DETERMINANTS OF FERTILITY IN KENYA: A COMPARATIVE ANALYSIS OF CENTRAL, NYANZA, AND WESTERN PROVINCES

By
CHEPNGENO GLORIA
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DECLARATION

I declare that this is my original work and that to the best of my knowledge, it has not been produced in any university or education institution.

Gloria Chepngeno
(Candidate)
Date. 26TH NOV 1999

This thesis has been submitted for examination with our approval.

Dr. Murungaru Kimani
(Supervisor)
Date. 26TH NOV 1999

Mr. J.C. Oyieng
(Supervisor)
Date. 26th Nov. 1999

Population Studies Research Institute
University of Nairobi
P.O.Box 30197 Nairobi, Kenya.

DEDICATION

To my parents, brother and sisters, without whom it would not have been possible to reach this level and to my dearest Elisaphan. Gathagu.

ABSTRACT

Kenya is one of the countries in sub-Saharan Africa that is at last experiencing a decline in fertility. This decline has been attributed to so many factors such as increase in contraceptive use, rapid social change - especially increased formal education for women, greater government legitimization of family planning, grater bureaucratic efficiency especially in the distribution of contraceptives and so on.

The decline in fertility affected geographical and social categories of the population in a similar way, however, not to the same extent. The objective of this study was therefore to find out factors that have contributed to the differentials ion fertility between Nyanza, Western, and Central provinces of Kenya.

The data that was used was the Kenya Demographic and Health Survey that was carried out in 1993.

Various statistical techniques were used to test the hypotheses, these were the OLS (ordinary least squares) regression method, logistic regression model, and chi-square test. The objectives of the study was carried out based on the Easterlin and Crimmins theoretical framework which is one of the economic theories based on supply - demand aspects.

The study found out that the differentials in fertility between Central province and Nyanza and Western provinces could have been due to the fact that woman are desiring smaller families, they are spending more years in school and are more exposed to mass media. Hence, they are more likely to be exposed to family planning information, modern ideas that can compete with traditional norms of marriage and child bearing. The low number of children dead per woman could have also been a contributory factor hence they are able to achieve their desired family size without having to give birth to many children. The low marital duration, another indicator of modernization, could have also been a contributory factor as well as the low physic cost of contraception.

The study found out that marital duration greatly influence fertility as it leads to a wider period of exposure to the risk of conception Education was also found to be closely associated with the various aspects of fertility such as desired family size, contraception, and potential supply of surviving children High proportion of child loss greatly influenced the variation in fertility in the three provinces probably because of the replacement effect and insurance effect of child loss.

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CHAPTER ONE: INTRODUCTION AND BACKGROUND INFORMATION TO THE STUDY AREAS

Chapter one gives a brief introduction, background information of the study areas. A comparison between the three provinces based on the socio-economic, demographic, physical, and ecological aspects in the three provinces.

1.1 INTRODUCTION

This study explains the differentials in fertility between Central, Nyanza and Western provinces. The Easterlin and Crimmins theory of fertility has been used to explain the differentials, one of the economic theories of fertility. According to the theory, modernization leads to changes in the economy, and social and political aspects of the society. As part of the modernization there are changes in fertility, mortality and migrations. With regards to fertility there is a decline hence decline in number of children desired. Changes also occur in fertility regulation where there is an increase in the use of modern methods of fertility regulation. Based on this theory, this study explains the differentials in fertility between the three provinces Central, Nyanza and Western Kenya.

1.1 BACKGROUND TO THE STUDY AREAS

1.2.1 Location, Size and Climate

Central province occupies the highland region of Kenya within the Nyandarua mountains and mount Kenya areas. It covers an area of 13,176 square kilometers and enjoys the best climate in Kenya. This region belongs to the high potential agricultural areas of Kenya.

Nyanza and Western provinces together fall entirely within, and comprise the major parts of that portion of the Lake Victoria Basin within Kenya. Nyanza province covers an area

of 16,162 square kilometers. It lies in a plateau 1000-1500 m above sea level within the lake Victoria basin. This region enjoys favourable climate influenced by the lake body. Western province is the smallest of all the provinces. It covers an area of 8,360 square kilometers

Central province has two rainy seasons, the short rains in November and the long rains in April and May. Temperatures are modified strongly by altitude, Mount Kenya having a permanent snow cap. Rainfall in Western Kenya ranges from over 2,000 mm per annum in parts of Kisii district, to below 750 mm in a small area on Uyoma Peninsula. Kisii Highlands, a belt between Kakamega and Butere, and the Mount Elgon area are areas of heavy rainfall and as the elevation of the land drops towards the lake, the annual rainfall declines to less than 1,000 mm per annum.

1.2.2 Ethnic Composition

Unlike Central province, which is dominated by the Kikuyu ethnic group, Western and Nyanza provinces are not areas of homogeneous ethnic grouping. The three main ethnic groups are, the Luo, the Luhya, and the Kisii.

1.2.3 Demographic Characteristics

Population Size and Growth

Table 1.1. Trends in Population Size and Growth By province (000')

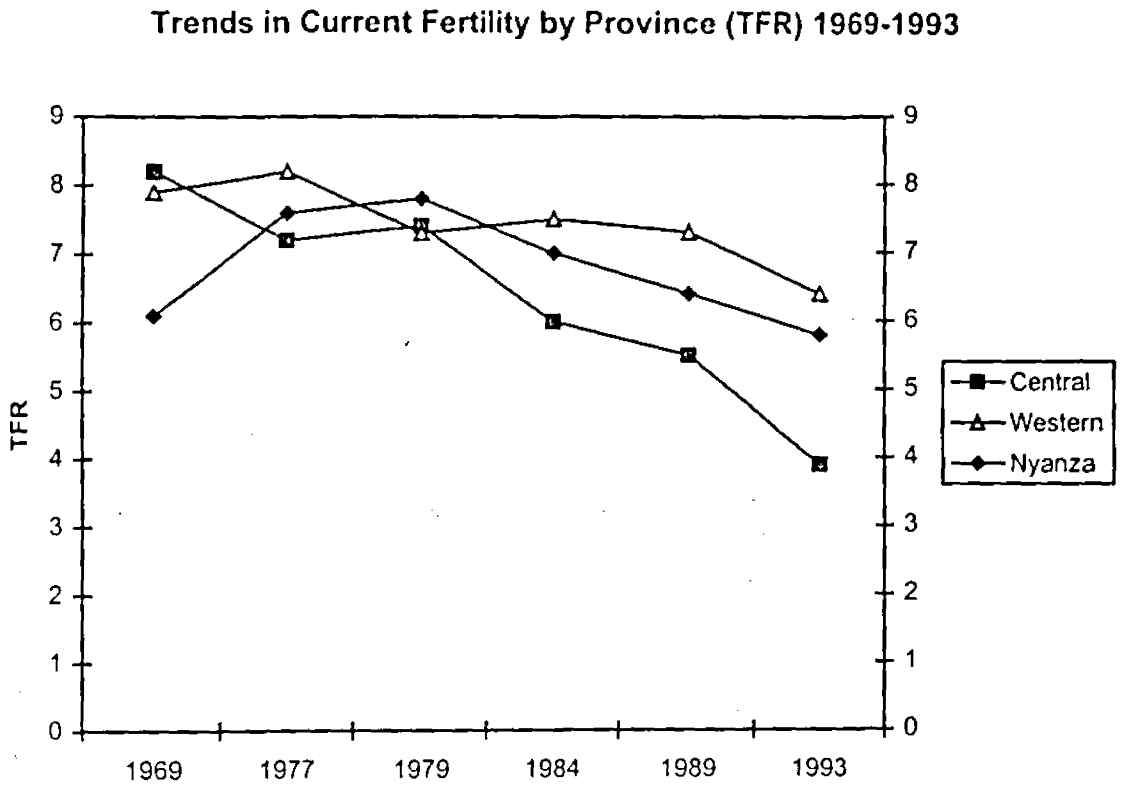
PROVINCE	1969 POP CENSUS	1979 POP CENSUS	1989 POP CENSUS	INTERCENSAL GROWTH
Central	1,676	2,344	3,116	2.8%
Nyanza	2,122	2,645	3,507	2.8%
Western	1,328	1,833	2,545	3.3%

Source: CBS Population Census 1969, 1979, and 1989

The population in the three regions has been growing steadily with the highest growth rate occurring in Western province.

Trend in Fertility

Figure .1.

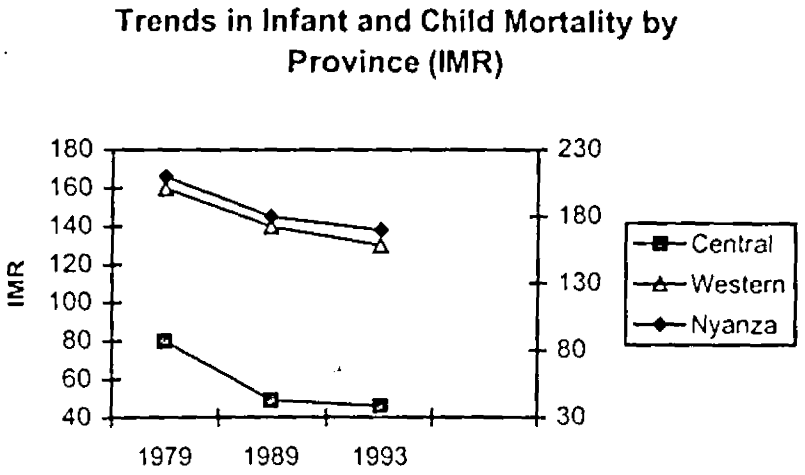


Source: CBS 1969, 1979, 1977/78, 1984, NCPD/CBS 1989 and 1994

In the three provinces, Central province has the lowest current fertility (3.9). The decline in the TFR has also been rapid in Central from 8.2 in 1969 to 3.9 in 1993 compared to Nyanza that declined from 6.1 to 5.8 and Western 7.9 to 6.4 during the same period.

Infant and Child Mortality

Figure 2:



Source: CBS 1979, 1989 Census; NCPD/CBS 1989 and 1994

High infant and child mortality induces families to have many children to assure themselves of surviving progeny. Infant and child mortality has been declining in all the provinces. However, Central province has continued to have low rates of infant and child deaths as compared to the other two provinces. Nyanza province has the highest rates of infant and child mortality.

Age at First Marriage

Central province has the highest age at first marriage followed by Western. In Nyanza the mean age at marriage is 17.4 according to KDHS 1993 which is the lowest in the three regions, Western province had 18.7 while Central province which was the highest in the three provinces had 20.1 years (NCPD/CBS, 1994). Over the years the age at marriage has been raising in all the three provinces. Age at marriage is one of the major determinants of fertility as it signifies the start of child bearing and exposure into the risk of pregnancy.

Ever-Married Women in Polygamous

Nyanza and Western provinces have the highest percentage of ever-married women in polygamous unions. Although polygamy is hypothesized to have a negative effect on fertility, there is still high fertility in these two regions. The high percentage of ever-married women in polygamous unions in this region can be used to show that people in these regions are still deeply rooted in their cultural practices.

