario.

This study therefore is undertaken against a background of declining fertility in Kenya and rising female education. Women's education has been rising at a faster rate than that of men in the last few decades; a trend likely to have played a critical role in Kenya's most recent fertility decline.

2.1.0 Fertility Trends

Kenya has recently recorded such rapid reductions in fertility that Demographic observers agree that the country has entered the Demographic Transition. Fertility reached the peak in the late 1970's, when a Total Fertility Rate (TFR) of 8.2 births per woman was registered. There after it begun to decline first slowly but more rapidly during the later part of the 1980's.

This decline has been systematic and sustained occurring among women of all reproductive ages and across all socio-economic and geographic sub-groups.

By the early 1990's, TFR had declined to as low as 5.4 births per woman a decline of more than 20%. Similarly during the same period, fertility preference declined rapidly as evidenced by ideal family size which declined from 6.2 children in the late 1970's to 3.4 children by early 1990's. Below are figures to illustrate the declining trend in ideal family size preferences.

TABLE 2.1.0

Fertility trends in Kenya 1977-1993

TRENDS IN FERTILITY DECLINE 1977-1993				
PERIOD	**1977/78 (KFS)**	**1984 (KCPS)**	**1989 (KDHS)**	**1993 (KDHS)**
TFR	8.2	7.7	6.7	5.4
TRENDS IN FERTILITY PREFERENCE 1977-1993				
PERIOD	1977/78(KFS)	1984(KCPS)	1989(KDHS)	1993(KDHS)
International Fertility Survey (IFS)	6.2	5.8	4.4	3.4

Source: KDHS 1993

2.1.1 Education Trends

Kenya has one of the highest literacy levels in Sub-Saharan Africa and although female education still lags behind that of men, women have made marked improvements in school

enrolment in the past decades. Statistics show that women do not enter and also do not remain in school at the same rate as men. Deble, (1980) indicated that no other Sub-Saharan African country had high education enrolment rates for women. Disparity between male and female education has persisted even with the introduction of mass education as noted by a 1976 National Literacy Survey (NLS) undertaken by the Central Bureau of Statistics (CBS) which showed literacy rates by sex as 69% for males and 30% for females.

It has however also been revealed that the trend in female primary school enrolment rate was rising fast such that it rose from 34% in 1963 to 47% in 1977. The same trend was found to be true for secondary education where though the pace was slower, the proportion of females rose from 32% in 1963 to 38% in 1977. By 1990 already 40% of girls in Kenya were enrolled in primary school, UNICEF (1989) and by 1993 over 96% of Kenyan girls were estimated to undergo some form of primary school education with over 42% of all secondary school enrolment being females and a significant improvement at post secondary school level, Brass & Jolly (1993).

Table 2.1.1

Education trends in Kenya

% OF WOMEN ACCORDING TO EDUCATION (NO. OF YRS OF SCHOOLING)							
YRS/ LEVEL	0	1-3	4-6	7-9	10+	Prim.	Sec.
%	25.1	7.4	20.2	34.2	12.8	54.8	20.8
PERCENTAGE OF WOMEN ACCORDING TO LEVEL OF LITERACY							
LEVEL OF LITERACY		Can not read		Reads with difficulty		Reads easily	
%		27.6		18.1		53.9	
MEAN LEVEL OF YEARS OF SCHOOLING BY AGE GROUPS							
AGE-GROUP	15-19	20-24	25-29	30-34	35-39	40-44	45-49
YRS OF SCHOOL	7.1	7.1	5.9	4.1	3.5	2.6	1.7

Source: UN 1995

The above table shows that 74.8% of all Kenyan women had enrolled for education, of these 20.4% had secondary education while 54.4% had primary education. Only 25.1% of the women had no education at all. It also indicates that 72% of all Kenyan women are able read, 18.1% read with difficulty while the majority (53.9%) are able to read easily. Only 27.6% of the women could not read at all. It has also been found that the mean level of schooling of women changes with Age. Younger women i.e. those aged between 15-24 years had an average of 7.1 years of schooling compared to 5.9, 4.1, 3.5, 2.6 and 1.7 years for 25-29, 30-34, 35-39, 40-44 and 45-49 age groups respectively.

2.1.2 Fertility Differential by Level of Education

Trends of fertility closely relate to those of education in that women with higher levels of education have a lower fertility, on the other hand, women with lower levels of education have higher fertility. Hence, female education seems to be inversely related to fertility.

TABLE 2.1.2

FERTILITY DIFFERENTIALS BY EDUCATION LEVEL

EDUCATION BY NO OF YRS	0	1-3	4-6	7-9	10+
TOTAL FERTILITY RATE (TFR)	7.2	7.5	7.5	6.2	4.6

Source: UN 1995

Table 1.1.3 (a) reflects that fertility rises initially but later declines with increasing level of education. Women with 1-6 years of education have a TFR of 7.5 compared to 7.2, 6.2 and 4.6 for women with no education, those with 7-9 and those with 10+ years of schooling respectively.

Various possible explanations have been put forward in an attempt to account for this dramatic demographic change in Kenya which has placed the country among the forerunners of Demographic Transition in Sub-Saharan Africa. One of the most commonly cited explanation is the increase in acceptability and use of modern contraceptives
owing to the successes registered by the National Family Planning Programme. The other widely cited reason is the general economic transformation which has not only raised the

standards of living thus exerting great pressure on parents but has on the opposite side greatly improved the health status of the society thereby enhancing the survival status of children. However such explanations normally fail to identify the main primary policy amenable forces behind these social economic transformations.

2.2 GENERAL EDUCATION-FERTILITY RELATIONSHIP

Studies in fertility conditions and change have consistently pointed that education is an important factor accounting for fertility change and regulation. The education fertility relationship is one of the most widely documented in demographic literature in the developed western world in which a negative relationship between education level and family size has been found to exist in most studies.

Women's education has proved more consistently important than any other social cultural factor as a determinant of fertility behaviour, Wain Berger et al (1989). Although female education is associated with many other socio-economic characteristics such as place of residence, social status, family income e.t.c, the effect of mothers education on fertility remains significant even after these other variables were controlled for, Cleveland & Rodrigues (1990). Bogue has also established that among nine indices of modernization, education and literacy has the highest impact on fertility, Bogue (1969).

The choices and opportunities available to women of diverse levels of education shapes them towards different patterns of marriage, family formation, working as well as living arrangements. In particular more educated women have alternatives for personal/individual

development other than those associated with reproduction and child care,(UN 1987) Caldwell while confirming this however stressed that the greatest influence of education on fertility is not direct, Caldwell (1980).

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

2.2.0 Female Education and Fertility

Although studies in fertility condition and change (behaviour) have consistently pointed education in general as the single most significant socio-economic factor affecting fertility change and regulation, female education in particular has been shown to be far more important in this regard than male education, Freedman et al (1989) in America established that family size varies with a woman's education attainment among other factors. He showed that wives with lower educational attainment expected to bear a larger number of children while wives with higher educational attainment expected to bear a lesser number of children.

The greatest difference is expected in women who had never gone beyond elementary school and those who had gone beyond high school, while the difference in fertility expectation of women with varying amounts of high school and college education was very small.

Chaul (1977), in a study of women's work and 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 to her level of education. The total number of children born to a woman who was either illiterate or with only primary education was 6.6 children on average, for women with middle grade education it was 5.5 children, 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.

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

Casterline (1980) studying fertility differentials in Pakistan using 1975 Pakistan Fertility Survey established 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) study in Ghana on the determinants of family size preferences found that women with no schooling wanted seven children on average compared to four children for women with eleven or more years of education.

UN (1987) research using WFS data found that women with seven or more years of education would bear 3.9 children on average compared to 6.9 children for women with no schooling. Henin (1979) found that women with primary education in Kenya have higher fertility that women with no education. However, beyond seven years of education, fertility tends to decline. This lead him to conclude that possibly secondary school education is a pre-requisite to fertility change. Lesthaeghe et al (1993) found that although female education had mutually led to substantial increase in marital fertility in Kenya but that the trend was being reversed, -in the individual and contextual effects of female education on the Kenyan marital fertility transition.

2.2.1 Female education and ethnicity

A review of the existing literature indicates that there is widespread relationship between female education attainment and ethnicity or race. Indeed for reasons ranging from pure historical accident, natural favouritism to deliberate political and social-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 women have had greater access to education than either the black people, the peoples of minority groups and those of mixed blood due to long exploitation during the error of slavery and racialism while in Israel the Jewish women have had greater access to education than the women of Arab origin. The aboriginal of Australia have had lesser access to education than their white counterparts while in South Africa the

white and Afrikaner women who experienced massive economic prosperity under the apartheid regime 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 and had taken over the leadership of the country under the Kabakas have had greater access to education than women from the other ethnic communities while here in Kenya the Kikuyu women have had greater access to education partly due to their early contact with Christian missionaries who established schools in Kikuyuland, partly due to the economic well-being of the society arising from agriculture and proximity to urban centres plus the fact of political advantage of having produced the first president of the country compared to women from most of the other ethnic communities.

2.2.2 Female education and Residence

The association between female education and the type of place of residence is well documented in the existing education -fertility literature wherein higher education is associated with Urban residence while lower level or absence of education is associated with Rural residence, UN (1993). Women with secondary and above level of education have been found to migrate from the Rural areas to Urban areas in search of formal employment but also end up finding marriage partners and becoming residents in the Urban areas.

Apart from these educated migrant women those women born and brought up in the Urban areas are generally more educated since they have greater access to education as a result of high income family background and better educational infrastructures found in the Urban areas,

Connel & others (1976), Goldstein (1973), UN (1992). The women with no education remains predominantly rural as they seek employment in the agricultural sector either as casual workers or where they get married as farm wives and housewives. Also women with lower education are more likely to remain in the Rural areas where they seek employment either as primary school teachers or as junior clerical officials in the agro-based and other rural industries, Lipton (1980), Hugo (1981a), UN (1993).

Besides those women born and brought up in the Rural areas are less likely to have access to education due factors associated with rural poverty such as low income family background and poor educational infrastructure existing in the Rural areas.

2.2.3 Female education and income

Education both for men and women is the single most important proxy for economic empowerment and the well documented positive relationship between female education and their income is justified (Sautu 1991). Women with high education have access to formal employment and consequently higher incomes and are likely to be earning as much as ten times or more than women with little or no education who usually end up in agricultural and other low paying jobs (Castells & Portes, 1990).

A study carried out on the female education-income relationship found it to be U-shaped but generally acknowledged that women with higher education also had higher incomes, (Standing, 1978). In a study carried out in Mexico by the World bank 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, (UN,1993).

2.2.4 Female Education and Marriage

Although in principle a woman could bear children throughout her reproductive life this is rarely the case as her overall exposure to child bearing is limited to the total duration of that period during which she is actually cohabiting that is she is in a regular sexual union. This duration is dependent on age at first marriage, proportion of married women as well as the frequency of widowhood, separation and divorce.

Female education affects the probability of a woman marrying at each age and therefore the age at marriage as well as the overall probability of her marrying. Female education has been found to be positively related to age at marriage and the incident of never marrying for women. Delayed age at marriage gives women an opportunity to develop careers or personal interests which compete with childbearing role once the woman finally gets married. This enhances the chances that the woman will use contraceptives for purposes of family planning. Besides, delayed marriage will reduce the period of a woman's exposure to the risk of pregnancy by shortening her reproductive lifespan which is confined between menarche and menopause.

Dixon (1974), in a study of women aged 40-44 years found that in Eastern Europe, Middle East and Asia the higher the level of female education the higher the proportion of women who were never married. She also established that the age at marriage monotonically rose with increasing level of education.

Chojnocka (1971) in a study in Russia had established that female literacy was negatively correlated with the proportion of women married.

Several studies carried out in the developing countries have also confirmed that generally female education increases the proportion of never marrying women and also that the age at marriage rose with the level of a woman's education. Speare et al (1973) in a study in Taiwan found that all 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 women's level of education decreased the proportion of women married at all ages while age at marriage for those marrying rose with their educational attainment.

Several studies have also confirmed a positive relationship between female education and age at marriage (Koguts, 1974) in Brazil; (Knowles and Anker, 1975) in Kenya; and (Ifamon, 1970) in the Philippines.

Mott (1976) in Western Nigeria established that only 70% of women aged 15-19 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 age bracket.

UN (1986) established that the average percentage of women who never married increased with level of education attainment i.e. 3% for women with no education and 8% for women with seven or more years of schooling. Henti et al showed the greatest differential of 10 points

between those with no education (3%) and those with seven or more years of education or more (13%).

Age at marriage was also shown to increase with rising levels of education attainment. The cingulate age at marriage (SMAM) for women with seven or more years of education was found to be almost four years higher or average than for women with no education. In some cases however e.g. Costa Rica, the marriage age for women with no education was slightly higher than that of women with only a few years 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 different age groups (over all) between women with no education and those with seven or more years of education showed a difference of 3.8 years for women aged 40-49, 3.9 years for women aged 30-39 and 4.8 years for women aged 20-29 which shows a modest widening of the educational differential in marriage age over time.

2.2.5 Female education and age at first birth

Age at first marriage like age at first birth is highly correlated to female education in that higher levels of female education are associated with low fertility UN (1993). According to a study carried out in Mexico in 1993 by the world bank it was 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.

Since age at first birth is closely associated with age at first marriage as marriage is in many societies regarded the legitimate means of exposing a woman to a regular sexual union and hence signals the beginning of child bearing (Anker & Knowles 1975). Marriage is immediately followed by child bearing as in most cases there is no time lost between marriage and the first birth. And since female education has been found to be positively related to age at first marriage it is by this implication positively related to age at first birth. Women with higher education marry at later ages and are more likely to use contraceptives which automatically raises their age at first birth while women with little or no education marry at relatively younger ages, are less likely to use contraceptives and therefore have their first birth while they are relatively young, (Sarah R Millman and Gerry E Hendershot, 1990) in Family Planing perspective Vol. 12 No. 3 May/June 1990.

Also women who have their first births in their young ages are forced to drop out of school and are thereafter unable to continue with further education .This further explains the negative relationship between female education and age at first birth.

2.2.6 Female education and contraception

Few scholars would take issue with the fact that female education affects contraception and a woman's level of education has universally been found to be positively related to contraceptive knowledge, access and use. Furthermore, educated women may be more likely to use contraceptives because information about the availability, correct use, side effects, costs, e.t.c,

is usually less difficult and less costly for educated women to assimilate and may make them more effective and satisfied users (World Bank 1995).

The World Bank (1995). In a study conducted in 15 Sub-Saharan countries by the World bank in 1995 ,it was found that an increase in female education is associated with an increase in contraceptive use and that female education has an even stronger relationship with a woman's use of contraceptives. The marginal impact of women's schooling on contraceptive use increases with amount of schooling without any relation to level of income per capita.

Mazur (1931) in a study in Poland found that contraceptive increased with a woman's level of education. He established a higher contraceptive use among married women with 75% of women with secondary school and above using compared to 56% of intermediary level women and only 42% of women with elementary level of education used. In a similar study in Indonesia it was found that a women's education is positively related to the use of contraceptives. Thirty eight (38%) women with academic/university level of education were users compared to 36% of women with senior education and 31% 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 behaviour than any other factor. The effect of a woman's education on contraception was found to be quasi-linear and that the likelihood of using contraceptive rises monotonically with increased education.

Amin Ruhul et al (1993) In his study he found that although both primary and above primary level of education lead to increased contraceptive use, this pattern is much higher among post primary school educational level women than among primary school level women.

Abdulal et al (1984) in a comparative study of contraceptive use in the Common-Wealth Caribbean countries he found a positive relationship between a woman's level of education and contraceptive use. Similarly, Imaer-wahr (1981), in a study in Sri Lanka established a definite and generally monotonous relationship between the years of wife's education and the use of contraceptives among women aged 15-50 who were exposed to the risk of contraception. However, Safulios and Mburungu (1986) found that a woman's level of educational attainment was not an important determinant of whether or she was currently using contraceptives. Rather the important issue was whether or not a woman was literate as none of the illiterate women was found to be using modern contraceptives.

2.2.7 Female education and fertility preferences

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

Family size norms play a crucial role in shaping fertility behaviour (Lightborne, 1985b; Westoff, 1990) and other previous studies have shown that desire for children declines with rising levels

of female education e.g. studies done in India, Pareak and Kothandapani (1969) showed an inverse relationship between female education and ideal family size.

Evidence from a number of studies, Khalifa, (1973) in Egypt; Chung, (1972) 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. Olusanya (1971) in Western Nigeria showed that the proportion of women who felt that fertility was up to God decreased from over 90% for women with no education to below 10% for women with above primary school level of education.

UN (1995) In this study it was established that although the relationship between education and fertility preferences 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 get. In most countries desired family size was found to decline monotonically with increasing education although the scope of decrease varies from country to country. It is however most pronounced in Sub-Saharan Africa where the difference is an average 2 children, moderate in West Africa (below chibly and Quite Models) in Latin America. Generally the studies observed that better educated women want smaller families than poorly educated women.

2.2.9 Summary of Literature Review

From the literature reviewed it's evident that there exists sufficient evidence to suggest that greater exposure to schooling for girls and women does in the long run result in declining

fertility. However, it is also evident that female education does not affect fertility directly but indirectly through other independent or background variables and proximate determinants.

This indicates that mass female education by itself is unlikely to have any significant effect on fertility unless it is targeted specifically towards altering some specific background and proximate determinants of fertility.

The literature review shows that the relationship between female education and fertility is not always inverse but that under some conditions it is either positive on neutral. Thus, it is observed that theoretical as well as practical gap exists between the positive and negative extremes of the female education-fertility relationship.

This study is an attempt to close the gap by trying to identify the circumstances under which purely negative or positive relationship at certain levels of education do exist by focusing upon those background and proximate determinants of fertility through which female education/fertility relationship operates.

In other words, this study attempts to establish the circumstances under which female education can and does produce an inverse relationship, a positive relationship or does not affect fertility at a micro-level and the mechanisms/variables through which each of these relationships is likely to occur.

It is evident from the literature review that:

a) Age at marriage influences fertility by determining the number of women who marry and the length of exposure to pregnancy to mothers within stable marital union.

b) Contraception delays and or postpones the incidence of getting pregnant thus determining fertility.

c) The level of education influences a womans' ideal family size which in turn influences the above discussed proximate determinants of fertility.

d) The potential of female education as a policy instrument to influence family size is great, but our ignorance of the mechanisms through which female education affects fertility is also great and the need for further research to bridge this gap is nowhere higher than here and now for although there is great controversy as to the causes, nature and levels of the education- fertility relationship there is absolutely no doubt from existing literature that education indeed has an important bearing on fertility.

2.3 STUDY FRAMEWORK

THEORETICAL FRAMEWORK

A theory is a set of hypothetical empirical generalisations or hypotheses that are deductively connected. Theories are important because of their essential role as part of the scientific process and also because they not only provide a framework for explaining the phenomena but also one within which policies and programmes are formulated.

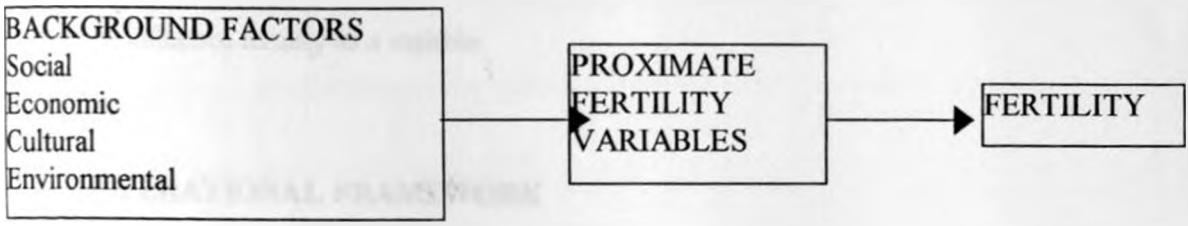
Although there is a general consensus among theorists that a theory should be logical in terms of the relationships that exists among its' component statements, there is great variation among theories in the degree of detail and tightness with which the hypotheses making up the theory are related to each other. Therefore in practice if not in principle there are great variations in the degree of rigour of their formulation. Yet all are agreed that the theorems derived from any theory should be testable i.e. should be able to show that they are consistent with the data under study.

Various theories of fertility have been formulated to investigate fertility differentials and change by theorists from various disciplines. These includes Medical/Biological, Mathematical, Sociological, Psychological and Economic Theories among others. Although the Economic Theories have dominated fertility studies for the better part of the 1960's and the 1970's, other theoretical models have gained prominence in this area in the 1980's and the 1990's.

The Conceptual Framework used in this analysis is the Traditional Fertility Framework (Davis and Blake 1956; Bongaarts 1982). This model is based on the theoretical proposition that any change in background characteristics such as Social, Economic, Cultural, Demographic and Environmental variables is bound to cause corresponding changes in a set of intermediate or proximate determinants of fertility thereby causing a change in fertility performance.

The intermediate or proximate determinants of fertility directly affect fertility. These are intermediate to the extent that they are the variables through which any societal determinant necessarily exerts its' effect if it is to influence fertility.

Figure 2.3.0
Bongaarts' 1982 Fertility Analysis Model

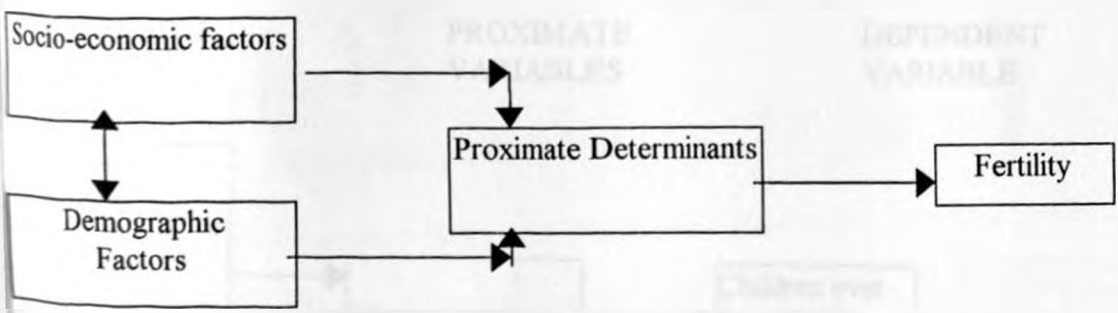


Source: Bongaarts' Model for Fertility Analysis

2.3.1 CONCEPTUAL MODEL

The Conceptual Model is a modification of Bongaarts'(1982) Model for Fertility Analysis. In this model, female education is conceptualised to operate independently or jointly with other independent socio-economic and demographic factors through various intermediate or proximate determinants to influence fertility.

Figure 2.3.1
Modified Bongaarts' 1982 Fertility Analysis Model



Source: Modification of Bongaarts' 1982 Fertility Analysis Model

2.3.2 CONCEPTUAL HYPOTHESES. -

Background factors operate individually or jointly through various proximate determinants of fertility to influence fertility as a variable.