The percentage of women in polygamous unions has been declining rapidly in all the provinces from over 30 percent in 1977 to almost 10 percent in 1977 (CBS, 1977/78, NCPD/CBS, 1994). According to KDHS 1993, 7.5 percent of women in Central province were in polygamous unions while in Nyanza and Western province it was 26.1 and 26.4 percent respectively (NCPD/CBS, 1994).

Family Planning Services

Table 1.2. Demand for Family Planning Services by province

PROVINCE	UNMET NEED FOR FP	MET NEED FOR FP	% OF DEMAND SATISFIED
Central	25.1	56.0	69.0
Western	39.0	23.8	37.9
Nyanza	43.1	25.1	36.8

Source: NCPD/CBS, 1994.

In Central province the percentage of ever married women in reproductive age whose demand is satisfied is 69.0 as opposed to 37.9 in Nyanza and 36.8 in Western province. The un-met need for family planning is also high in Western 43.1 percent and Nyanza 39.0 percent (NCPD/CBS, 1994). Hence, more women are having unwanted, or mistimed pregnancies.

Knowledge of contraception and family planning is high in all the three provinces; over 90 percent of all the married women have family planning knowledge. However, there is variation when it comes to use. A higher percentage of ever married women in Central province are using contraceptives (56%) unlike in Nyanza 23.8 percent and 25.1 percent in Western province. More women in Central province are also using a modern method (49.7%) of family planning which are most effective as opposed to traditional methods which can therefore explain the variations in fertility and the different rates of decline (NCPD/CBS, 1994).

Western and Nyanza provinces have the highest number of community based distributors of contraceptives in the whole country, 3,163 for Western province and 2,905 for Nyanza but the contraceptive prevalence rates are low 21 for Nyanza and 21.7 for Western. On the other hand, Central province has 538 and the contraceptive prevalence rate is high (49.7).

1.2.4 Socio-Economic Characteristics

Agriculture is the only means of income for the vast majority of the population of Central province. It is also the economic base for nearly all the urban growth. In most Districts of Western Kenya there are large areas with high potential soils which are only partly utilized and then not intensively. Conservative ethnic customs, tsetse fly infestation and a lack of market opportunities result in land not being used for its full potential especially in parts of central and southern Nyanza that slows down the adoption of modern agricultural techniques. Therefore, there is low agricultural output in most parts of Nyanza province. Also, the regional per capita income is low, the purchasing power of the region is low and therefore the market for locally produced goods and services is low. There are certain cultural practices which constraints development for example matrimonial practices such as polygamy and widow inheritance,

traditional practices governing planting and harvesting of produce, regulations governing burials, setting up of homes, and funeral ceremonies (CBS, 1995).

Central province has good and well-planned social and economic infrastructure. Nyanza province has a considerably lower standard of infrastructure development relative to its population density than Central province. Of all the elements of physical infrastructure which are necessary for the development of a modern economy, a cheap, reliable, efficient transport system is generally the most basic. Central province road system is generally well developed and is focused on the two major trunk routes emanating from Nairobi. It's also provided by a closely spaced series of parallel roads adequately linking all communities with the main highway and with other communities. Although the trunk road system in Western Kenya is quite good, the feeder road system is very poor and some areas are as much as 25 miles from an all-weather road.

Unlike the other two provinces, in Central province, all urban centres have full time banking facilities and most of the rural and market centres have part-time banking services and almost the whole area is supplied with electricity. The low standard of infrastructure development in most parts of Western Kenya discourages socio-economic development (CBS, 1995).

A larger proportion of the active population in Central province are involved in various industries which is a pre-requisite for a faster economic growth coupled with the realization for a higher standard of living unlike in the provinces of Nyanza and Western.

Of the three provinces, Central province recorded the highest mean monthly household income of Kshs 9,266.70 while Nyanza recorded Kshs 6,749.60 and Western Kshs 7,659.20.The household income determines its expenditure on goods and services and the welfare of the

household in general. Per capita income and consumption expenditure are widely accepted proxy indicators to economic well being.

Health Institutions

Table 1.3. Health Institutions by province 1994

PROVINCE	HOSPITALS	HEALTH CENTRES	SUB-CENTRES/ DISPENSARIES
Central	37	70	322
Western	35	76	126
Nyanza	57	98	277

Source: CBS, 1995.

Nyanza province has the highest number of hospitals and other health institutions followed by Western. The low number of health institutions in Central province could be due to its proximity to Nairobi. Diseases are also prevalent in Nyanza province such as malaria, diseases of respiratory infections, skin disease, diarrhea and intestinal worms (CBS, 1989).

According to the Welfare Monitoring Survey II, Nyanza province had the highest proportion (32 percent) sick during the two weeks preceding the survey. Highest proportions (36 percent) were recorded in both Siaya and Busia in Western Kenya. Nyamira and Kisumu also recorded high rates of morbidity (34 percent). Although fever/malaria remains the major cause of morbidity in all areas of the Country, Nyanza and Western provinces recorded the highest incidence, over 70 percent, of those who were reported to be sick as opposed to Central province which was less than 20 percent. The type of action taken in the event of sickness also varies from one region to another. In Nyanza and Western provinces, over 80 percent of those who were sick bought drugs from a pharmacy compared to unlike 59 per cent in Central province.

Lack of professional medical attention is dangerous for the general health of the population. This is because some type of sickness turn out to be different from the suspected sickness when diagnosed by qualified medical practitioners and also, some type of sickness turn out to be symptoms of other sickness unknown to the affected patient (CBS, 1995).

Malnutrition poses a major threat to children and a primary cause of death of children under 5 years of age. It is also a contributing factor in infectious diseases as it impairs normal body responses to diseases. Using the heights and weights as indicators of nutritional status of children, the WMS II found that 6.5 percent of the children in Central province are undernourished, 7.1 percent in Nyanza and Western provinces recorded the highest which was 9.5 percent (CBS, 1994).

School Enrolment

Western province has the lowest percentage of students enrolled in primary while Nyanza had the highest. In terms of number of primary schools Western and Nyanza have the highest number of primary schools 3,451 for Nyanza and 1,854 for Western (CBS, 1995).

There are many secondary schools in Nyanza and Western provinces, 539 in Nyanza and 563 in Western, however, unlike primary education, enrolment in secondary schools is quite low for these two provinces and the number has continued to be low over the years. This shows that the drop out rate in these two provinces is high while Central province has 359 secondary schools and the enrolment is high. The sex ratio in schools also varies between these provinces. In Central there are more girls, than boys in both primary and secondary schools. For example in primary school it is 48 percent as opposed to Western and Nyanza where it is 53 percent and 59 percent respectively (CBS, 1995).

According to the 1989 Census, Central province recorded the highest literacy rate of 91 percent while Nyanza recorded 71 percent and Western 77 percent. There was also no major difference between the literacy levels of males and females in Central province which was 95 percent and 88 percent respectively unlike in Nyanza which was 83 percent for males and 61 percent for females, and in Western 86 percent and 69 percent respectively.

Accessibility to Safe Clean Water

In Nyanza province very few households (28 percent) have access to safe water and also reliable sources of water compared to 43 percent in Western province and 46 percent in Central province. Distance taken to water sources especially during dry season is greater for Nyanza province where on the average was more than two hours, while in Western and Central province is less than 30 minutes. In terms of sanitation, Western and Central provinces have the highest percentage (90 percent) of households with access to toilet facilities compared to 72 percent in Nyanza province, the situation is especially worse in Homabay District where more than half the population have no toilet facility (CBS, 1995).

The background information therefore shows that there is diversity among these three provinces. The study will focus on the underlying factors that have led to differential in rates of fertility decline between these provinces.

1.3 Problem Statement

In recent years many developing countries have experienced decline in the fertility levels. Most of these countries have also undergone processes of socio-economic development. The possibilities of an inverse relationship between the two is indicated and this is supported by considerable but isolated evidence.

Unlike earlier predictions, fertility in Kenya has begun to decline as evidenced by the results of the 1989 and 1993 Kenya Demographic and Health Surveys as well as other numerous studies both qualitative and quantitative. In general, fertility reduction has been observed in all regions, however, there is considerable variation in fertility between the provinces of Kenya, Central province on one hand and Western and Nyanza on the other.

There exist a lot of differences between Nyanza, Western, and Central provinces of Kenya, both demographic and socio-economic, which can explain the differentials in fertility decline. During the 1984-1992 period, the percentage change in TFR was 35 percent for Central, 21 percent for Western and 18 percent for Nyanza province. The TFR for Central is 3.9, 5.8 in Nyanza and 6.4 in Western province. In terms of contraceptive usage 56 percent of currently married women aged 15-49 are current users of contraceptives while in Nyanza and Western its 24 and 25 percent respectively. The under-five mortality also varies greatly; Central province is 41 per 1000 live births, 110 in Western and 187 in Nyanza (NCPD/CBS 1994). This study examined the underlying factors that have led to the diversity in fertility differenctials between these three provinces.

1.4 Objectives of the Study

1.4.1 General Objectives

The main objective of the study was to find out the factors that have contributed to the differentials in fertility in the three provinces.

1.4.2 Specific Objectives

1. To determine whether some selected demographic variables have lead to fertility differentials in the three provinces.
2. To determine whether the demand and or supply of children are the major causes of differences in contraceptive use and hence fertility differences.
3. To examine how selected socio-economic variables have influenced the varied fertility differentials in the three provinces.

1.5 Justification of the Study

The decline of fertility in Kenya contradicts nearly all the earlier "expert" predictions about fertility and contraceptive practice in Kenya. A new and largely unpredicted trend has emerged. Kenya has entered a fertility transition and very little has been done to try and explain the differentilas in fertility that has occurred, more so in areas where the decline has been very rapid. Studies of the causes of fertility levels and their changes often seek to measure directly the impact of socio-economic factors on fertility. This study has gone further to incorporate the demand and supply (of children) factors in determining fertility.

A comparative study is useful in determining the policy approach that would be more appropriate in attaining a continued downward trend in fertility. The three regions vary in all aspects both socio-economic and demographic. This study is therefore useful in determining whether the difference in the rate of fertility decline between the provinces is due to socio-economic development, availability and quality of contraceptive services, infant and child mortality or due to cultural factors. Hence, it has a broad appeal to policy makers as it offers mechanisms susceptible to manipulation by official policy. This study is therefore of interest to both scholars and policy-makers on the demography of developing countries especially in those Countries that have entered a demographic transition.

1.5 Scope and Limitation

The study covered three provinces in Kenya namely, Central, Nyanza and Western, as was covered by the KDHS 1989 and 1993, and also by the censuses, disregarding any boundary alterations that have taken place.

In determining the levels and trends of fertility over time, the censuses of 1962, 1969, 1979, and 1989 were used as well as the Kenya Fertility Survey (1977/78), Kenya Contraceptive Prevalence Survey (1984), and the Kenya Demographic and Health Surveys (1989 and 1993). Therefore one of the limitations was the use of various data sets that vary in scope, quality, sample size, and objectives.