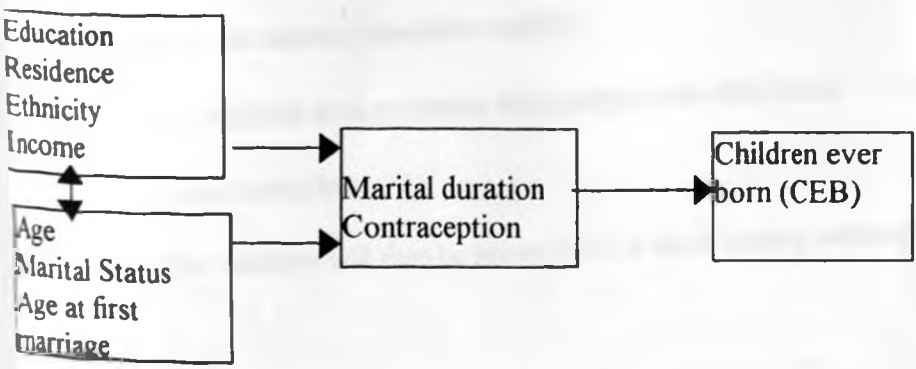
2.3.3 OPERATIONAL FRAMEWORK

The Conceptual Model was operationalised to enable investigation as to whether the identified independent variables individually or jointly affects various proximate determinants to influence fertility. In the Operational Model, the variables of the study were identified and the presumed relationships or hypotheses to be tested formulated.

2.3.3.1 Operational Model

The Operational Model is the diagrammatic presentation of the operationalization of the above described operational hypotheses.

Figure 2.3.2
Operational Model for Study



Source: A Modification of Bongaarts' Fertility Analysis Model

2.3.4 OPERATIONAL HYPOTHESES

a) Education has a negative effect on children ever born (CEB).

b) Place and type of residence influences children ever born.

c) Income has a negative effect on to children ever born.

d) Ethnicity influences children ever born.

e) Age has a positive effect on children ever born.

f) Marital status has an influence on children ever born.

h) Age at first marriage has a negative effect on children ever born.

i) Age at first birth has a negative effect on children ever born.

j) Marriage duration has a positive effect on children ever born.

k) Contraception has a negative effect on children ever born.

2.4 CATEGORIZATION OF VARIABLES AND THEIR DEFINITION

2.4.1 categorization of variables

In this study a total of twelve variables will be used. These variables will then be categorised into three main groups as follows:

(i) education the main independent variable;

(ii) control variables which includes demographic and other social economic variables; and

(iii) proximate variables

Each of the variables will then be presented as a set of dummy as described below.

Table 2.8 Variable categories

VARIABLES	CATEGORIZATION
a) Education	None [reference category], Primary [coded as 1:0 otherwise], Secondary + [coded as 1:0 otherwise]
b) Ethnicity	Kikuyu [reference category], Kalenjin [coded as 1:0 otherwise], Luhyia [coded as 1:0 otherwise], Others [coded as 1:0 otherwise]
c) Income	Earns cash [reference category], Does not [coded as 1:0 otherwise]
d) Residence	Urban [reference category], Rural [coded as 1:0 otherwise]
e) Age	15-24 [reference category], 25-34 [coded as 1:0 otherwise], 35+ [coded as 1:0 otherwise]
f) Age at first marriage	<15 [reference category], 15-19 [coded as 1:0 otherwise], 20+ [coded as 1:0 otherwise]
g) Marital status	Single [reference category], Married [coded as 1:0 otherwise], Others [coded as 1:0 otherwise]
h) Age at first birth	<15 [reference category], 15-19 [coded as 1:0 otherwise], 20+ [coded as 1:0 otherwise]
a) Marriage duration	Never married [reference category], 0-4[coded:10otherwise], 5-9 [coded as 1:0 otherwise],10-19 [coded as 1:0 otherwise], 20+[coded as 1:0 otherwise]
b) Contraception	Never used [reference category], Traditional/folkloric [coded as 1:0 otherwise] Modern Methods [coded as 1:0 otherwise]
Children ever born	0-2 [reference category], 3-5 [coded as 1:0 otherwise], 6+ [coded as 1:0 otherwise]

NB: Although the dependent variable CEB is categorised as three dummies i.e. (0 – 2), (3 – 5), (6 plus), for the purpose of multiple regression, it is defined as a continous variable that is the total number of children ever born.

CHAPTER THREE

DATA AND METHODOLOGY

This chapter describes the data used and methodologies employed for analysis in this study. This study utilised secondary data hence the methodology of data collection described here are those used by the bodies/organizations that conducted the Kenya Demographic and Health Survey (KDHS) of 1993 namely the National Council for Population and Development (NCPD) and the Central Bureau of Statistics (CBS).

The description of analysis methodology focuses on the statistical models for the analysis and the related statistical parameters as well as for testing hypotheses regarding the relationships. The description of the statistical tools for the analysis of data focuses also on examining the strengths and weakness of these tools.

3.1 SOURCE OF DATA

The study utilised data drawn from the Kenya Demographic and Health Survey KDHS, 1993. The KDHS was a nationally representative survey designed to provide information on levels and trends of fertility; infant and child mortality; family Planning knowledge and use; maternal and child Health and Knowledge of AIDS.

The survey was conducted by the National Council for Population and Development (NCPD) and the Central Bureau of Statistics (CBS) with the financial and technical assistance of Macro International Inc. through the International Demographic and Health Surveys (IDS) contract with the US Agency for International Development.

3.1.1 Sampling and Sample Design

The sample for 1993 KDHS was national in scope despite the fact that it excluded North Eastern Province and four other Northern (remote) districts in Eastern and Rift Valley provinces -Isiolo, Marsabit, Samburu and Turkana. These excluded areas accounted for less than 4% of Kenyan population. The sampling method used was a two stage stratified sampling. The master sample consisted of 1373 sample points (Clusters), 536 sample points (Clusters) were covered.

3.1.2 Questionnaire Design

To collect information relating to fertility a woman's questionnaire was used. A total number of 709 questions and filter questions were included in the woman's questionnaire. These questionnaires were pre-coded before implementation. A total number was 7540 women were interviewed.

3.1.3 Sample Implementation

The fieldwork was carried out by 12 interviewing teams each consisting of one supervisor, one field editor, 4-7 female interviewers, one male interviewer and four drivers. The woman's questionnaire took an average of 42 minutes for each eligible women in the 536 sampled clusters of which 520 clusters were successfully covered while 16 others were inaccessible for various reasons.

3.2 QUALITY OF DATA

As with all other sampling estimates, the KDHS (1993) was affected by sampling and non sampling errors. To calculate sampling errors for the KDHS, the computer software ISSA Sampling Error module (ISSAS) was used. This module used the Taylor Linearlization method of variance estimated for survey estimates that are means or proportions. Sampling errors were calculated for selected variables considered to be of primary interest.

In general the relative standard error for most estimates at the national level was small. There were however, differentials in the relative standard error for the estimates of sub-populations e.g. for the variable (CEB) children ever born to women aged 15-49 the relative standard error was estimated at 1.3% for the whole country 4.3% for urban areas and 7.9% for Nairobi.

The 1993 KDHS data is among the new set of high quality data sets collected in the developing countries. It is recognised and recommended internationally by such world bodies like U.N.F.P.A. and the united nations world population council. The quality of the data is therefore unquestionable.

3.3 METHODS OF DATA ANALYSIS

The statistical package for social sciences (SPSS) computer software was used to analyze data in this study. In this respect a number of statistical analytical techniques were employed; these are Univariate analysis, Bivariate analysis and Multiple regression analysis as discussed below.

In the univariable and bivariable analysis, the dependent variable CEB is defined or used as dummy variable categorised into three dummies i.e.(0 – 2), (3 –5), (6 plus). In the multiple

progression however, the dependent variable CEB is defined or used as a continous variable i e. the total number of children ever born.

3.3.1 Frequency Distributions

Frequency distribution is a statistical tool for summarizing data by grouping it into class intervals. Class intervals are continuous, non overlapping intervals selected in such a way that they are mutually exclusive and exhaustive such that each value in the set of data can be placed in one and only one of the intervals. First the class interval is determined, then the data is examined and a count of the number of values into each class interval is determined. The results can be displayed either in tabular or graph form and is called a frequency distribution.

The distribution is therefore any device such as a graph or table that displays the values that a variable can assume along with the frequency occurrence of these values, either independently or as they are grouped into a set of mutually exclusive and exhaustive intervals. Such a distribution should not have too few or too many class intervals as this is likely to result in excessive loss of information or simply defeat the purpose of summarization respectively.

The number of class intervals can be determined using the Struges Formula (Surges 1926) i.e.:

If K represents the number of class interval and N represents the number of observations, then:-

$$K = 1+3.322(\log n)$$

However in actual cases the number of class interval used may be more or less than the number K obtained by the formula if this will make for greater convenience and clarity.

Also important when grouping data is the width of the intervals. As a general rule all intervals should be of the same width preferably of five units, ten units or some multiple of ten since these are more readily comprehended. However sometimes it may be impossible or undesirable to have class intervals of equal width and in such cases unequal class intervals are preferred to better communicate the true nature of the data.

3.3.2 Cross-tabulations and Chi-square

The cross-tabulation technique is used to assess the associational relationship between two variables, i.e. the dependent and the independent variable. In this study it was used to assess the association between the dependent variable and each of the independent and proximate variables.

The chi-square on the other hand is used to determine the statistical significance of the association by testing the hypothesis that a relationship does not exist between the two variables, i.e. the two variables are independent.

By definition and as a general rule, two variables are independent if the probability of a case falling into a given cell is simply a product of the marginal probabilities of the two categories defining a cell. The Chi-square is used to test whether or not frequencies which have been empirically obtained differ significantly from those which could be expected under the assumption of independence.

The chi-square is given by the following formula:

$$\text{Chi-square } X^2 = \sum \frac{(O-E)^2}{E}$$

Where:

O is the observed frequency

E is the expected frequency

The Chi-square is a statistic which is more often used to test if the row and column variables are independent is obtained by summing over all the cells of the squared residuals by expected frequencies.

The chi-square is obtained by first taking the sum of the difference between the observed and the expected frequencies in each cell. This sum is then divided by the expected number of cases in each cell to standardise it so that the biggest contribution do not always come from the largest cells. The sum of these none negative quantities for all cells is the value of chi-square.

The expected value for each cell is got by the following formula:

$$\text{Expected Value} = \frac{(\text{No. of rows})(\text{No. of columns})}{\text{Total number}}$$

The value of the chi-square depends on the number of rows and columns in the table being examined and therefore the degrees of freedom for the table should be known. The degrees of freedom are defined as the number of cells of the table that can be arbitrarily filled when the row and the column tables are fixed. Thus for an row by column (R x C) table, the degrees of

freedom are (R-1) since (R-1) row and (C-1) column cells must be chosen so that the marginal totals are maintained.

Conditions for Pearson's chi-square

In order for chi-square to be applied the following conditions must be met:-

(a) Experimental data be independent of each other.

(b) Sample data be drawn from the target population.

(c) Data be expressed in original units.

(d) Sample contain at least 50 observations.

(e) There be no less than five observations in any case of the cells.

To produce an estimate of how likely the calculated value is if the two variables are actually independent, the calculated value chi-square is compared to the critical points of the theoretical chi-square distribution.

Interpretation of chi-square

The chi-square is used to test the Null Hypothesis that there exists no relationship between the dependent and the independent variables.

The chi-square test was set at:

($a = 0.05$) level of significance for all cross-tabulations in this study. If the calculate C^2 is smaller than 0.05 level of significance, then the alternative hypothesis was accepted as true.

In this study C^2 was used to assess the association between the dependent and the independent variables. The closer the calculated significance level value is to zero the stronger the relationship between the variables.

3.3.3 Linear Regression Analysis.

Linear regression analysis is useful when making inferences on how changes in one or more independent variables are related to changes in the dependent variable. It therefore deals with the description of the nature or direction of the relationship between the variables .

When the relationship being investigated is between two variables, then the analysis is simple linear regression. If the relationship being investigated is between more than two variables, then the analysis is multiple linear regression.

Closely associated with multiple regression is partial correlation analysis. This provides a single measure for the association between the dependent variable and one specified independent variable while controlling for all other independent variables.

3.3.3.1 Simple Linear Regression analysis

Literally the word regression means stepping back or returning to the average value. In modern statistical usage however, the term has a much wider meaning. Regression Analysis in the general sense means the estimation or prediction of the unknown value of one variable from the known value of another variable. It's a very important statistical tool used to study the relationship between two or more variables that are related casually.

It is a mathematical measure of the average relationship between two or more variables in terms of the original units of the data.

The regression analysis confined to the study of the relationship between only two variables at a time is termed as simple regression analysis while multiple regression analysis studies the relationship between more than two variables at a time.

3.3.3.1.0 Regression Equation

The mathematical equation of the regression curve or the regression equation enables us to study the average change in the value of the dependent variable that is the variable whose value is influenced or is to be predicted for any given value of the independent variable that is the variable whose value influences or is used to predict the value of the dependent variable.

3.3.3.1.1 Linearity in Regression Analysis

In regression analysis, regression between any two variables is said to be linear if corresponding to a unit change in one variable, there is a constant change in the other variable over the entire range of values.

The simple linear regression equation is given as follows:

$$y = a + bx + e$$

Where:

y = The dependent variable

a = The intercept (constant) of x and y

b = The gradient (constant) it represents the increment in the value of the dependent variable y for a unit change in the value of the independent variable x

e = The error component in the model.

3.3.3.1.2 Assumptions underlying simple linear regression

a) The values of the independent variable x may be either mixed i.e. selected in advance so that during data collection x values are controlled or they may be random such that x values may be obtained without imposing any restrictions.

b) The variable x is measured without error that is the magnitude of the measurement of error is practically negligible.

c) For each value of x there is a sub-population of y values.

d) These sub-populations must be normally distributed for most of the inferential procedures of estimation and hypothesis testing to be valid.

e) The variances of the sub-populations of y are all equal.

f) The means of the sub-populations of y lie on the same straight line that is the assumption of linearity.

g) That the y values are statistically independent such that in drawing the sample, the value of y chosen at one value of x is in no way dependent on the value of y chosen at another value of x.

h) The error (e) is normally and independently distributed with mean O and variance O^{-2}.

3.3.3.1.3 Obtaining the coefficients of the regression equation

The objective of regression analysis is to estimate the regression coefficients a and b in order to make inferences regarding the best line of regression of y on x. The values of these coefficients are usually estimated using the least squares method which can be done through the use of computer print out which not only provides adjusted b values but also test for significance of the values using the t-test via an inbuilt mechanism.

3.3.3.1.4 Use of least squares method

It is a more objective method of drawing the regression line and determines the best fitting straight line based on the principles of least squares. It consists in minimising the sum of the squares of the residuals or the errors of estimate that is the deviations between the given observed values of the variable and their corresponding estimated values as given by the line of the best fit.

The smaller the sum of squares of deviations between observed data set and the fitted line, the better the fit of the regression line. The line drawn using the least squares method is best in the sense that sum of squared deviations of the observed data points from the least squares line is smaller than the sum of squared deviations of the data points from any other line that can be drawn through the data.

The least square method of estimating the regression coefficients make use of the following formulas:

$$\hat{a} = \overline{Y}(\hat{b}\overline{x})$$

$$\hat{b} = \frac{\Sigma(X - \overline{X})(Y - \overline{Y})}{\Sigma(X - \overline{X})^2}$$

The least square line is therefore defined as the choice coefficients for which the sum of squares of deviation is minimum.

3.3.3.1.5 The Regression Coefficient Method

The regression coefficient (simple r) for simple linear regression is a numerical measure of linear relationship between X and Y and is defined as the ratio of the covariance between X and Y to the product of the standard deviation of X and Y, given by:

$$R = \frac{\Sigma(XY)}{\sigma X \sigma Y}$$

R is calculated by the formula:

$$R = \frac{\Sigma(X - \bar{X})(Y - \bar{Y})}{\sqrt{\Sigma(X - \bar{X})^2 \Sigma(Y - \bar{Y})^2}}$$

3.3.3.1.6 Interpretation and properties of regression coefficient

The regression coefficient cannot numerically exceed 1 hence it lies between -1 and +1.

When r = 1; it implies a perfect positive relationship between the two variables such that the values of the two variables deviate in the same direction i.e. an increase in the value of one variable results on average to an increase in the value of the other variable and a decrease in the value of one variable results on average to a decrease in the value of the other variable.

When r = -1; it implies a perfect negative relationship between the two variables such that the values of the two variables deviate on the opposite direction i.e. an increase in the value of one variable results on average to a decrease in the values of the other variable and a decrease in the value of one variable results on average to an increase in the value of the other variable.

If r = 0; it implies that the variables are unrelated i.e. no linear (straight line) relationship between the variables. This however does not mean that the variables are independent. For other values of R lying between +1 and -1 the general interpretation however is that the closer the value of R to 1 the stronger the relationship and the closer R is to 0 the weaker the relationship either negative or positive.

The regression coefficient is independent of the change of origin and scale. This means that in computing r we can conveniently change the origin and scale (where possible) in X and/or Y to get new values that is U and V and compute the correlation between U and V for example where X(bar) and Y(bar) are in fractions or if X and Y are too large.

3.3.3.1.7 Evaluating the regression line

After determining the regression equation it has to be evaluated to determine whether or not it adequately describes the relationship between the two variables and see whether or not it can be effectively used for prediction and estimation purposes.

The regression line can be determined using the coefficient of determination R^2. Since coefficient of regression between variables is a measure of linear relationship between them and indicates the amount and variation of one variable which is associated with or accounted for by comprehensible measure for this purpose is the coefficient of determination which gives the percentage variation in the dependent variable that is accounted for by the independent variable. Hence it gives the ratio of the explained variance to the total variance i.e. R^2 (The square of the regression coefficient).

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

Coefficient of determination (R^2) is a much useful and better measure for interpreting the value of R. Since the coefficient of correlation has been grossly overrated and is over-used. Its' square (the coefficient of determination) is a much more useful measure of linear co-variation of two variables e.g. for a given value of R = 0.8, we cannot conclude that the variation in

dependent variable is 80% but instead the coefficient of determination R = 0.64 meaning that only 64% of variation in the dependent variable has been explained by variation in the independent variable while the remaining 36% of the variation is due to other factors.

3.3.3.1.8 Testing for the goodness of the fit of a linear regression model

If there is no relationship between the dependent variable and the independent variables in a multiple linear regression model this would imply that the value of b is zero (b=0). This would be taken as the Null Hypothesis and therefore we conduct the T-test for simple linear regression to test the Null hypothesis (H_O).

If the computed value of T is equal to or exceeds the critical value of T provided in the T test tables at a specified level of significance (0.05) and at the appropriate number of degrees of freedom, then we reject the Null Hypothesis (H_O) that Y is not related to X and accept the Alternative Hypothesis (H_A) that Y is related to X.

3.3.3.2 MULTIPLE REGRESSION ANALYSIS

Multiple regression analysis is applicable in situations whereby the expected value of the dependent variable y depends upon two or more values of the independent variables X_1, X_2 .....X_k. It is a useful tool for statistically estimating a functional relationship between two or more independent variables and the dependent variable. Multiple regression in a linear model may be quantitative in nature that is the independent variables assume only values of 1 or 0 and represent a classification and they are called dummy variables. If all independent variables are

categorical then the linear model is an analysis of variance model and if only part of the independent variables are categorical, the model is an analysis of a covariance model.

The multiple linear regression equation for studying such a relationship is as follows:

$$Y = a + b_1X_1 + b_2X_2 + \ldots\ldots + b_kX_k + e$$

where,

y is the dependent variables

a is the intercept constant

b_i's are the partial regression coefficients (scope)

x_i's are the independent variables

e is the error component/term in the model.

Multiple regression analysis is an extension of the simple regression analysis based on the fact that if one can predict the value of a variable on the basis of knowledge of one associated variable, one might be able to make an even better prediction of the value of a variable given knowledge of several associated variables.

3.3.3.2.0 Assumptions underlying multiple linear regression

The assumptions underlying the multiple regression as well as the evaluation of the regression equation are the same as those in simple linear regression apart from the fact that in multiple regression we use multiple R instead of simple R.

3.3.3.2.1 Obtaining the coefficients of the regression equation

The objective of regression analysis is to estimate the regression coefficients a and b_i's in order to make inferences regarding the best line of regression of y on x_i's. The derivation of the partial regression coefficients of the multiple regression equation is the same as that employed in simple regression and the values of these coefficients are usually estimated using the least squares method which can be done through the use of computer print out which not only provides adjusted b_i values but also test for significance of b_i values using the F-test via an inbuilt mechanism.

The derivation of the partial regression coefficients of the multiple regression equation is the same as that employed in simple regression.

3.3.3.2.2 Evaluating the regression line

The regression line like in simple regression can be determined using the coefficient of determination R^2. Since coefficient of regression between variables is a measure of linear relationship between them and indicates the amount and variation of one variable which is associated with or accounted for by comprehensible measure for this purpose is the coefficient of determination which gives the percentage variation in the dependent variable that is accounted for by the independent variable. Hence it gives the ratio of the explained variance to the total variance i.e. R^2 (The square of the regression coefficient).

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

Coefficient of determination (R^2) is a much useful and better measure for interpreting the value of R. Since the coefficient of correlation has been grossly overrated and is over-used. Its' square (the coefficient of determination) is a much more useful measure of linear co-variation of more than two variables e.g. for a given value of R = 0.8; we cannot conclude that the variation in dependent variable is 80% but instead the coefficient of determination R = 0.64 meaning that only 64% of variation in the dependent variable has been explained by variation in the independent variables while the remaining 36% of the variation is due to other factors.

3.3.3.2.3 Testing for the goodness of the fit of a linear regression model

If there is no relationship between the dependent variable and the independent variables in a multiple linear regression model this would imply that the value of b_i's is zero (b_i=0). This would be taken as the Null Hypothesis and therefore we conduct the T-test for simple linear regression and F-test for multiple regression to test the Null hypothesis (H_O).

If the computed value of F is equal to or exceeds the critical value of F provided in the F test tables at a specified level of significance (0.05) and at the appropriate number of degrees of freedom, then we reject the Null Hypothesis (H_O) that Y is not related to X_i's and accept the Alternative Hypothesis (H_A) that Y is related to X_i's.

CHAPTER FOUR

FEMALE EDUCATION AND FERTILITY

This chapter presents the analysis results and then their interpretation. Interpretation of the relationships between various independent variables, proximate variables and the dependent variable are computed using various methods explained in chapter three above and appropriate deductions or interpretations made to explain these relationships.

4.1 DISTRIBUTION OF VARIABLES

The frequency distributions of the respondents' characteristics by various variables as shown in table 4.1 are described below.

Table 4.1
Distribution of women by various characteristics

Variables	percentage	Number
Level of education		
No Education	17.2	1297
Primary	59	4449
Secondary +	23.8	1794
Ethnicity		
Kikuyu	20	1506
Luhya	15.3	1152
Kalenjin	14.6	1096
Others	49.9	3769
Income (Earns cash for work)		
No	19.8	735
Yes	80.2	2983
place of residence		
Urban	15.9	1266
Rural	84.1	6686

Age		
15-24	45	3393
25-34	30.6	2311
35+	24.4	1836
Age at first marriage		
Less than years	12.4	647
15-19 years	57.3	2993
More than 20 years	0.3	1580
Age at first birth		
Less than 15 years	7.4	399
15-19 years	60.4	3268
More than 20 years	32.3	1748
Marital status		
Single	30.8	2320
Married	60.8	4583
Others	8.4	637
Duration of marriage		
Never married	30.8	2320
0-4 years	15.7	1185
5-9 years	13.3	100
10-19 years	22.9	1724
More than 20 years	17.4	1310
Contraceptive use		
Never used	55.2	4163
Folkloric/traditional	11	827
Modern methods	33.8	2550
Children ever born		
0-2 children	51.6	3891
3-5 children	25.5	1924
More than 6 children	22.9	1725

Level of education

As shown in the table slightly over 17.2% of the women had no education, 59% had primary education while 23.8% had secondary and above education. Hence it's reflective that majority (over half) of the respondents had some form of primary school education, slightly less than a quarter had secondary education, while a substantial minority had no formal education.