An analysis of fertility decline beyond pure description of trends and differentials is considerably difficult, particularly if it attempts to identify underlying causes. Of the many possible factors which might have brought about a basic change in fertility behaviour, very few can be identified through available statistics. Therefore, only a limited number of crude indices of socio-economic factors were used in an attempt to explain changes, which are intricate and complex.

CHAPTER TWO: LITERATURE REVIEW, THEORETICAL FRAMEWORK, OPERATIONAL FRAMEWORK AND HYPOTHESES

Chapter two gives the literature review, a description of Easterlin's and Crimmins theory, the theoretical and operational framework and the hypotheses.

2.1. INTRODUCTION

The causes of recent fertility declines, both in developing and developed countries, remain in some dispute and probably will be for many years. In broad terms, the dispute relates to the relative importance of changes in social and economic factors as compared to the role of family planning programs. There is consensus that low fertility is always found in societies that have become industrialized and modernized, but there is increasing evidence that a high degree of modernization is not a necessary condition for achieved low fertility. Although definitive answers about the causes of fertility decline are likely to elude us, some degree of consensus seems to be emerging. Marriage patterns in terms of age at first marriage, proportion married account for a substantial part of recent decline, perhaps one third in developing countries, but marital fertility itself is the major component even against differences in age structure.

Social settings or development has a substantial relationship to fertility decline, certainly on a holistic basis, and probably selective with regard to health and education status. Family planning programs have a significant, independent effect, certainly in developing countries with favourable settings as well. Moreover, the longer the program and the clearer its demographic intents, the greater its effects. Social settings and family

planning programs together predict or "explain" a large part of fertility decline (Mauldin, 1980).

The diversity of experience among less developed countries is broadly consistent with the diversity already noted among the developed countries. Two new variables affected fertility change in the period since 1950. Most governments in developing countries have pursued explicit fertility reduction goals and urged their citizens to reduce family size. The other variable was the increasing availability and quality of contraceptive methods and services. The uneven administration of population policy and the uneven extension of modern contraceptives technology to potential users are both factors explaining some of the diversity in economic and demographic performance which economic development alone cannot explain (McGregory, 1985).

2.1.2 FAMILY PLANNING PROGRAMS AND FERTILITY CHANGE

The decline in fertility that occurred in Asia in the period since world war II, is perhaps more comprehensively and accurately documented than transitions in any other major regions. This is because it has occurred under the watchful eye of scientist fully expecting to observe fertility decline and the concerned gazes of anxious policy
makers fearful of the detrimental consequences of continued high fertility. It is common to associate fertility decline in Asian countries with the widespread use of modern contraception. While it is true that replacement level fertility was attained in East Asia in the 1980s and may be attained in Thailand soon, was chiefly the consequence of contraceptive practice in combination with induced abortion, the major contribution of nuptiality changes is often lost sight of. It is difficult to deny that the national family planning programs played an instrumental role in fertility decline, at least initially (Casterline, 1991).

Rosenzweig and Wolpin (1982), estimated that doubling the number of villages with a

family planning clinic , from 2 percent to 4 percent in India in 1970, would have lowered the TFR by 13 percent. Shultz (1971) estimates that in Taiwan, in the mid 1960s, a 1 percent increase in the number of field workers per 1000 women of reproductive age was associated with a fertility decline of between 1 percent and 2 percent. However, there is weak evidence on the ways in which differentials in socio

economic characteristics of couples made these effects large or small (Birdsall, 1985).

The average annual crude birth rate in India was about 45 per 1000 population for the decade 1951 61. Estimates for the period 1961-71 are less certain, although a number of scholars have derived estimates of 40-42 during this period and 36-37 in 1977. These figures suggest a decline in the crude birth rate (CBR) of about 10 percent between 1951-61 to 1961-71. India was the first country in the world to adopt a population policy designed to reduce rates of population growth in 1952. A distinctive feature of the Indian family program has been its reliance on vasectomies, particularly in some states. The evidence of the family planning program is unmistakable in that fertility has fallen significantly in India during the past 25 years even though the level of fertility is not known with precision. The decline was a remarkable achievement given that India's per capita income is low with a slow rate of increase (Mauldin, 1980).

Over the past two decades, a series of carefully conducted studies of the institutional determinants of fertility have concluded that major demographic effects are not to be anticipated from supply oriented policies in rural Bangladesh. In Matlab, where a rural pre-transitional population subsists in a state of great poverty, substantial demographic change has occurred in response to supply oriented policies. This challenges the view that population problems in traditional societies can not be solved with the provision of commodities, facilities or imported

service strategies. An appropriate system and supply, with structures and functions that are adopted to familial needs and interfaced with village institutions, can profoundly affect reproductive behaviour, even in the absence of societal conditions that independently induce demographic change. It demonstrates that the supply side can comprise an important institutional determinant of fertility change. It further demonstrates that demand represented a necessary, but not sufficient condition for fertility decline, since rigorous contraceptive service delivery was the critical catalyst of the Matlab fertility transition. It challenges the view that demand for contraception arises from economic improvement or social betterment alone, or that development is a pre-requisite to supply-side success (Phillips et al, 1987).

Indonesia has a very low per capita income, a low rate of economic growth, low life expectancy, high infant mortality rate but a moderate rate of literacy. It is thought that fertility changed little from 1950 until the late 1960s but there are indicators of substantial change during the 1970s. In 1968, Indonesia embarked upon a large-scale family planning program and it is normally thought to be the most vigorous, most effective program in the world. The number of family planning acceptors has been remarkably high, and therefore, it is reasonable to suppose that fertility rates have continued to decline. Indonesia's success with its family planning program has led to optimism regarding further declines in fertility (Mauldin, 1980).

Thailand is currently in the midst of a major decline in fertility. Although it is difficult to date precisely when the decline began, most evidence indicates that the decline started to gain momentum during the 1960s. Contraceptive knowledge has increased rapidly in the recent past to a point where it is now close to universal among married women. The practice of contraception has increased dramatically as well. The fall in fertility and increase in contraceptive use were practically pronounced in the rural section of the population. The

national family planning program facilitated the rapid changes that have taken place (Maudlin, 1980).

Findings from Chiang Mai Fertility Survey support findings from previous studies and provide firm evidence of the impressive impact of family planning program on family size in Chiang Mai province of Thailand, where fertility fell from a high level to below the replacement level in less than 20 years. The most striking finding was the rate of rapid decline in rural areas where it was at a higher level than that of the urban population where by late 1972 had reached such a low level that it nearly equaled the rate prevailing in Chiang Mai city. Yet differences still existed between the urban and rural areas in such "modernity" aspects as education level, electrification, water supply, home appliances, medical services and occupation. Also Chiang Mai's rapid fertility decline between 1960 and 1970 did not coincide with a change in the marriage pattern. So, marital fertility fell before age at marriage rose and this is attributed to the family planning program. The fertility decline in Chiang Mai province has been more rapid than in other parts of Thailand because of the early introduction of family planning services and the intensiveness of family planning program (Pardthaisong, 1986).

In Costa-Rica, the decline in birth rates for the period 1960-1975 was most marked between 1965 and 1975 when the national family planning program was instituted. The drop in the birth rate was not the result of changes in the age structure of the population or in the marriage or nursing practices, but resulted in the actual changes in the sexual practices of couples who used contraceptives because they wanted smaller families. The decline in fertility was continuous and sharp, beginning in 1960, with the result that the birth rate decline from 48 per thousand in 1960 to 30 per thousand in 1975; similarly, the size of the family declined during the

same period from 7 to fewer than 4 children (UN,1985).

Korea in 1962 started a family planning program that was instrumental in a sharp fertility decline. The program employed a large corps of full time field workers, set annual targets to be met by local administrative and health officials, and also involved national leaders, the mass media, the military, schools and other institutions in the legitimization of family planning and endorsement of the small family concept. The family planning program was frank and vigorous in its advocacy of birth control. Through this program Korea had a very sharp fertility decline overall: for all women ages except 25 - 29, and for all married women over the age of 30. These declines were due, in various proportions in different age groups, to later marriage, to abortion, and to the program (Kim et al, 1972).

Presser (1979) estimated that about one-third of all Puerto-Rican mothers aged 20 to 49 in 1965 were sterilized. In her study women were sterilized early in their reproductive span. She found the median age when being sterilization to be 26 years. For women in stable first marriage the median number of years married when sterilized was six. The widespread prevalence and early timing of sterilization suggested a substantial impact on fertility. Analysis of the age pattern of the decline in Puerto-Rican fertility since 1950 provided further evidence of the role of sterilization as a means of fertility control. There was a notable decline both in marital and total fertility between 1950 and 1960 for women aged 25 to 39. The decline was chiefly attributed to the increased prevalence and early timing of sterilization. The decline of Puerto-Rican fertility continued since 1965 at an accelerated rate and sterilization played a major role as well as an increased number of women practicing other methods of fertility control prior to the attainment of their desired family size among other secondary factors (Presser, 1979).

2.1.3 SOCIO-ECONOMIC DEVELOPMENT AND FERTILITY CHANGE

In strictly economic terms, development is the capacity of a national economy, whose initial economic condition has been more or less stable for a long time, to generate and sustain an annual increase in its Gross Domestic Product of 5 percent or more (El-Badry, 1982). Such economic development has certainly occurred in many developing countries as evidenced by changes in economic indicators. However, the process itself has created structural in-equalities that did not exist previously. As a consequence, particular social groups have emerged, some of which do not benefit from development. As fertility is linked with socio-economic development, it can be expected that the fertility of these deprived groups will be different from that of the rest of the population (El-Badry, 1982).

In Singapore where fertility transition is well documented and where universal primary education had been achieved by 1960 according to UNICEF 1990, within one generation, the average number of births per woman fell from more than 6 to just under two. But, Singapore had experienced such high rates of economic growth and per capita incomes such that women's participation in the labour-force had risen rapidly and over half of the households were of the nuclear type (Lucas, 1991).

Economic-demographic changes that could have led to lower fertility have occurred in many countries outside Europe. Some low and middle income countries got an early start in economic development but have had their demographic transition thwarted (MaGreevy, 1985).

The societal settings for the Asian fertility declines have been highly diverse, economically and socially. Modernization, as conventionally defined, has not been a necessary condition, but in Asia at least it appears to be a sufficient condition (Casterline, 1991)

In China, despite low-income level, fertility declined more than in any country. Neither

low income nor the late start in development inhibited China's demographic transition. The Chinese case shows that political commitment can substitute for the lack of prior development previously thought necessary to permit fertility decline. India, Sri-Lanka, Thailand, Vietnam and the Philippines have also achieved large reductions in fertility at low levels of income (Kouaouci, 1992).

In Brazil, the decline in fertility began during a period of rapid economic expansion, suggesting that it may have been driven by economic development. It continued during a period of severe recession and it was even more during the economically depressed 1980s than those that occurred during the economic growth years of the 1970s (Lam, 1992).

There are a number of factors that make Costa-Rica a special case, the demographic transition, and particularly the decline in fertility, coincided with dynamic economic and social development which resulted in radical changes in the production structure, the standard of living and social conditions. The far reaching changes that Costa-Rica experienced in the period beginning with the 1948 revolution could be seen in 1970 in different areas of national life. There was a substantial change in the composition of the GDP, a reduced role for agricultural production with parallel growth of the industrial sector, a significant expansion of the state bureaucracy to the point that it became a decisive factor in guiding the country's destiny. There was also a rise in school enrolment which improved a series of health sector indicators, and morbidity of a large proportion of the economically active population from agricultural occupations to urban employment (UN, 1985).

In Korea, the initial fertility decline was a joint product of the favourable socio-economic conditions and the national family planning program, which undoubtedly contributed later to an acceleration of the reduction in fertility. Celibacy had never been culturally supported in Korea.

Fertility control, therefore, seems to have been the only alternative for the Korean population and they were ready to accept and practice contraception. The government organized family planning efforts have been vigorous and successful in providing contraceptives which were available as early as 1960 (Kim, 1992).

The recent decline in Cuba's fertility is one of the most rapid declines ever recorded. From a level of 35 births per 1,000 population in 1963, the crude birth rate dropped by 60 percent to a low of 14 births per 1000 in 1980. Age Specific Fertility Rate also declined in all ages albeit not uniformly. The TFR declined from 3.7 in 1970 to 1.92 in 1978 and to 1.81 in 1979. Contrary to the situation in China, Costa-Rica, Taiwan, Singapore and other countries undergoing rapid and significant fertility decline, in Cuba, it took place in the absence of explicit policies to produce that effect. The fertility change occurred in a national context of considerable social, economic and political change.

Cuba had relatively high levels of income and consumption, fairly advanced medical and sanitary standards, a comparatively well developed system of education and other social facilities. There was also a high proportion of persons of European origin, a fairly irreligious and urbanized population and a rather large middle class that aspired to high levels of consumption. By the 1970s, the social reforms that had been initiated especially in education and health had produced a generation that was entering the reproductive ages with relatively high levels of "modernity" as measured, for example, by the level of educational attainment. Socio-economic conditions underlying the rapid fertility decline of the 1970s were socio-economic reforms and modernization efforts, a severe housing shortage which lowered the marriage rate for young couples, a return of economic differentiation which resulted in higher prices for consumer goods, higher domestic budgets and even some re-emergence of unemployment (Lisandro, 1982).

2.1.4 FEMALE EDUCATION AS A DETERMINANT OF FERTILITY

A negative correlation between education and fertility is one of the most widely observed empirical relationship in research on fertility. According to Caldwell (1982), the coincidental timing of the attainment of mass education and the onset of fertility decline is probably neither fortuitous nor due to a third factor dictating the exact timing of both. Hence, when mass education is achieved it is associated with the beginning of a fertility decline. According to Caldwell's wealth flow theory (1982), mass education leads to changes in the family economy which in turn change fertility (Lucas, 1991).

The education of women in Brazil has changed in important ways in recent decades. First, there has been a substantial increase in the mean level of education for both men and women, although this remains low by international standards, mean years of completed schooling for women more than doubled in the three decades between the 1925-27 cohort and the 1955-57 cohort. Women's education has been rising at a faster rate than that of men for the last four decades. These trends in education are likely to have played a critical role in Brazil's most recent fertility decline. Based on estimates from decennial censuses and the 1984 National Population, Development and fertility supplement, the TFR for all of Brazil fell from 5.75 in 1970 to 4.35 in 1980 to 3.53 in 1984. Although the level and the pace of fertility decline varies across Brazil's widely diverse regions, fertility has declined significantly in both the higher income Southeast and the poorer less developed Northeast. Brazil's decline unlike other Latin American countries, began during a period in which there were only modest family planning programs and in which government policy was relatively pro-natalist (Lam, 1992).

London and Haden (1989), attempted to test Caldwell's hypothesis concerning mass

education and fertility decline in Thailand. They wanted to find out whether education changes might be more important to fertility decline than are economic growth and development. Their analysis examined at trends in both the dependent variable fertility, and independent variables, in contrast to fertility analyses based on cross-sectional data on the dependent variables. However, they may have in fact been measuring the continuation of fertility decline rather than onset.

Using the WFS results, Kabir (1980) gives the percentage of women with no schooling age for 6 Asia countries and 4 Latin American countries and using other data given when fertility began to decline in most of these nations. If attainment of mass education is the year by which 90 percent of a cohort of women had received some schooling, Bangladesh and Pakistan were clearly not approaching this situation, nor had their fertility began to decline. In Colombia however, in 1979, 90 percent of women respondents around age 26 were presumably in primary school in late 1950s and fertility began to decline in the next decade (WFS, 1978). For Malaysia and Peru also, fertility began to decline in the same decade when the 90 percent school attendance was reached.

Some African countries seem unlikely to achieve mass education because of the deteriorating economic circumstances, such a situation would be compounded when the number of children of primary school age is growing rapidly. According to Shultz (1993), the conclusion that compulsory universal education triggers the decline in fertility is not tenable given what we know of the legislative record and enforcement capabilities of most low income countries. The attainment of mass education may be a necessary condition for the beginning of a fertility decline but not a sufficient condition. In some situations, intervening variables may cause a lag between the attainment of mass education and the achievement of fertility decline (McGreevey, 1985).

2.1.5 MARRIAGE FACTORS IN FERTILITY

Marriage influences the reproductive behaviour of individuals and determines a society's fertility level in many ways. It determine to a large extent what proportion of women ultimately engage in reproduction, when reproduction starts and how large on average a woman is exposed to childbearing. Universality of marriage, age at marriage, widowhood, divorce practices and remarriage patterns are the major direct determinants of all the marital structure of a society, however, all of these converge into the proportion of currently married individuals.

Most births in Korea occur within wedlock. In traditional Korea, illegitimate children were rare due to the custom of extremely early marriage and social approval of concubinage. Profound social and legal sanctions are known to be exercised against illegitimate children. Proportions of currently married women of reproductive age declined substantially since 1960. The changing pattern differs greatly according to age, the proportion decreased in the age groups below 50 and increased at age 30 and above. The proportional decrease at younger ages is mostly explained by the rising age at marriage and the increase at older ages by the decreasing risk of mortality (Kim, 1992).

Although the existence of the family planning program and its considerable efficiency has been a major force in accelerating the fertility decline in Rural South India, there is little doubt in the community that there have been underlying forces reducing the value of unrestricted fertility. The changing value of children and the increasing cost of children as well as the expansion of schooling led to changes in the attitude towards children. The level of female education has also been rising rapidly. The increase in non-agricultural employment and the provision of schooling created a situation in which there are real choices to be made (Caldwell et al, 1982).

2.1.6 AFRICA'S FERTILITY SITUATION

There was at first some reluctance to accept the reality of any fall in fertility in Sub-Saharan Africa. By 1990 it was clear, from the more sophisticated cohort analysis and , where possible, the comparison between two or more surveys, that birth rates had probably fallen by 15-25 percent in Botswana, Zimbabwe, and Kenya which exceeded by a substantial margin the 10 percent fall that has come to be conventionally accepted as indicating the onset of irreversible fertility transition. The most striking common characteristic of these three countries is that they alone in the region exhibit infant mortality rate below 70 per thousand live births. It also suggests that the attainment of this level of infant mortality may prove to be the necessary condition for African fertility decline. Consistent with this suggestion is the fact that little fertility decline has occurred in those parts of Kenya with higher infant mortality (Caldwell, 1992).

In most of Sub-Saharan Africa, use of contraceptive methods is primarily motivated by the desire to space births or avoid premarital or extra marital pregnancy, rather than to stop childbearing. In 1971, Botswana joined a small group of African countries that adopted population policies to reduce their high growth and fertility rates. Its family planning program ranked by Maudlin and Ross (1991) as the strongest on Sub-Saharan Africa. Contraceptive use increased from 12 percent among currently married women to 33 percent. Fertility on the other hand, declined sharply from 7.1 children per woman to 4.9, a decline of a little more than two children in a relatively short period of time (Gule, 1994).

Botswana, Zimbabwe, and Kenya also exhibit unusually high levels of education. Christianity, Islam, and Western education have undermined much of traditional society, even

the reverence for ancestors. The importance of lineage and, with it, the practices of fostering are weakening. In some countries, statutory law is tackling the question of widows right to inherit. The share of population living in urban areas and the share of labour-force engaged in non-agricultural employment are increasing (Caldwell et al, 1992).

2.1.7 KENYA'S FERTILITY DECLINE

A recent analysis of the Kenyan fertility decline identified some factors such as rapid social change especially increased formal education for women, greater government legitimization of family planning, greater bureaucratic efficiency, especially in organizing the distribution of contraceptives and the continued global growth in the acceptance of family planning programs (Sinding, 1991).

A study carried out among employees working in the formal wage sector found that parents in Kenya favour their children with educational resources whatever the ultimate family size. A rising rate of return to level of education permits family resources to be increased in this way. One element that might favour the educational attainment of youngest children in large families is that parents in Kenya are able to exert considerable control over the labour income of their eldest children. It may be that within large families, by the time the youngest children are born, parental income begins to increase owing to income remittances from their eldest children and would then be used to finance the education of the younger children. Therefore, it concluded that extension of formal schooling should not be considered as a straightforward policy instrument for reducing family size in Kenya. As long as rates of return to education rise with increased schooling, and as long as educational advantaged children can be induced to make income remittances to parents, the parental budget constraint that operates to restrict family size

is weakened (Gomes, 1984).

It has been argued that in Kenya, the transition to emotional nucleation within the emerging urban middle class is already well advanced. Among the many ethnic groups-in particular the Gikuyu-couples have adopted or are seeking to adopt the complex specialized culture that is associated with the industrialized world. There is a move towards economic and emotional nucleation. The study consisted of a sample of 836 male household heads under the age of 55 years. In terms of parental support couples in the "modern" category providing the least parental support desired fewer children, had fewer children and lost fewer children than "traditional" respondents. Emotional nucleation was found to be positively associated with approval of contraceptive use and negatively associated with levels of fertility. Emotional nucleation was also positively associated with education. The researchers concluded that neither economic nor emotional nucleation in rural Kenya was at a level sufficient to encourage the general acceptance of new or modern fertility values and behaviour (Dow, 1983).

The near universality of the decreases in fertility in Kenya indicate that the determinants of the decline have a strong central component affecting geographical and social categories of the population in a similar way although not to the same extent. Increase in contraceptive use was the most important proximate cause of the fertility decline. Increase in contraceptive use has been influenced by increase in the number of family planning service delivery points at the district level, income and exposure to modern ideas such as electricity, mass media, and density of roads within a district. Decrease in infant mortality rate as a result of female education and adult literacy also played a major role. Kenya has undergone enormous socio-economic development through it's adoption of liberal economic policies as well as improvements in public sector, health and education sector (Brass, 1993).

There are considerable variations in fertility between the urban and rural sector for each province in Kenya. Urban completed fertility is systematically lower than rural fertility in every province of Kenya. The highest fertility in Kenya is found in the Western and Nyanza provinces if Kenya. The differentials in fertility undoubtedly reflect not only variations in fertility attitudes between the different ethnic groups in Kenya, but in addition, differences in values regarding marriage, including variations age at first unions, ideas regarding polygamy and tendencies and values in connection with marital dissolution (Henna, 1979).