Place of residence

Nearly 16% of women lived in urban areas while those living in rural areas constituted 84.1% as indicated by the table. Accordingly majority of the respondents lived in rural areas while only a minority of respondents lived in urban areas, this reflects that most of women in Kenya live in the rural areas.

Ethnicity

The results in the above table show that 20% of the women were Kikuyu, 15.3% were Luhya, 14.6% were Kalenjin constituted while 49.9% were from other ethnic communities. Hence majority of the respondents (about 50%) were drawn from a combination of most of the ethnic minorities across the country. The Kikuyus constituted the largest but the largest single ethnic group followed by the Luhya and then the Kalenjin ethnic groups. This means that almost all as well as the major ethnic communities were well covered in the survey.

Income (Earns cash for work)

Examining the table above we note that those women earning cash for work constituted 80.2% while 19.8% did not earn any cash for work. Accordingly majority of respondents earned cash (income) for their work while only a small number did not. This implies that majority of Kenyan women earn cash for their work and so have some income.

Age

The table shows that 45% of the women were aged 15-24 years while 30.6% were aged 25-34 years and 24.4% were aged 35 and above. It is evident that majority of the respondents were

aged between fifteen and twenty four years, followed by the twenty five to thirty four years with the thirty five and above ages constituting the minority thereby indicating that most women of reproductive age in Kenya are aged between fifteen and thirty four years.

Marital status

Examining the results in the above table it is noted that 60.8% of the women were married at the time of the survey, 30.8% had never married at the time of the survey while 8.4% were either divorced, windowed or separated at the time of the survey. This indicates generally high levels of marriage for Kenyan women.

Age at first marriage

Those women who married for the first time aged below 15 years constituted 12.4% of the sample, those marrying at between ages 15-19 years were 57.3%, while those marrying at ages above 20 constituted 30.3%. This indicates that majority of respondents (50%) married in their 15-19 age bracket, while those marrying at ages under 15 years marriages were the minority.

Age at first birth

Majority of the women 60.4% had their first birth at the ages of 15-19 years, 32.3% had their first birth at the ages above 20, while only 7.4% had their first births at the ages of less than 15 years. This is reflective that age at first birth among the Kenyan women is considerably low.

Duration of marriage

Twenty two percent of the women had been married for 10-19 years, 17.4% for over 20 years and 15.7% for less than five years with 13.3% having been married for 5-9 years. This shows a relatively long mean duration of marriage among Kenyan women.

Contraceptive use

According to the table above 55.2% of the women had never used any contraception method, 11% had used folkloric or traditional methods, while 33.8% had used modern methods. Hence it is observed that majority of the respondents (over half) had never used any form of contraceptives, quite a substantial number had used some form of modern contraceptive while a minority had used a folkloric or traditional method indicating that contraceptive use in Kenya is high.

Children ever born

The table shows that about half of the women that is 51.6% had between 0-2 children, 25.2% had between 3-5 children, while 22.9% had more than 6 children. This indicates that majority of the women had at least one birth by the time of the survey.

4.2 ASSCIATION BETWEEN CHILDREN EVER BORN AND INDEPENDENT VARIABLES

4.2.1 Association between children ever born (CEB) by the rest of independent and proximate variables

Table 4.2.1.0

Children ever born by Education

Children Ever Born (CEB)	Level of education				
	None	Primary	Secondary & above		Total
0-2 children	264 (20.4)	2412 (54.2)	1215 (67.7)		3891 (51.6)
3-5 children	328 (25.3)	1147 (25.8)	449 (25.0)		1924 (25.5)
More than 6 children	705 (54.4)	890 (20.0)	130 (7.2)		1725 (22.3)
Total	1297 (100)	4449 (100)	1794 (100)		7540(100)

Chi-square 296.927 DF 4 Sig 0.00 a 0.05

Table 4.2.1.0 indicates that most of the women who had no education 54.4% had six or more children compared to 20% of those with primary education and only 7.2% of those with secondary and above education. On the other hand 67.7% of women with secondary and above education had 0-2 children compared to 54.2% of those with primary education and 20.4% of those with no education which is an indication of an association between education level and children ever born.

The chi-square test value of 296.927 was significant at a level of 0.0000 indicating a very strong association between the two variables.

Table 4.2.1.1

Children ever born by place of residence

Children Ever Born (CEB)	Residence		
	Urban	**Rural**	**Total**
0-2 children	792 (68.2)	3099 (48.6)	3891 (51.6)
3-5 children	262 (22.6)	1662 (26.1)	1924 (25.5)
More than 6 children	107 (9.2)	1618 (25.4)	1725 (22.9)
Total	1161 (100)	6379 (100)	7540 (100)

Chi-square 265.613 DF 2 Sig 0.00 a 0.05

Table 4.2.1.1 shows that more women residing in the rural areas that is 25.4%had six or more children compared to only 9.2%of those residing in the Urban areas. On the other hand more women residing in the urban areas 68.2% had 0-2 children compared to 48.6% of those residing in the rural areas. This is an indication of a strong association between place of residence and children ever born.

The chi-square test value of 265.613 was significant at a level of 0.0000 which indicates a very strong association between the two variables.

Table 4.2.1.2
Children ever born by Ethnicity

Children Ever Born (CEB)	Ethnicity				
	Kalenjin	Kikuyu	Luhya	Others	Total
0-2 Children	531 (48.4)	840 (55.8)	582 (50.5)	1929 (51.2)	3882 (51.6)
3-5 Children	257 (23.4)	404 (26.8)	292 (25.3)	967 (25.7)	1920 (25.5)
More than 6 Children	308 (28.1)	262 (17.4)	278 (24.1)	873 (23.2)	1721 (22.9)
Total	1096 (100)	1506 (100)	1152 (100)	3769 (100)	7523 (100)

Chi-square 250.727 DF 6 Sig 0.00 a 0.05

Table 4.2.1.2 indicates that more Kalenjin women 28.1% had six children compared to Kikuyus 17.4% Luhya 24.1% and Others 23%. About sixty percent of Kikuyu women on the other hand had 0-2 children compared to Kalenjin 48.4%, Luhya 50.5% and Others 51.2%. This is an indication of an associational relationship between ethnicity children ever born. The chi-square value of 250.727 was significant at a level of 0.0000 which is an indication of a very strong association between the two variables.

Table 4.2.1
Children ever born by income

Children Ever Born (CEB)	Income		
	Earns cash	Does not	Total
0-2 children	1211 (40.6)	311 (42.3)	1522 (40.9%)
3-5 children	965 (32.3)	218 (29.7)	1183 (31.8%)
More than 6 children	807 (27.1)	206 (28.0)	1013 (27.2%)
Total	2983 (100)	735 (100)	3718 (100)

Chi-square 200.257 DF 2 Sig 0.37 a 0.05

Table 4.2.1.3 shows that more women who had no income that is they did not earn cash for work 28.1% had six or more children compared to 27.1% of those who earned income. Also more women who did not earn income 42.3% had 0-2 children compared to 40.6% of those who earned income. This may be a sign of a weak or absence of an associational relationship between income children ever born. The chi-square test value of 200.257 was not significant at 0.05 level thus indicating a very weak association between the two variables.

Table 4.2.1.4
Children ever born by Age of women

Children Ever Born	Current age of Respondent			
	15-24 years	**25-34 years**	**Above 35 years**	**Total**
0-2 children	3105 (91.5)	629 (27.2)	157 (8.6)	**3891 (51.6)**
3-5 children	297 (8.5)	1203 (52.1)	434 (23.6)	1924 (5.5)
More than 6 children	1 (0)	479 (20.7)	1245 (67.8)	1725 (22.9)
Total	3393 (100)	2311 (100)	1836 (100)	7540 (100)

Chi-square 420.04 DF 4 Sig 0.00 a 0.05

Table 4.2.1.4 indicates that more women aged 35 and above years 67.8% had six or more children compared to 20.7% of those aged 25-34 years and almost none (approximately 0%) of those aged 15-24 years. On the other hand more women aged 15-24 years 91.5% had 0-2 children compared to 27.2% of those aged 25-34 years and 8.6% of those aged 35 and above years. This as expected is an indication of an associational relationship between age and children ever born. The chi-square test value of 420.040 was a significant at a level of 0.0000 thus indicating a very strong association between the two variables.

Table 4.2.1.5

Children ever born by Marital status

Children Ever Born	Marital Status			
	Single	Married	Others	Total
0-2 children	2244 (96.7)	1420 (31.0)	227 (35.6)	3891 (51.6)
3-5 children	65 (2.8)	1658 (36.2)	201 (31.6)	1924 (25.5)
More than 6 children	11 (0.5)	1505 (32.8)	209 (32.8)	1725 (22.9)
Total	2320 (100)	4583 (100)	637 (100)	7540 (100)

Chi-square 145.733 DF 4 Sig 0.00 a 0.05

Table 4.2.1.5 reflects that as many married women as 'Others' that is the divorced widowed and the separated i.e. 32.8% of each of the two categories had six or more children compared to a mare 0.5% of those who were single. On the other hand more single women 96.7% had 0-2 children compared to 31% of the married had 35.6% of the Others which is a clear indication of an associational relationship between marital status and children ever born. The chi-square test value of 145.733 was significant at a level of 0.0000 which indicates a very strong association between the two variables.

Table 4.2.1.6

Children ever born by Age at first marriage

Children Ever Born	Age at first marriage			
	Under 15 years	15-19 years	20-24 years	Total
0-2 children	89 (13.8)	903 (30.2)	655 (41.5)	1647 (31.6)
3-5 children	335 (34.5)	1067 (35.6)	596 (36.0)	1859 (35.6)
More than 6 children	223 (51.8)	1023 (34.2)	356 (22.5)	1714 (32.8)
Total	647 (100)	2993 (100)	1580 (100)	5220 (100)

Chi-square 204.140 DF 4 Sig 0.00 a 0.05

Table 4.2.1.5 show that more women who entered into marriage aged less than 15 years 51.8% had six or more children compared to 34.2% of those who entered into marriage aged 15-19 years and 22.4% of those who entered into marriage aged 20 and above years. On the other hand more women who married aged 20 and above years 41.5% had 0-2 children compared to 30.2% of those who married aged 15-19 years and only 13.8% of those who married aged less than 15 years. This is an indication of an associational relationship between age at first marriage and children ever born. The chi-square test value of 204.140 is significant at a level of 0.0000 indicating a very strong association between the two variables.

Table 4.2.1.7
Children ever born by Age at first birth

Children Ever Born	Age at first birth			
	Under 15 years	15-19 years	More than 20 years	Total
0-2 children	66 (16.5)	998 (30.5)	702 (50.2)	1776 (32.6)
3-5 children	125 (31.3)	1153 (35.3)	646 (30.0)	1924 (35.5)
More than 6 children	208 (52.1)	1117 (34.2)	400 (19.9)	1725 (31.9)
Total	399 (100)	3268 (100)	1748 (100)	5414 (100)

Chi-square 127.105 DF 4 Sig 0.00 a 0.05

Table 4.2.1.7 indicates that more women who had their first birth aged less than 15 years 52.1% had six or more children compared to 34.2% of those who had their first birth aged 15-19 years and 19.9% of those who had their first birth age 20 or more years. On the other hand more women who had their first birth aged 20 or more years 50.2% had 0-2 children compared to 30.5% of those who had their first birth aged 15-19 years and only 16.5% of those who had their first birth aged less than 15 years. This is a sign of an association between age at first birth and children ever born. The chi-square test value of 127.105 is significant at a level of 0.0000 thus indicating a very strong association between the two variables.