Kenya is, at last, experiencing an increasingly rapid uptake of contraceptive use after a long period of largely unfruitful efforts by the government and donor agencies. From a level of 7 percent contraceptive prevalence among currently married women of fertility age in 1977-78, the contraceptive prevalence rate (CPR) rose to 17 percent in 1984, 27 percent in 1989 to 33 percent in 1993. The TFR fell from 7.6 children per woman in 1984, 6.7 in 1989 to 5.4 in 1993 and a number of smaller-scale surveys and the monitoring of contraceptive prevalence is continuing to increase and fertility rates are falling. The probable causes of the sudden take-off of family planning in Kenya have recently been reviewed and seen to relate to both demand and supply factors. Although the harsh realities of the structural adjustment era in Africa undoubtedly provide the most pressing collective impetus to limit family size, improvement in Information, Education, and Communication (IEC) and distribution logistics have clearly facilitated the adoption of effective contraception (Ferguson, 1992).

2.2. THEORETICAL FRAMEWORK

This section gives the theoretical framework used in the study and the operational hypotheses. Easterlin and Crimmins supply demand theory was selected for this study as it was developed to analysis World Fertility Survey (WFS) and the Demographic and Health Surveys are a continuation to the World Fertility Surveys. Easterlin's theory is also developed to explain fertility behavior in developing countries.

2.2.1. EASTERLIN AND CRIMMIN'S SUPPLY-DEMAND THEORY

Easterlin's theory is cast explicitly in terms of modernization, stressing the effects of both structural and attitudinal consequences of socio-economic change. This perspective deviates from many other modernization theories in its explicit economic orientation although modernization is typically used to cover an array of social, demographic, psychological, political and economic development. The modern decline in fertility is seen as an intrinsic part of his process, especially through the use of attempts to deliberately control and restrict family size (Graff, 1979).

According to Easterlin and Crimmins, modernization consists of structural change, which affects political, economic and social dimensions of the society in which it occurs. During the process of economic change, modernization increases per capita income. As part of the economic transformation, a major industrial, occupational, and spatial re-organization of productive resources occurs at the same time as monetization of the economy.

As a social as well as a demographic phenomenon, modernization alters the level and structure of fertility, mortality and migration patterns; and the type and structure of the family; education and health services. Changes of this magnitude are normally associated with

improvements in income levels and a weakening of the stratification system which, in tum, foster the re-organization of social institutions and the political systems. There arises a growing demand for democratic forms of participation, challenges to parental authority, a search for rational decision-making, and increased respect for individual needs.

Demographically, the major change is related to fertility and the possibility and will for controlling it. Modernization also re-organizes family life which it produces, profoundly affecting both the number of children and the standard of child quality whereas a rise in the relative prices of inputs required for children would lead to substitution against both child numbers and child quality. Subjective preferences relating to child quality might change leading for example to greater emphasis on number of children.

Supply of Children

This is the natural fertility of a couple and the chances of child survival. This will fall short of reproductive potential because physiological conditions limiting fertility such as, malnutrition, or because of cultural circumstances such as, breast feeding practices or an intercourse taboo which have the unintended effect of lowering fertility.

Cost of Fertility Regulation

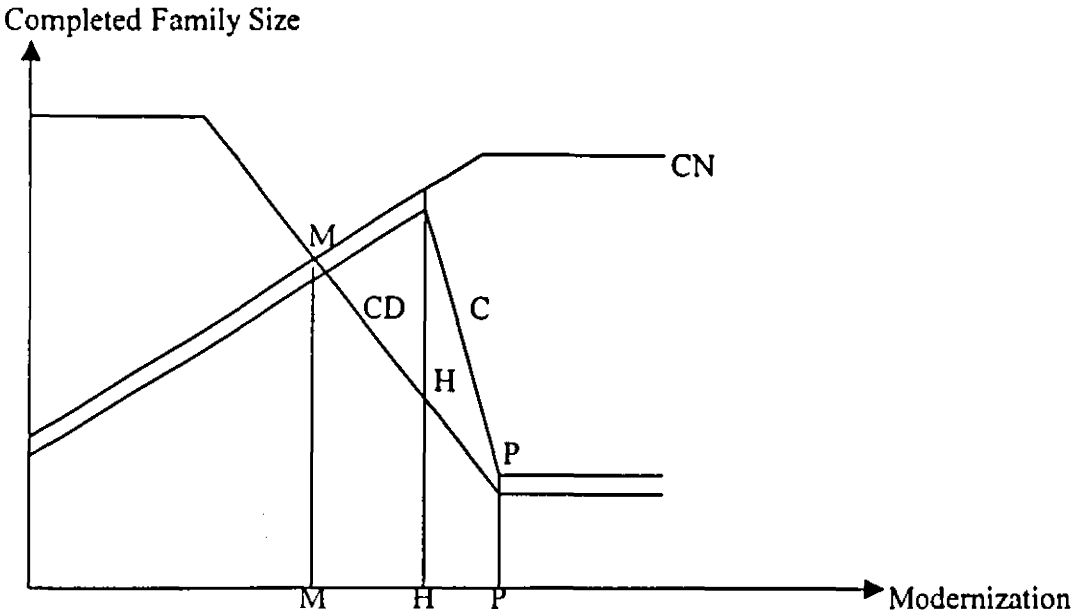
This refers to couples attitude toward, and access to fertility control methods and supplies, distaste for the general notion of family planning and the drawbacks of specific techniques like abortion and the economic cost of control such as the time and money required to procure family planning services. Most family planning programs lowers market costs by increasing information and providing services free or at low cost. The lower the cost therefore

the greater would be the adoption of fertility regulation and the more nearly would be the number of children correspond to the number they desire. When costs are high the lower would be the deliberate control of fertility and the greater would be the number of unwanted children especially when motivation is low.

The potential supply of and the demand for children jointly determine the motivation for fertility regulation. If the potential supply falls short of demand then there's no desire to limit fertility. Households might have knowledge of the means regulating fertility but there would be no incentive to use them hence the number of children would correspond to their potential supply. If the potential supply exceeds demand, the parents would be faced with the prospect of having unwanted children and would be motivated to regulate their fertility. Only if there are economic and social changes leading people to desire smaller families, will deliberate fertility control be adopted. Even if demand remains constant an increase in supply can increase motivation and generate a need for fertility control.

Therefore the typical couple's decision whether or not to limit family size is viewed here not as a highly formal decision, but a gradual response to the balance between demand, supply, and regulation cost.

Figure 2.1. THE EASTERLIN (ESF) FRAMEWORK



Source: Easterlin/Crimmins, 1983.

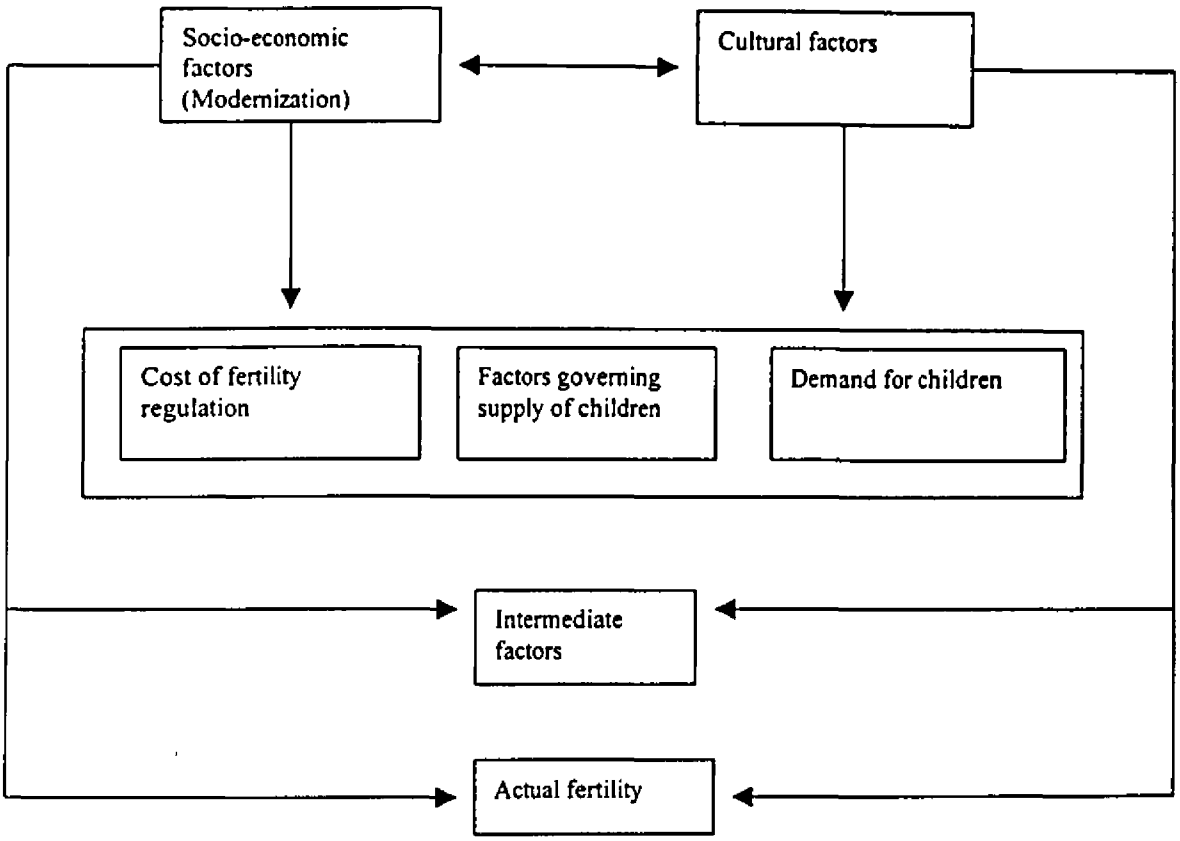
Supply of children (CN) rises as development reduces mortality, nutritional and other constrains to fertility. Demand for children (CD) is high in the beginning but falls as development occurs. Demand and supply of children are equal at point M hence a point of an equilibrium. To the left of point M, there is excess demand (CD) over supply, and to the right, there is excess supply of children (CN) over demand (CD). Actual fertility (C) is above the ideal demand for children (CD) between points M and P, this divergence allows for the impaired ability of couples to achieve their actual desire owing to imperfect fertility regulation.

Efficiency and availability of means of fertility regulation improves with modernization and by point P, the two curves coincide hence demand for children or actual desired number of children (CD) equals actual fertility (C). The decline in the demand for children is due to the

rising cost of children with development. Demand and supply of children measured on the vertical axis are functions of "modernization" measured on the horizontal axis. Demand and supply of children define rather than cause motivation to control fertility. Motivation arises at point M when surplus supply becomes apparent either because of declining demand for children, rising supply or the combined effect of both hence, reduction in demand.

2.3 CONCEPTUAL FRAMEWORK

Figure 2.3. Conceptual Framework

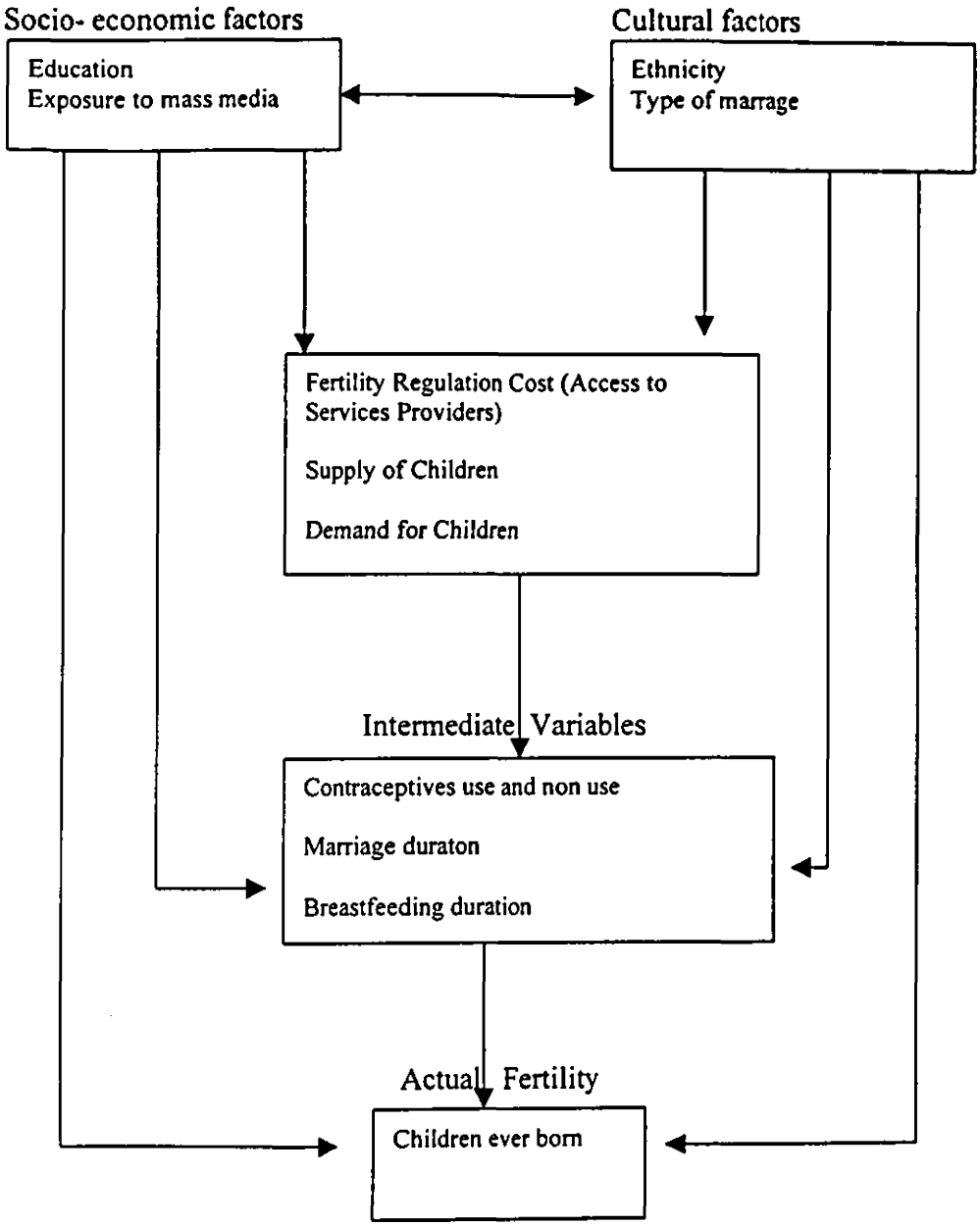


Source: Adopted from Easterlin/Crimmins Framework, 1985

This framework is adopted from Easterlin's model. The major change brought about by modernization, is related to fertility and the possibility and will for controlling it. Parallel to this revolution in fertility levels, an annual significant transformation occurs in the mechanism that makes fertility choices possible. This process can be conceived of as a shift from a situation where control is exerted through biological and social mechanisms to another in which fertility control results from deliberate decisions on the part of the individuals.

2.4 OPERATIONAL FRAMEWORK

Figure 2.4 A modification of Easterlin's Framework



Source: Adopted from Easterlin/Crimmins Framework, 1985

2.5 OPERATIONAL HYPOTHESES

Differences in fertility levels between the three regions, is likely to be caused by differences in education and exposure to mass media.

The differences in fertility levels between the three regions can be explained by varying supply and demand for children.

The differences in the fertility levels in the three regions can be explained by differences in accessibility of family planning supply points and or use of contraceptives.

The differences in marriage duration and breastfeeding duration can explain the variation in fertility levels.

CHAPTER THREE: METHODOLOGY

In chapter three, methods of analysis used in the study, the data used and the variables have been defined. The Analysis was done in three stages therefore the method of analysis and the variables used in each stage have also been described.

3.1. DATA SOURCE

The source of data used for this study are drawn from the Kenya Demographic and Health Survey 1993 (KDHS II). National Council for Population and Development, and the Central Bureau of Statistics conducted KDHS (II). It was conducted within the framework of the DHS Program of Macro International Inc. Funding was provided by the U.S Agency for International Development. Data for the KDHS was collected from 7,950 households and complete interviews were carried out among 7,540 women aged 15-49 and 2,336 men. The interviews took place between 17 February 1993 and 15 August 1993.

3.1.2 SAMPLING TECHNIQUE

The KDHS used a two-stage, stratified sample consisting of 536 clusters. First Districts were sampled out from each of the selected provinces then from each District the final clusters were selected. The KDHS used the National Sample Survey and Evaluation Program (NASSEP II). NASSEP is a cluster sample of households maintained by the republic of Kenya's Central Bureau of Statistics (CBS, 1985). The NASSEP II sample covers roughly the lower half of the country, containing 95 percent of the population and 32 of the Country's 41 administrative Districts.

NASSEP III is a third in a series that has seen a progressive improvement in coverage

and maintenance of the sample. The rural portion of NASSEP II sample frame consists of 24 geographical clusters in each of the 32 included administrative districts. The target number in each cluster is 150, although this numbers may vary. The cluster boundary definitions are also subject to adjustment over the 5-year life of the sample frame in order to account for the population shifts. The KDHS sample was designed to derive stable District level demographic estimates in as many Districts as possible and province level estimates for other Districts.

SAMPLE SIZES OF SELECTED PROVINCES RELEVANT TO THE STUDY

Not all districts were sampled out from each of the three provinces. Hence, in Central province two Districts were sampled Muranga and Nyeri Districts. In Nyanza province, South Nyanza, Siaya, and Kisii were selected while in Western province Bungoma and Kakamega districts were selected.

The number of selected households in Central province were 1,339 where 1,129 eligible women aged 15-49 were interviewed. In Nyanza, 1,523 households were selected and 1,350 eligible women were interviewed. In Western, 898 households were selected and 963 eligible women interviewed. The percentage coverage in all the three provinces was over 90 Percent. In this study only ever-married women from the three provinces were selected for analysis purposes. In Central province there were 687 ever-married women, 941 in Nyanza and 671 in Western province.

3.1.4 OBJECTIVES OF KDHS II

The survey had a number of objectives both general and specific, which it aimed to achieve. The general objectives were to assess the overall demographic situation in Kenya and assist in the evaluation of the population and health programs in Kenya. The other general objective was to advance survey methodology and assist the NCPD to strengthen and improve its technical skills.

Among the specific objectives, the survey aimed at providing data on family planning and fertility behaviour of the Kenyan population to enable the NCPD to evaluate and enhance the National Family Planning Program. The other objective was to measure changes in fertility and contraceptive prevalence and at the same time study the factors which affect these changes, such as, marriage patterns, urban/rural residence, availability of contraception, breast-feeding habits and other socio-economic factors. The last objective was to examine the basic indicators of maternal and child health in Kenya.

3.1.5 QUALITY OF KDHS II DATA

Usually, two types of errors, non-sampling, and sampling error affect results from sample surveys. Non-sampling error is due to mistakes made in carrying out field activities for example, failure to locate and interview the correct household, errors in the way questions are asked, data entry, and so on. This type of error can only be minimized in surveys. The sampling error is a measure of the variability between possible samples. It is usually measured in terms of the standard error.

The relative standard error in KDHS II for most of the estimates was found not to be large for the whole country. The magnitude of the error increased as the estimates of the sub-

populations such as for particular provinces and Districts are considered.

Sample surveys can be very accurate when done carefully and the savings in time and money should be obvious. It also achieves a greater response rate and greater co-operation in general thus increasing its accuracy. In order to reduce errors in the field, highly qualified staff were recruited and the criteria included ability to speak at least one of the eight local languages in which the survey was conducted, educational attainment, maturity and experience in other surveys. There was an intensive training for four weeks. There were also permanent field supervision and spot checks.

3.2 METHODS OF DATA ANALYSIS

Easterlin's approach involves a three-stage analysis of fertility determination proceeding backward from fertility behaviour to its more remote structural determinants. The first stage consists of an individual-level intermediate variable analysis of the proximate determinants of fertility. In the second stage use of fertility control (an intermediate variable) is selected for analysis in terms of the impact of the differences in motivation and the costs of regulation on fertility control. Finally in the third and last stage the variables entered in the previous stages are treated as dependent variables to be explained by family background characteristics as well as women's cultural values and practices. The fitting of the regression model was done by computer where all the variables were entered, and the computer selected the variables according to the significance.

STAGE ONE ANALYSIS: METHOD OF ANALYSIS AND VARIABLES USED

Intermediate variable approach and regression analysis has been used to explain the dependent variable children ever born (CEB). The intermediate variables used are marriage duration, proportion of child mortality, contraceptive use and breastfeeding duration. Marriage duration and proportion of child mortality were expected to be positively associated with numbers of children ever born. Contraceptive use was expected to be negatively related. Breastfeeding duration was expected to be negatively associated with numbers of children ever born. The method used for the analysis is least square regression. The results of bivariate analysis have been used as opposed to multivariate analysis because the study objective was to find out how each of the independent variables behaves with the dependent variables.

VARIABLES USED IN STAGE ONE ANALYSIS

Dependent variable

- Children ever born (CEB)

The respondents total number of children ever born alive.

Independent variables

- Breastfeeding duration (BRESDUR).

Length of breast feeding of the last child of the respondent in months. The last child is used with the assumption that it is highly correlated with breast feeding duration of the previous births.

Has 4 categories BRESDUR1, BRESDUR2 BRESDUR3 and BRESDUR4.

BRESDUR1 refers to 1 - 10 months.

BRESDUR2 refers to 11 - 20 months.

BRESDUR3 refers to 21 - 30 months.

BRESDUR4 refers to 31+ months.

The reference category is BRESDUR1, the other categories take the code 1 if the case 0, otherwise.

- Marital Duration (MARDUR).

Duration of the respondents marriage in years. It is constructed by subtracting the age of marriage from the age of the respondent at the time of the interview. This variable is used with the assumption that the marriage in reference is the respondent's first and only marriage.

Has 3 categories MARDUR1, MARDUR2 and MARDUR3.

MARDUR1 refers to 0 - 4 years in marriage.