Table 4.2.1.880

Children ever born by Duration of marriage

Children Ever Born	marital duration in years					
	Never married	0-4 years	5-9 years	10-19 years	More than 20 years	Total
0-2 children	2244(57.7)	1063 (27.3)	340 (8.7)	159 (4.1)	85 (2.2)	3891 (51.6)
3-5 children	65(3.4)	112 (5.8)	633 (32.9)	871 (45.3)	243 (12.6)	1924 (25.5)
More than 6 children	11(0.6)	20 (0.6)	28 (2.6)	694 (40.2)	982 (56.9)	1725 (22.9)
Total	2320(100)	1185 (100)	1001 (100)	1724 (100)	1310 (100)	7540 (100)

Chi-square 229.009 DF 8 Sig 0.00 a 0.05

Table 4.2.1.8 indicates that more women who had been married for 20 or more years about 57% had six or more children compared to 40.2% of those who had been married for 10-19 years, 1.6% of those who had been married for 5-9 years and only 0.6% of those who had been married for 0-4 years and those who had never married respectively. Women who had never married on the other hand majority 57.7% having had 0-2 children followed by 27.3% of those who had been married for 0-4 years compared to 8.7% of those married for 5-9 years, 4.1% of those married for 10-19 years and only 2.2% of those married for 20 or more years. This is an indication of an association between marital duration and children ever born. The chi-square test value of 222.009 was significant at a level of 0.0000 which indicates a very strong association between the two variables.

Table 4.2.1.9

Children ever born by Contraceptive use

Children Ever Born	Contraceptive use			
	Never used	Trad.and folkloric	Modern methods	Total
0-2 children	2621 (63.0)	446 (53.9)	824 (32.3)	3891 (51.6)
3-5 children	758 (18.2)	208 (25.2)	958 (37.6)	1924 (25.5)
More than 6 children	784 (18.8)	173 (20.9)	768 (30.1)	1725 (22.9)
Total	4163 (100)	827 (100)	2550 (100)	7540 (100)

Chi-square 1889 DF 4 Sig 0.00 a 0.05

Table 4.2.1.9 reflects that mare women who used modern methods of contraception 30.1% had six or more children compared to 20.9% of those who used traditional and forkloric methods and 18.8% of those who never used any method. Similarly more women who had never used any method 63% had 0-2 children compared to 53.9% of those who had used traditional and folkloric methods and 37.6% of those who had used modern methods. Contrary to expectation this is an indication of a weak or mixed associational relationship between contraceptive and children ever born. The chi-square test value of 189.201 is significant at a level of 0.0000 indicating a very strong association between the two variables.

4.2.2 Association between Education (the independent variable of interest) by other independent variables.

Table 4.2.2.0

Education by Residence

Level of education	Residence		
	Urban	Rural	Total
No Education	125 (10.8)	1172 (18.4)	1297 (17.2)
Primary	531 (45.7)	3918 (61.4)	4449 (59)
Secondary and above	505 (43.5)	1289 (20.2)	1794 (23.8)
Total	1161 (100)	6379 (100)	7540 (100)

Chi-square 199.710 DF 2 Sig 0.00 a 0.05

Table 4.2.2.0 above indicates that 43.5% of urban women had secondary and above education compared to 20.2% of rural women. On the other hand fewer urban women 10.8% had no education compared to 18.4% of rural women .This is an indication that there is an association between place of residence and education. The chi-square test value of 199.710 was significant at a level of 0.0000 thus indicating a very strong association between the two variables.

Table 4.2.2.1

Education by Ethnicity

Level of education	Ethnicity				
	Kikuyu	Luhya	Kalenjin	Others	Total
None	137 (9.5)	146 (12.7)	211 (19.3)	801 (21.3)	1295 (17.2)
Primary	869 (57.3)	715 (62.1)	676 (61.7)	2177 (57.8)	4437 (59)
Secondary and	500 (33.2)	291 (25.3)	209 (19.4)	791 (21.0)	1791 (23.8)

above					
Total	1505 (100)	1152 (100)	1096 (100)	3769 (100)	7523 (100)

Chi-square 188.664 DF 6 Sig 0.00 a 0.05

Table 4.2.2.1 reflects that more Kikuyu women 33.2% had secondary and above education compared to Luhya 25.3% , Kalenjin 19.4% and Others 21%. On the other hand fewer Kikuyu women 9.5% had no education compared to 12.7% for Luhya , 19.3% for Kalenjin , and 21.3% for Others which is an indication of an association between ethnicity and education. The chi-square test value of 188.664 is a significant at a level of 0.0000 indicating a very strong association between the two variables.

Table 4.2.2.2

Education by Income

	Income		
Level of education	**Earns cash**	**Earns no cash**	**Total**
No education	160 (21.8)	520 (17.4)	680 (18.3)
Primary	473 (64.4)	1648 (55.2)	2121 (57)
Secondary and above	102 (13.9)	815 (27.3)	917 (24.7)
Total	735 (100)	2983 (100)	3718 (100)

Chi-square 134.427 DF 2 Sig 0.00 a 0.05

Table 4.2.2.2 indicates that 23.7% of women who did not earn income had secondary and above education compared to 13.9% of those who earned income .Similarly 21.8% of women who earned income had no education compared to 17.4% of those who did not earn income thus indicating an association between income and education. The chi-square test value of

134.427 was a significant at a level of 0.0000 which indicates a very strong association between the two variables.

Table 4.2.2.3

Education by Age of women

Level of education	Age of respondent			
	15-24 years	25-34 years	35 years and above	Total
No education	142 (4.2)	377 (16.3)	778 (42.4)	1297 (17.2)
Primary	2355 (69.4)	1229 (53.2)	865 (47.1)	4449 (59.0)
Secondary and above	896 (26.4)	705 (30.5)	193 (10.5)	1794 (23.8)
Total	3393 (100)	2311 (100)	1836 (100)	7540 (100)

Chi-square 315.821 DF 4 Sig 0.00 a 0.05

Table 4.2.2.3 above shows that more women aged 25-34 years 30.5% had secondary and above education compared to 26.4^ of those aged 15-24 years and only 10.5% of those aged 35 and above years. On the other hand more women aged 35 and above years 42.4% had no education compared to 16.3% of those aged 25-34 years and a mare 4.2% of those aged 15-19 years which is an indication of an associational relationship between age and education. The chi-square test value of 315.821 is significant at a level of 0.0000 indicating a very strong association between the two variables.

Table 4.2.2.4
Education by Marital status

Marital status	Level of education			
	No education	Primary	Secondary and above	Total
Single	75 (5.8)	1473 (33.1)	772 (43)	2320 (30.8)
Married	1019 (78.6)	2360 (59.1)	934 (52.1)	4583 (60.8)
Others	203 (15.7)	346 (7.8)	88 (4.9)	737 (8.4)
Total	1297 (100)	4449 (100)	1794 (100)	7540 (100)

Chi-square 109.574 DF 4 Sig 0.00 a 0.05

Table 4.2.2.4 reflects that more women with secondary and above education 43% were single compared to 33.1% of those with primary education and only 5.8% of those with no education. On the other hand 78.6% of women with no education were married compared to about 59% of those with primary education and 52.1% of those with secondary and above education. This is an indication of the existence of an association between marital status and education. The chi-square test value of 109.574 is significant at a level of 0.0000 thus indicating a very strong association between the two variables.

Table 4.2.2.5
Education by Age at first marriage

Age at first marriage	Level of education			
	No education	Primary	Secondary and above	Total
Below 15 years	303 (24.8)	316 (10.6)	28 (2.7)	647 (12.4)
15-19 years	675 (55.2)	1917 (64.4)	401 (39.2)	2993 (57.3)
20 years and above	244 (20.0)	743 (25.0)	593 (58.0)	1580 (30.3)
Total	1222 (100)	2976 (100)	1022 (100)	5220 (100)

Chi-square 126.673 DF 4 Sig 0.00 a 0.05

Table 4.2.2.5 shows that more of the women with secondary and above education 58% entered into marriage aged 20 and above years compared to 25% of those with primary education and 20% of those with no education. On the other hand more women with no education 24.8% entered into marriage aged less than 15 years compared to 10.6% of those with primary education and only 2.7% of those with secondary and above education. This indicates an association between age at first marriage and education. The chi-square test value of 126.673 was significant at a level of 0.0000 thus indicating a very strong association between the two variables.

Table 4.2.2.6

Education by Age at first Birth

Age at first birth	Level of education			
	No education	Primary	Secondary and above	Total
Below 15 years	172 (14.4)	201 (6.5)	26 (2.3)	399 (7.4)
15-19 years	697 (58.2)	2084 (67.8)	487 (42.5)	3268 (60.4)
20 years and above	329 (27.5)	787 (25.6)	632 (55.2)	1748 (32.3)
Total	1198 (100)	3072 (100)	1145 (100)	5415 (100)

Chi-square 84.368 DF 4 Sig 0.0000 a 0.05

Table 4.2.2.6 reflects that more women with secondary and above education had their first birth aged 20 and above years 55.2% compared to 25.6% of those with primary education and 27.5% of those with no education. On the other had more women who had no education had their first birth aged less than 15 years 14.4% compared to 6.5% of those with primary education and only 2.3% of those with secondary and above education. This is an indication of an association between age at first birth and education. The chi-square test value of 84.368

was significant at a level of 0.0000 which indicates a very strong association between the two variables.

4.2.3 Association between Education by the proximate variables

Table 4.2.3.0

Education by Marital duration

Marital Duration	Level of education			
	None	Primary	Secondary and above	Total
Never married	75(5.8)	1473(33.1)	772(43.0)	2320(30.8)
0-4 years	69 (5.3)	772 (17.4)	344 (19.2)	1185 (15.7)
5-9 years	100 (7.7)	612 (13.8)	289 (16.1)	1001 (13.3)
10-19 years	431 (32.2)	967 (21.7)	326 (18.2)	1724(22.9)
20 years and above	622 (48.0)	625 (14.0)	63 (3.5)	1310 (17.4)
Total	1297 (100)	4449 (100)	1794 (100)	7540 (100)

Chi-square 172.188 DF 6 Sig 0.00 a 0.05

Table 4.2.3.0 indicates that most women with secondary and above education had never married 43.0% followed by those who had been married for 0-4 years compared to33.1% of those with primary education and only 5.8% of those with no education. On the other had most of the women with no education 48.% had been married for twenty or more years compared to 14% of those with primary education and only 3.5% of those with secondary and above education. This indicates an association between marital status and education. The chi-square test value of 172.188 is significant at a level of 0.0000 thus indicating a very strong association between the two variables.

Table 4.2.3.1

Education by Contraceptive use

Contraceptive Use	Level of education			
	No education	Primary	Secondary and above	Total
None use	864 (66.6)	2670 (57.8)	729 (40.6)	4163 (55.2)
Trad/folkloric	106 (8.2)	491 (11.0)	230 (12.8)	827 (11.0)
Modern	327 (25.2)	1388 (31.2)	835 (46.5)	2550 (33.8)
Total	1297 (100)	4449 (100)	1794 (33.8)	7540 (100)

Chi-square 142.257 DF 4 Sig 0.00 a 0.05

Table 4.2.3.1 above shows that more of the women with secondary and above education used modern methods of contraceptives 46.5% compared to 31.2% of those with primary education and 25.2% of those with no education. On the other hand 66.6% of women with no education had never used any contraceptive method compared to 57.8% of those with primary education and only 12.8% of those with secondary and above education. This is a clear indication of an association between contraception and education. The chi-square test gave a value of 142.257 which was significant at a level of 0.0000 indicating a very strong association between the two variables.