MARDUR2 refers to 5 - 19 years in marriage.

MARDUR3 refers to 20+ years in marriage.

The reference category is MARDUR1, the other categories take the code 1 if the case 0, otherwise.

- Contraceptive Use/Non use (EVERUSE)

Use of contraception is broadly defined to include the modern methods of contraception, traditional or natural methods as well as folkloric methods. Breastfeeding is not included as a method of contraception.

Has 2 categories EVERUSE1 and EVERUSE2.

EVERUSE1 refers to those who have never used any contraceptive method, while EVERUSE2 refers to those who have used any method of contraception.

The reference category is EVERUSE1, the other, EVERUSE2 takes the code 1 if the case 0, otherwise.

METHOD OF ANALYSIS USED IN STAGE ONE ANALYSIS

Regression Analysis

This is the most widely used of all available statistical techniques. It measures the nature of the relationships between variables. Regression involves finding the straight line that provides the best fit to points plotted and then using the equation of this line and knowledge of X or dependent variable to predict the unknown Y or independent variable hence regression of Y on X. Regression equation applies a functional rule to make predictions about Y values from knowledge of X values (Hays, 1973). Regression analysis was be used for determining the

probable form of the relationship between variables. The ultimate objective when using this method of analysis is usually to predict or estimate the value of one variable corresponding to a given value of another variable.

Use and Advantages of Regression

Regression is used for prediction purposes. It is also used to determine the important variables that influence the dependent variable. Regression can also be used to find the best linear prediction equation and evaluate its prediction accuracy. It has also been used to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables. It has also been used to find structural relations and provide explanations for seemingly complex multivariate relationships.

One advantage of regression is that it is sufficiently developed that assumptions about the behaviour of disturbance terms are explicit (Blalock, Jr., 1972).

Assumptions of Multiple Regression

There are certain assumptions that have to be considered when using regression. However, problems are encountered when certain of the regression assumptions seem questionable (Lentner, 1972).

1. Xi variables may either be explanatory or predictor variables.
2. For each combination of Xi values, there is a normally distributed sub-population of Y variables. In experimental applications we often are in a position to select fixed levels of X or dependent variable hence since the value of Y or independent variable is under our control we seldom worry about this assumption. However, in many experimental situations even this

assumption is naive since in manipulating the dependent variable one may inadvertently affect other factors left out of the equation and therefore contained in the disturbance term.

3. The variances of the sub-population of Y values are all equal.
4. The Y values are independent.

Most of the problems like linearity of the model, equality of variances, equality of slope for similar experiments require sufficient amount of data to correct these problems (Lentner, 1972).

The Least-Square Line

The distribution of cases on the X and Y axis can be plotted in the conventional manner to form a scatter diagram and then approximate these points by some sort of a best-fitting curve. One way of doing this is to draw by inspection. Another more precise method is the method of least squares (OLS). The least square criterion involves finding the unique straight line which has the property that the sum of squares of the deviations of the actual Y values from this line is a minimum (Blalock, 1972). The formula of obtaining the best fit line is given as

$$Y = a + bx$$

Where:

$$b = \frac{n\Sigma x_i y_i - \Sigma x_i y_i}{n\Sigma x^2_i - [\Sigma x_i]^2}$$

$$a = Y - bx$$

Simple Linear Regression

This is the simplest type of functional relationship, it is the regression of Y on X. This analysis is concerned with the relationship between two variables X and Y, X being the independent variable and Y the D

Dependent hence regression of Y on X. The formula is given by

$$Y_i = \alpha + \beta_i + e_i$$

Where Y_i = value of the Y variable

X_i = value of the X variable

α = regression constant is the point at which the regression line crosses the Y axis and represents the predicted value of Y when X = 0.

β = non-standardized regression coefficient is the slope of the regression line and indicates the expected change in Y with a change of one unit of X.

Multiple Regression

In multiple regression attempt is made to predict a single dependent variable from any number of independent variables (Blalock, 1972). The equation is given as

$$Y_i = \beta_0 + \beta_1 x_{ij} + \beta_2 x_{2j} + ... \beta_k x_{kj} + e_j$$

Where Y = dependent variable

$\beta_0, \beta_1, ... \beta_k$ = Partial regression coefficients

$x_{1j}, x_{2j}, ... x_{kj}$ = Observed values of the independent variables $X_1, X_2, ... X_k$.

Co-efficient of Determination

The co-efficient of determination provides an objective measure of the goodness of fit and it's denoted by R2. R2 ratio determines the proportion of the variability of Y that the regression function explains. It is the proportion of the total variation in the independent variable explained by the dependent variable (Blalock, 1972). The best the fit of the computed regression line, the closer R2 will be to 1. R2 lies between $0 < R2 < 1$ since the sum of squares cannot be negative nor can the numerator exceed the denominator (Lentner, 1972).

The co-efficient of multiple determination provides an overall measure of the adequacy of the equation and analysis of variance and the F-test as an overall significance test for regression. The amount of variation of dependent variable Y explained by the independent variable in the regression model is therefore measured by R2. If $R2 = 0$, there's no correlation between Y and independent variables X. The higher the value of R2 the better fit the regression line. Regression coefficients give the value by which one variable changes for a unit change in the other variable.

Student "t"-test of Significance

Student's t test is the statistic used in calculating the probability associated with the null hypothesis. It is generally applicable to a normally distributed random variable where the mean is known and the population variance is estimated from a sample. The formula of "t" is given as;

$$t = \frac{(x - u)}{s}$$

where x = variable

u = mean

s = sample variance

If the value of "t" is more than 1.96 the difference is supposed to be significant at specific levels of significance. If it is less, it is described as arising due to chance. Usually in the analysis of small samples, the estimation of the parameter value is not done but the observed value of the sample is found out if the sample could have arisen by sampling fluctuation from some value which is given. In the case of large samples, the value of "t" can directly tell whether the difference between actual and observed mean is significant or not. In small samples the table value of "t" is used. If the calculated value of "t" is less than the table value at a specified level of significance, the null hypothesis is accepted and the error could have risen due to fluctuation of sampling (Elhance et al, 1982).

A significant functional relation among a set of variables should not be interpreted as a "cause - and - effect" relationship. All that could be said is that prediction is better since the dependent and independent variables used in the investigation might by highly related to other variables which are in fact causing the experimental variable to change on the fashion exhibited by the data (Lentner, 1972).

STAGE TWO ANALYSIS: METHOD OF ANALYSIS AND VARIABLES USED

Use of contraception one of the determinants of numbers of children ever born in stage 1 analysis is explained using logit regression containing three explanatory variables, cost of fertility regulation number of children desired and potential supply of children.

VARIABLES USED

- Desired Family size (DFS).

This refers to the desired family size that is number of children a respondents considered to be the ideal family size. The respondents were asked "If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life how many would that be?". For those who did not have children they were asked "If you could choose exactly the number of children to have in your whole life how many would that be?".

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$S = 1 - PROPDEAD$

$N = \beta + \Sigma i=1,^{4} \beta X_i$

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X2 = Duration of breast feeding in last birth interval

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Theoretically, the cost of fertility regulation should reflect both the monetary and psychological costs of contraception. However, with the KDHS Data, the cost of fertility regulation has limited information on the cost. The respondent's perception of the distances from her home to the nearest family planning clinic will be used as a proxy. Hence, the closer a respondent is to family planning clinic the lower are her time cost of using the clinic's facilities.

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$$P_x/q_x = \beta_0 + \beta_1 X_1 + ... + \beta_p X_p.$$

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Expressed in terms of logits, a unit change in the variable Xi, changes the logit of risk (In Px/qx) by the amount βj. The logit model is a linear function of the variables Xi,...Xp indicating that the "effect" of Xi does not depend on the values of the other variables. By introducing transformed variables such as X1, X2 or X12 in the equation one may allow for logistic interaction and non linearity. The relative importance of variables may be compared in terms if standardized coefficients. Each standardized coefficient β_1 measures the change in the logit of risk resulting from a change of one standard deviation in the variable Xi. Also considering the reduction of the logit of risk as an objective can assess the relative importance of variables. One first estimates the magnitude of the changes in each of the P variables that can be affected with a given expenditure of resources. One then ranks the variables in order of the sizes of coefficient change. There are two basic approaches in the estimation of logistic parameters (βi), maximum likelihood estimation and discriminant analysis (Schlesslman, 1982).

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Likelihood ratio test provides an alternative method of finding an approximate confidence interval for any particular parameter βj and can also be used to compute a joint confidence region for a set of parameters. In large samples a one degree of freedom chi-square test of significance based on $x^2 = [\beta / SE(\beta i)]^2$ is equivalent to the corresponding likelihood ratio test.

If the variables Xj.....Xp have a multivariate normal distribution with equal covariance matrices of the cases and controls then the maximum likelihood estimation is preferable to discriminant analysis since it does not depend on any priori assumption of multivariate normality. However, normality assumption is not always correct in most applications the discriminant function estimates can result in estimated coefficients that are incorrect. Maximum likelihood estimation gives generally slightly better fits to the logistic model and also the total expected number of cases equaling the observed total. Discriminant function approach works reasonably well if one is fitting the model to isolate relevant risk factors by means of tests of significance. Maximum likelihood estimation works well when trying to estimate the actual

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Education of the respondent in completed years spent in school.

Has 3 categories WEDU1, WEDU2 and WEDU3.

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This chapter gives the frequency distributions, cross tabulation and chi-square results, and the results of the regression analysis. Frequencies are used to show the distribution of characteristics of the study population in the three provinces that is Central, Nyanza and Western provinces.

Frequencies have been used as they show the similarities and or differences between the provinces at a glance. Cross tabulation has been used to determine whether there is any association between selected variables used in the study. These associations have been established by using the column percentages of the cross tabulation tables. The chi-square has been used to test null hypothesis that there is no relationship between the dependent and independent variables. The significance level is at alpha = 0.05 level.

Regression analysis has been used to find out how the various independent variables affect the dependent variables. This method has also been used to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables. Ever married women who have had at least two births were selected.

4.1 BACKGROUND CHARACTERISTICS OF RESPONDENTS

Table 4.1 Percentage distribution of all women by province according to various characteristics

	CENTRAL			NYANZA			WESTERN		
Total Number of Children Ever-born per woman									
Number of children									
0 - 4	61			54			47		
5 - 9	36			40			46		
10+	3			6			7		
TOTAL	100			100			100		
Duration of breastfeeding.									
Duration									
1 - 15	16			12			10		
16 - 30	38			23			26		
31+	1			2			2		
Never breastfed	2			2			1		
Still breastfeeding	42			53			56		
Breastfed until died	1			8			4		
TOTAL	100			100			100		
The Percentage distribution of Women according to duration of marriage and age									
Age	0 - 4	5 - 19	20+	0 - 4	5 - 19	20+	0 - 4	5 - 19	20+
15 - 19	11	0	0	32	1	0	31	0	0
20 - 24	59	7	0	54	15	0	54	17	0
25 - 29	23	30	0	10	32	0	12	29	0
30 - 34	7	37	0	3	37	0	2	34	0
35 - 39	0	20	8	1	10	24	0	18	0
40 - 44	0	6	49	0	3	44	1	2	38
45 - 49	0	0	43	0	0.	31	0	0	31
TOTAL	100	100	100	100	100	100	100	100	100
Ever use of Contraception									
FP Method									
Never used	25			54			50		
Folkloric	1			1			2		
Traditional	8			11			9		
Modern	66			34			38		
TOTAL	100			100			100		
Number of Children									
Number of children									
0	87			64			71		
1 - 3	12			31			27		
4 - 6	1			4			2		
7+	0			1			0		
TOTAL	100			100			100		
Ideal Number of Children per woman									
Number of children									
0 - 1	4			1			2		
2 - 3	45			23			33		
4 - 5	44			56			48		
6+	4			13			13		
non-numeric response	3			7			4		
TOTAL	100			100			100		
Time taken to get to the nearest family planning services source									
Time (minutes)									
Mobile clinic	0			1			1		
0 - 59	42			34			35		
60 - 119	27			23			32		
120+	25			33			25		
TOTAL	100			100			100		

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Regression analysis has been used to find out how the various independent variables affect the dependent variables. This method has also been used to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables. Ever married women who have had at least two births were selected.