4.3 RELATIONSHIP BETWEEN INDEPENDENT VARIABLES AND CHILDREN EVER BORN

The simple linear regression will be used in the following section to examine the relationship between the dependent variable (children ever born) and each of the eleven independent

variables. The following results were obtained by regressing each set of the independent and the proximate dummy variable against the dependent variable whereby in the analysis the following dummies were used as the reference categories:-

a) Noed for Education

b) Kikuyu for Ethnicity

c) Earns for income

d) Urban for residence

e) Age1 for age

f) Agab1 for age at first birth

g) Agam1 for age at first marriage

h) Single for marital status

i) Mardur1 for marital duration

j) None for contraceptive use

Table 4.3 (a)

Simple regression analysis results

Variables	Coefficient B	Error (e)	T- Significance
Sechi	-3.85	2.89	0.00
Prim	-2.82		0.00
None(ref)	5.75		0.00
Rural	1.40	3.11	0.00
Urban (ref)	1.99		0.00
Kalenjin	0.74	3.14	0.00
Rest	0.40		0.00
Luhya	0.50		0.00
Kikuyu(ref)	2.79		0.00
Does not	0.99	3.11	0.00
Earns (ref)	2.78		0.00
Age3	6.03	1.20	0.00
Age2	3.09		0.00
Age1 (ref)	0.75		0.00
Married	4.08	2.54	0.00
Others	3.87		0.00
Single(ref)	0.36		0.00
Agam2	2.93	2.86	0.00
Agam3	2.07		0.00
Agam1 (ref)	1.58		0.00
Agab2	3.63	2.71	0.00
Agab3	2.84		0.00
Agab1 (ref)	0.94		0.00
Mardur2	0.07	0.47	0.00
Mardur3	0.65		0.00
Mardur4	1.27		0.00
Madur5	1.65		0.00
Mardur1(ref)	0.04		0.00
Modm	1.74	3.05	0.00
Tradfork	0.66		0.00
None (ref)	2.51		0.00

The following information is important to the explanation and interpretation of the above table.

(I) The accuracy of the regression equation is determined using the standard error which reflects the standard error of the estimate. It indicates the standard deviation of residuals thus indicating how much the actual values of the dependent variable can be expected to deviate from the predicted scores.

(II) The regression coefficient B which represents the mean number of children ever born per woman can be used to predict the relative change in the dependent variable on the basis of some specified change in each of the independent variables.

(III) The difference between the coefficients of reference categories and the other categories indicate the average deviation in the number of children ever born according to the individual variables.

(IV) T significance is the level at which the statistic computed using the student's t-test was found to be statistically significant at a 0.05.

4.3.0 Interpretation and explanation of the results

Education against children ever born

The regression analysis of education with children ever born gave the regression coefficient B value of -3.82 for secondary and higher education and -2.82 for primary education against a constant value of 5.75. This implies that while women with no education had an average of 5.75 children, those with primary education had an average of 2.93 children while those with secondary and higher education had an average of 1.93 children which is a very big difference

of a whole 3.82 children between women with the highest and the lowest levels of education. These differences are shown to be as reflected by the T - valuesa.

This may be explained by the fact that higher education changes the tastes and the roles of women from largely reproductive and household to non-reproductive and career based which favours small family preferences. Also women with higher education usually have greater access to contraception, marry at later age and are less likely to stay within marital union throughout their reproductive lives all of which again favours small family sizes.

Residence against children ever born

The regression analysis of Residence to children ever born gave the regression coefficient B a value of 1.40 for Rural against a constant value of 1.99. This implies that while women residing in Rural areas had an average of 3.39 children those residing in Urban areas had an average of 1.99 children a difference of 1.40 children which is quite substantial. The T -test found T significant at a 0.05.

Possible explanation for this is that majority of the women residing in Urban areas also have higher levels of education as well as being exposed to the forces of modernization and urbanization which shapes their fertility preferences towards small family size.

Ethnicity against children ever born

The regression analysis of Ethnicity to children ever born gave the regression coefficient B a value of 0.74 for Kalenjin category 0.40 for the Rest and 0.50 that of Luhya against a constant value of 2.79. This implies that while Kalenjin women had an average of 3.53 children, those

from Rest had an average of 3.19 children and Luhya had an average of 3.29 children, the Kikuyu had an average of 2.79 children a difference of 0.74 children between the ethnicities with the largest and the smallest families which is however not big. The T-test found T significant at a 0.05.

We can explain this difference from the observation that women from the Kikuyu community have higher levels of education than their counterparts from the other ethnic communities. They are also more likely to be residing in Urban areas or have closer proximity to Nairobi city.

Income against children ever born

The regression analysis of Income to children ever born gave the regression coefficient B a value of 0.99 for does not earn against a constant value of 2.78.

This implies that while women who did not earn cash for work had an average of 3.77 children while who earned cash had an average of 2.78 children which is not a very big difference of 0.95 children. The T-test found T significant at a 0.05. It has to be born in mind that most of the women who earned cash from work other than family work also have higher education and are more likely to be Urban residents which explains their having fewer children.

Age against children ever born

The regression analysis of Age with children ever born gave the regression coefficient B a value of 6.03 for Age3 and 3.09 for Age2 against a constant value of 0.75.

This implies that while women aged 35 or more years had an average of 6.78 children, those 25-34 years had an average of 3.84 children while those 15-24 years had an average of 0.75 children a remarkable difference of 5.03 children between the oldest and the youngest women.

The T-test found T significant at a 0.05. This can be explained by the fact that older women have had a longer period of exposure to the risk of pregnancy than the younger women most of whom are in their early stages of reproductive live.

Marital status against children ever born

The regression analysis of marital status to children ever born gave the regression coefficient B a value of 4.08 for the category married and 3.87 for that of Others against a constant value of 0.36. This means that while married women had an average of 4.44 children, those in the Others category i.e. (widowed, divorced or separated) had an average of 4.23 children while single women had an average of 0.36 children a very significant difference of 4.08 children between who had were married and those who were single. The T-test found T significant at a 0.05.

We explain this difference in that women who are within marital union are more exposed to the risk of pregnancy than those who are outside marital union. Also marriage is considered the institution within which child bearing should take place and so women who are within marital union have less pressures against child bearing than those outside marital union.

Age at first marriage against children ever born

The regression analysis of Age at first marriage to children ever born gave the regression coefficient B a value of 2.93 for Agam2 and 2.07 for Agam3 against a constant value of 1.58. This implies that while those who had entered into first marriage aged 15-19 had an average of 4.51 children, those who entered into marriage aged 20 and above had an average of 3.65 children while those who had entered into first marriage aged less than 15 had an average of 1.58 children a total difference of 2.93 children between women who married oldest and those who married youngest. The T-test found T significant at a 0.05. As marriage is considered to signal the beginning of child bearing , women who marry early have a longer period of their reproductive lives than those who marry late. Also most of the women marrying earlier are more likely to have lower levels of education than those marrying later.

Age at first birth against children ever born

The regression analysis of Age at first birth to children ever born gave the regression coefficient B a value of 3.63 for the category Agab2 and 2.84 for that of Agab3 against a constant value of 0.94. This implies that while who had their first birth aged 15-19 years
had an average of 4.57 children, those who had their first birth aged 20 or above had an average of 3.78 children while those who had their first birth aged less than 15 years had an average of 0.94 children.

This represents a very significant difference of 3.63 children between women who had their first birth oldest and those who had their first birth youngest. The T-test found T significant at a 0.05.

Marital duration against children ever born

The regression analysis of marital duration to children ever born gave the regression coefficient B a value of for the category1.65Mardur5,1.27 for the category Mardur4, 0.65 for the category Mardur3 and 0.07 for Mardur2 against a constant value of 0.03. This implies that while women married for 20 or more years had an average of 7.35 children, those married for 10-19 years had an average of 5.11 children, those married for 5-9 years had an average of 3.02 children while those married for less than 5 years had an average of 0.70 children a significant difference of 6.65 children between who had been married for the longest duration and those who had been married for the shortest period.

The T-test found T significant at a 0.05. And since the age at first birth marks the beginning of child bearing, those women who have their first birth youngest are likely to end up having more children than those who have their first birth in their later ages.

Contraceptive use against children ever born

The regression analysis of contraceptive use to children ever born gave the regression coefficient B a value of 1.74 for the category Modrn and 0.66 for that of Tradfork against a constant value of 2.51. This implies that contrary to expectation women who had used modern methods of contraception had an average of 4.25 children, those who had used traditional and folkloric methods of contraception had 3.17 children on average while those who had never used any method of contraception 2.51 children on average. This though a significant difference of 1.74 children between women who used modern methods of contraceptives and

those who did not use any method is contrary to expectation based on findings from other studies which have generally shown a negative relationship. The possible explanation for this may be that most of the women reportedly not using any contraceptives were mostly singe that is not marinade and so they had either few or no children. The T-test found T significant at a 0.05. This is because the incidence of pregnancy depends on the operation of contraception since women who use contraceptives usually are at a lower risk of becoming pregnant than those who do not. Besides majority of the women using contraceptives especially modern contraceptives have higher levels of education than those who either do not or use traditional methods of contraception.

4.4 RELATIONSHIP BETWEEN EDUCATION AND CHILDREN EVER BORN

The objective of the study was to assess the role of education in influencing fertility. In order to achieve this a multiple linear regression analysis was undertaken in which the variables were entered into the regression model at different levels in the form of regression equations as presented below.

Table 4.5

Multiple regression analysis results

Variables	Equation 1	Equation 11	Equation 111	Equation 1V
Education				
Primary	-2.82*	-0.293*	-0.277*	-0.382**
Secondary +	-3.85*	-0.724*	-0.602*	-0.112*
Control variables				
Demographic				
Age				
Age2		2.145*	2.167*	0.286*
Age3		4.852*	4.852*	0.575*
Marital status				
Married		2.218*	2.202*	-0.364*
Others		1.414*	1.465*	-0.182*
Age at marriage				
Agam2		-1.008*	-1.007*	-0.048**
Agam3		-0.562*	-1.533*	-0.013*****
Age at birth				
Agab2		1.122*	1.185*	0.124*
Agab3		0.349*	0.323*	0.094*
Social economic				
Ethnicity				
Kalenjin			0.404*	0.117*
Luhya			0.252*	0.061**
Rest			0.103**	0.036**
Income				
Doesnot			-0.043***	-0.010****
Residence				
Rural			0.609*	0.153*
Proximate				
Marital duration				
Mardur2				0.042***
Mardur3				0.466*
Mardur4				0.891*
Mardur5				1.056*
Contraception				
Tradfork				0.063**
Mmodrn				0.120*
Constant	5.75*	0.325*	-0.359*	-0.133*
R^2	0.16	0.69671	0.70369	0.70985
F	703.15	1729.52	1191.206	919.76968
F-Significance	0.000	0.000	0.000	0.000

Significance of individual variables

* 0.000 ** <0.05 *** 0.1095 **** 0.3660 ***** 0.6068

4.4.0 Interpretation and explanation of results

In equation one,education which is the variable of interest is alone entered into the model. The results are presented in column two in the above table. In interpreting the results of the regression equations one above, the coefficient of determination R^2 is used to explain variation in the dependent variable explained by corresponding variation in the independent variable dummies that is education. From the above results we find that education alone gave coefficient of determination R^2 value of 0.16 which explained about 16% of the variation in the dependent variable that is children ever born. The regression coefficient B can be used to predict the relative change in the dependent variable on the basis of some specified change in the independent variable that is education. With a B constant value of 5.75 secondary and above education had the greatest negative influence on C.E.B with regression coefficient B value of -3.85 followed by primary education with B value of -2.82.

The accuracy of the regression equation is determined using the standard error which reflects the standard error of estimate. It indicates the standard deviation of residuals thus indicating how much the actual values of the dependent variable can be expected to deviate from the predicted scores. The significance of the model is estimated by conducting the F-test which in this case gave a value of 703.10 significant at 0.000 meaning that the model is highly significant.

In equation two above the demographic variables of the study were entered in the regression equation alongside education which is the variable of interest. The results are presented in column three in the above table.

Again in interpreting the results of the regression equations given the above table the coefficient of determination R^2 is used to explain variation in the dependent variable explained by corresponding variation in the independent variables that is education together with the demographic variables namely age, age at first marriage, age at first birth, marital status and marital duration. From the above results we find that education together with the demographic variables gave coefficient of determination R^2 value of 0.69671 which explained about 70% of the variation in the dependent variable that is children ever born.

According to results of the second equation the regression coefficient B can be used to predict the relative change in the dependent variable on the basis of some specified change in the independent variables that is education together with the demographic variables. With a B constant value of 0.325 'Age3' had the greatest positive influence on C.E.B with regression coefficient B value of 4.852. This was followed by 'Married' with B value of 2.218, 'Age2' with B value of 2.145, 'Others' with B value of 1.414, 'Agab2' with B value of 1.222 and 'Agab3' with B value of 0.349. 'Agam3' had the greatest negative influence on Children ever born (CEB) with a B value of -1.562. It was followed by 'Agam2' with a B value of -1.008, 'Sechi' with a B value of -0.724 and 'Prim' with a B value of -0.293.

T significance is the level at which the statistic computed using the student's t-test was found to be statistically significant. From the above results all the variables were found to be statistically

significant at a = 0.05. We therefore find that on adding demographic variables into the regression equation one above the coefficients of education the main variable of interest in this study declines from -3.85 to - 0.724 for secondary and above education and from -2.82 to - 0.293 for primary education.

The accuracy of the regression equation is determined using the standard error which reflects the standard error of estimate. It indicates the standard deviation of residuals thus indicating how much the actual values of the dependent variable can be expected to deviate from the predicted scores. The significance of the model is estimated by conducting the F-test which in this model gave a value of 1729.51837 significant at 0.000 meaning that the model is highly significant.

In the third equation above social-economic variables namely ethnicity, residence and income were entered in the regression equation alongside education which is the variable of interest together with the demographic variables and the results are presented in the fourth column of the table. In the third equation above social-economic variables namely ethnicity, residence and income were entered in the regression equation alongside education which is the variable of interest together with the demographic variables and the results are presented in the fourth colum of the table. In interpreting the results once again the coefficient of determination R^2 is used to explain variation in the dependent variable explained by corresponding variation in all the independent variables that is education together with the demographic and the other social-economic variables. From the above results we find that education together with all the independent variables that is education together with the demographic and the other social-

economic variables gave coefficient of determination R^2 value of 0.70369 which explained about 70% of the variation in the dependent variable that is children ever born.

The regression coefficient B can be used to predict the relative change in the dependent variable on the basis of some specified change in all the independent variables that is education together with demographic and the other social-economic variables. With a B constant value of -0.359 'Age3' had the greatest positive influence on C.E.B with regression coefficient B value of 4.852. This was followed by 'Married' with B value of 2.202, 'Age2' with B value of 2.167, 'Others' with B value of 1.465, 'Agab2' with B value of 1.185 and 'Rural' with B value of 0.529, 'Kalenjin with B value of 0.404, 'Agab3' with B value of 0.323, 'Luhya' with B value of 0.252 and 'Rest' with B value of 0.103. 'Agam3' had the greatest negative influence on Children ever born (CEB) with a B value of -1.533. It was followed by 'Agam2' with a B value of -1.007, 'Sechi' with a B value of -0.602 and 'Prim' with a B value of -0.277 and 'Doesnot' with a B value of -0.043. Thus on adding social-economic variables into the regression equation two above the coefficients of education the main variable of interest in this study declines from -0.724 to -0.602 for secondary and above education and from -0.293 to -0.277 for primary education.

The accuracy of the regression equation is determined using the standard error which reflects the standard error of estimate. It indicates the standard deviation of residuals thus indicating how much the actual values of the dependent variable can be expected to deviate from the predicted scores. The significance of the model is estimated by conducting the F-test which in

this model gave a value of 1191.206 significant at 0.000 meaning that the model is highly significant.

In equation four above the proximate variables were entered in the regression equation alongside education which is the variable of interest together with all the other independent variables of the study that is demographic and social-economic variables. The results are presented in the fifth column of the table. In interpreting the results coefficient of determination R^2 is used like in the other equations to explain variation in the dependent variable explained by corresponding variation in all variables that is the independent and the proximate variables. From the above results we find that education together with all the independent variables that is education together with all the variables that is independent and the proximate variables gave coefficient of determination R^2 value of 0.70985 which explained about 71% of the variation in the dependent variable that is children ever born.

In equation four above the proximate variables were entered in the regression equation alongside education which is the variable of interest together with all the other indipendent variables of the study that is demographic and social-economic variables. The results are presented in the fifth colum of the table. In interpreting the results coefficient of determination R^2 is used like in the other equations to explain variation in the dependent variable explained by corresponding variation in all variables that is the independent and the proximate variables. From the above results we find that education together with all the independent variables that is education together with all the variables that is independent and the proximate variables

From the above results we find that education together with all the independent variables that is education together with all the variables that is independent and the proximate variables gave coefficient of determination R^2 value of 0.74285 which explained about 74% of the variation in the dependent variable that is children ever born.

The regression coefficient B can be used to predict the relative change in the dependent variable on the basis of some specified change in the independent and the proximate variables. With B constant values of -0.133 'Mardur5' had the greatest positive influence on C.E.B with regression coefficient B value of 1.056. This was followed by 'Mardur4' with B value of 0.891, 'Age3' with B value of, 0.575, 'Mardur3',with Bvalue of 0.466 , 'Age2' with B value of 0.286, 'Agab2' with B value of 0.124, 'Rural' with B value of 0.153, 'Kalenjin' with B value of 0.117, 'Agab3' with B value of 0.094', 'Tradfork' with B value of 0.063, 'Luhya' with B value of 0.61, 'Mardur2' with a B value of 0.042, and 'Rest' with B value of 0.036. 'Prim' had the greatest negative influence on Children ever born (CEB) with a B value of -0.382. It was followed by 'Married' with B value of -0.364, 'Others' with B value of -0.182, "Modrn' with B value of -0.120, 'Sechi' with a Bvalue of -0.112, Agam2' with a B value of -0.048, 'Agam3' with a B value of -0.013, and 'Doesnot' with B value of-0.010.

This shows that on adding the proximate variables into the regression equation three above the coefficients of education the main variable of interest in this study declines from -0.602 to 0.112 for secondary and above education and from -0.277 to -0.382 for primary education.

The accuracy of the regression equation is determined using the standard error which reflects the standard error of estimate. It indicates the standard deviation of residuals thus indicating how much the actual values of the dependent variable can be expected to deviate from the predicted scores. The significance of the model is estimated by conducting the F-test which in this model gave a value of 919.76968 significant at 0.000 meaning that the model is highly significant.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the findings

This study aimed primarily at looking into the influence of female educational attainment on a womans' fertility performance in an attempt to update the existing knowledge on female Education-fertility relationship using the most recent and internationally comparable national data namely the Demographic and Health Survey data.

The study attempted to estimate the extent to which a womans' education jointly or independently influences the fertility performance of a woman. Results from bivariate analysis namely cross-tabulation and simple linear regression showed that women with secondary and above levels of education had fewer children than those with primary or no education . Thus while women with no education had the most children those with secondary and above education had the least number of children. This is in agreement with findings in earlier studies which showed education to be inversely related to fertility.

Other variables that showed negative influence on fertility included age at first marriage as women who entered into marriage aged more than twenty years had fewer children than those entering marriage aged below twenty year, Age at first birth whereby women who had their first birth aged more than twenty years had fewer children than those who had their first birth aged less. Also contraception as women who used some form of contraceptives had fewer children than those who had never used any contraceptive method.

A similar finding is seen with residence and ethnicity with urban women having fewer children than rural women while Kikuyu women had fewer children than women from other ethnic groups.

Other variables however showed positive relationship such as age of the women whereby those aged thirty five or more years had more children than those aged less while for marital duration women who had been married for more than twenty years had more children than those who had been married for less and as for marital status married women had more children than other women.

The results from multiple regression analysis indicated that education operated jointly with other social-economic and demographic variables through the proximate determinant variables to influence fertility by accounting for about 71% of the total variation in the number of children ever born when all variables were entered into the regression equation as opposed to only 16% of the variation in the number of children ever born explained by education alone. It must be noted here that demographic variables seems to have the strongest effects together with education on fertility as education alongside demographic variables alone accounts for about 70% of the total variation in the number of children born. However after controlling for other social economic and demographic variables, education accounts for only about 19% of the variation in fertility performance of which about 16% is exerted directly and the remaining 3% through the proximate variables. The general findings of the study thus confirms the near universal belief that education is negatively related to fertility since in all cases but one

education gave negative B coefficients. The salient finding which I consider to be the main contribution of this study is that education influences fertility largely by interfering with or altering the demographic characteristics of the individual more than anything else such as the social-economic conditions.

5.2 CONCLUSION

Based on the findings of this study, it can be concluded that female education plays an important role in determining fertility by shaping the reproductive characteristics of women. That education for a woman alters or interferes with her demographic attributes (age at first marriage, age at first birth etc.) as well as her social behaviour i.e marriage in relation to reproduction in a manner that determines her fertility performance.

The evidence that advanced education leads to lower fertility was borne out by bivariate analysis results while multiple analysis results emphasised the fact that such effects are realised largely via alteration in the demographic variables and through other proximate determinant variables such as marital duration, contraception and coital activity. Education therefore plays a very significant role in determining a womans' reproductive performance at the micro-level which may also be the case at the macro-level. Female education is therefore a core factor in the construction of any low fertility or negative population growth models as well as the formulation of population policies.

5.3 RECOMMENDATIONS FOR FURTHER RESEARCH

It was noted in the scope and limitations of this study that no single research is possible or even feasible to investigate all the proposed mechanisms through which female education is likely to influence fertility.

It would be imprudent therefore to fail to acknowledge that this study has left unresolved some issues relating to our understanding of fertility differentials by female educational levels. It would on the contrary be prudent to acknowledge that this study stimulated new research concerns requiring further research in this same area.Based on the findings of this study therefore, the following recommendations are important for further research in this area.

1) Research methodologies needs to be re-examined particularly the application of "fertility models" to determine and recommend the most suitable model for the most effective analysis of female education relationship. This study analysed the bongaarts model – one among the many fertility models that exists. Although the results were satisfactorily and in line with the existing literature and expectations of the study, they nonetheless did not fully satisfy the theoritical assumptions of Bongaerts model. This is however well acceptable since social scientists do agree that there is generally no exact correspondence between empirical findings and particular theories or models since these are by no means exhaustive nor mutually exclussive.
2) Redifination of the "female education" variable in order to establish which component(s) of it is specifically for fertility reduction. This will enable researchers to understand why some women will have lower fertility and others maintain high fertility even after being exposed to the same level of education as was shown from the results of this study. Suggested way

of redefining "female education" could be for example to type or form of education acquired.

3) Broadening the scope of study in an attempt to include as many proposals both inti*** of variables and model adapted/modified. In this study, only two proximate determinants were examined which may have weakened the efficiency of the proximate determinant model which idealy must include all proposed seven proximate determinants hence left about 39% of variation in fertility unexplained.

5.4 RECOMMENDATIONS FOR POLICY MAKERS

As noted in the introduction education particularly for the woman continues to emerges as the single most universal and invariance social economic factor amenable to policy formulation that can be manipulated to influence or shape fertility as desired. Based on this understanding, these recommendations are hence relevant to policy formulation purposes:

1. Female Education should be made a core factor to be considered and incorporated into all future population policies in this country especially those policies aimed at reducing population/fertility control.
2. Female Education Policies must aim at beyond secondary school level of education is such education is to be of any demographic importance is as far as population/fertility control is concerned. This is because results from the study have indicated that lower primary education has a positive rather than a negative effects on fertility. Research responsive policies should be adopted both at government and institutional levels to ensure incorporation of past research findings and encourage further research.

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