4.1 BACKGROUND CHARACTERISTICS OF RESPONDENTS

Table 4.1 Percentage distribution of all women by province according to various characteristics

	CENTRAL			NYANZA			WESTERN		
Total Number of Children Ever-born per woman									
Number of children									
0 - 4	61			54			47		
5 - 9	36			40			46		
10+	3			6			7		
TOTAL	100			100			100		
Duration of breastfeeding.									
Duration									
1 - 15	16			12			10		
16 - 30	38			23			26		
31+	1			2			2		
Never breastfed	2			2			1		
Still breastfeeding	42			53			56		
Breastfed until died	1			8			4		
TOTAL	100			100			100		
The Percentage distribution of Women according to duration of marriage and age									
Age	0 - 4	5 - 19	20+	0 - 4	5 - 19	20+	0 - 4	5 - 19	20+
15 - 19	11	0	0	32	1	0	31	0	0
20 - 24	59	7	0	54	15	0	54	17	0
25 - 29	23	30	0	10	32	0	12	29	0
30 - 34	7	37	0	3	37	0	2	34	0
35 - 39	0	20	8	1	10	24	0	18	0
40 - 44	0	6	49	0	3	44	1	2	38
45 - 49	0	0	43	0	0	31	0	0	31
TOTAL	100	100	100	100	100	100	100	100	100
Ever use of Contraception									
FP Method									
Never used	25			54			50		
Folkloric	1			1			2		
Traditional	8			11			9		
Modern	66			34			38		
TOTAL	100			100			100		
Number of Children									
Number of children									
0	87			64			71		
1 - 3	12			31			27		
4 - 6	1			4			2		
7+	0			1			0		
TOTAL	100			100			100		
Ideal Number of Children per woman									
Number of children									
0 - 1	4			1			2		
2 - 3	45			23			33		
4 - 5	44			56			48		
6+	4			13			13		
non-numeric response	3			7			4		
TOTAL	100			100			100		
Time taken to get to the nearest family planning services source									
Time (minutes)									
Mobile clinic	0			1			1		
0 - 59	42			34			35		
60 - 119	27			23			32		
120+	25			33			25		
TOTAL	100			100			100		

♦ Supply of children

This is also referred to as the potential supply of surviving children. This refers to the potential supply family size in the absence of any deliberate regulation of fertility by the couple. The potential supply of surviving children is not directly observable. It is estimated by calculating the respondents' natural fertility (N) times it child survival rate (S). A sample of currently married women who have had at least two births are used to calculate the supply of children variable. To calculate natural fertility a multiple regression is fixed where the coefficients derived for each of the variable are used. Proportion of children dead is then subtracted from the natural fertility to get the supply of children as shown below.

Supply of children = S . N

$S = 1 - PROPDEAD$

$N = \beta + \Sigma i=1,^{4} \beta X_i$

X1 = Marriage duration in years

X2 = Duration of breast feeding in last birth interval

X3 = Proportion of child mortality

X4 = Use of contraceptives

♦ Proportion of child mortality (PRODEAD).

This variable refers to deaths to respondent's children as a percentage of the total number of children ever born. It is calculated by dividing the number of respondent's children who had died prior to the survey by the total number of children ever born to the respondent.

♦ Motivation for use of contraceptives.

Easterlin went further and came up with a variable Motivation for use of contraceptives which is computed by subtracting number of children desired by the respondent from the potential supply of surviving children.

- Cost of fertility regulation (CFR).

Theoretically, the cost of fertility regulation should reflect both the monetary and psychological costs of contraception. However, with the KDHS Data, the cost of fertility regulation has limited information on the cost. The respondent's perception of the distances from her home to the nearest family planning clinic will be used as a proxy. Hence, the closer a respondent is to family planning clinic the lower are her time cost of using the clinic's facilities.

Has 3 categories CFR1, CFR2 and CFR3.

CFR1 refers to 0 - 14 minutes.

CFR2 refers to 15 - 59 minutes.

CFR3 refers to 60+ minutes.

The reference category is CFR1, the other categories take the code 1 if the case 0, otherwise.

METHOD OF ANALYSIS USED IN STAGE TWO

Logistic Regression

Logistic regression model is different from linear regression model in that the outcome variable (dependent or response variable) is binary or dichotomous (Hosmer et al, 1989). The logistic model which relates the log odds (logits) to a set of variables is often expressed directly in terms of logits.

$$P_x/q_x = \beta_0 + \beta_1 X_1 + ... + \beta_p X_p.$$

β - logistic regression coefficients

Expressed in terms of logits, a unit change in the variable Xi, changes the logit of risk (In Px/qx) by the amount βj. The logit model is a linear function of the variables Xi,...Xp indicating that the "effect" of Xi does not depend on the values of the other variables. By introducing transformed variables such as X1, X2 or X12 in the equation one may allow for logistic interaction and non linearity. The relative importance of variables may be compared in terms if standardized coefficients. Each standardized coefficient β_1 measures the change in the logit of risk resulting from a change of one standard deviation in the variable Xi. Also considering the reduction of the logit of risk as an objective can assess the relative importance of variables. One first estimates the magnitude of the changes in each of the P variables that can be affected with a given expenditure of resources. One then ranks the variables in order of the sizes of coefficient change. There are two basic approaches in the estimation of logistic parameters (βi), maximum likelihood estimation and discriminant analysis (Schlesslman, 1982).

Maximum Likelihood Estimation

Maximum likelihood yield values for the unknown parameters which maximize the probability of obtaining the observed set of data and which agree most closely with the observed data. Maximum likelihood estimates of the parameters ßi are values ßi that maximize for the observed sample values of di and Xp (let di be a variable that indicates the occurrence di=1 with probability Pj or non-occurrence di=0 with probability dj an attribute). Likelihood equations are given as

$$\Sigma^{n}_{i=1} [yi - \pi(Xi)] = 0.$$

and $$\Sigma^{n}_{i=1} Xi [yi - \pi (Xi)] = 0.$$

Likelihood ratio test provides an alternative method of finding an approximate confidence interval for any particular parameter βj and can also be used to compute a joint confidence region for a set of parameters. In large samples a one degree of freedom chi-square test of significance based on $x^2 = [\beta / SE(\beta i)]^2$ is equivalent to the corresponding likelihood ratio test.

If the variables Xj.....Xp have a multivariate normal distribution with equal covariance matrices of the cases and controls then the maximum likelihood estimation is preferable to discriminant analysis since it does not depend on any priori assumption of multivariate normality. However, normality assumption is not always correct in most applications the discriminant function estimates can result in estimated coefficients that are incorrect. Maximum likelihood estimation gives generally slightly better fits to the logistic model and also the total expected number of cases equaling the observed total. Discriminant function approach works reasonably well if one is fitting the model to isolate relevant risk factors by means of tests of significance. Maximum likelihood estimation works well when trying to estimate the actual

magnitudes of the parameters or the probability of events under the logistic model (Schlesselman, 1982).

Assumptions of Logistic Regression

1. The conditional mean of the regression equation must be formulated to be bounded between 0 and 1.
2. The binomial and not the normal distribution describes the distribution of the errors and will be the statistical distribution upon which the analysis is based.
3. The assumptions of linear regression also apply to the logistic model.

Testing for the Significance of the Coefficients

This refers to finding out whether the variable in question tell us more about the outcome (or response) variable than when the model does not include that variable. This is achieved by comparing the observed values of the response variable to those predicted by the model with and without the variable based on the log likelihood function. The deviance in logistic regression (D) is used in assessing the significance of an independent variable. The change in D due to including the independent variable in the model is given as

G = D(for the model without the variable) - D (for the model with the variable).

under the hypothesis that βi is equal to 0, the statistic G will follow a chi-square distribution with 1 degree of freedom.

Disadvantages of Logistic Regression

Compared to the linear regression model, the parameters have a limited interpretation and range of validity due to the restriction that $0 < Px < 1$. Although a linear function may provide a

satisfactory approximation to Px over a restricted range of X, extrapolation would be suspect, since it is certain that the linear relation will be outside some range of values of X.

Variables are often always correlated so that a change in one is accompanied by a corresponding change in the others. Thus, the change in the logit of risk estimate to result from a postulated change in any particular variable may be misleading.

Advantages of Logistic Regression

From a mathematical point of view, it is extremely flexible and easily used function. It also leads itself to a plausible interpretation.

Conditional mean is transformed using logit transformation hence will have many of the desirable properties of a linear regression model.

STAGE THREE ANALYSIS: METHOD OF ANALYSIS AND VARIABLES USED

Stage three of the Easterlin-Crimmins model takes potential supply of children, child demand (desired family size) and the cost of fertility regulation and regresses each one on various socio-economic variables. Potential supply of children refers to potential family size in the absence of any deliberate regulation of fertility and it is not directly observable but has been calculated (See definition of variables). It involves the analysis of socio-economic and cultural determinants of fertility control as they affect the basic proximate factors that is the cost of fertility regulation, the motivation for fertility control, potential supply of surviving children and child demand. The method of analysis used in stage three is regression analysis (see page 54). The results of the bivariate analysis will be used because this study was to find out how each of the independent variables behaves with the dependent variables.

DEPENDENT VARIABLES

- Desired Family size (DFS).

This refers to the desired family size that is number of children a respondents considered to be the ideal family size. The respondents were asked "If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life how many would that be?". For those who did not have children they were asked "If you could choose exactly the number of children to have in your whole life how many would that be?".

Has 3 categories DFS1, DFS2 and DFS3.

DFS1 refers to those who desire 0 children.

DFS2 refers to those who desire 1 - 3 children.

DFS3 refers to those who desire 4+ children.

The reference category is DFS1, the other categories take the code 1 if the case 0, otherwise.

- Supply of children

This is also referred to as the potential supply of surviving children. This refers to the potential supply family size in the absence of any deliberate regulation of fertility by the couple. The potential supply of surviving children is not directly observable. It is estimated by calculating the respondents' natural fertility (N) times it child survival rate

Supply of children = S . N

$$S = 1 - PROPDEAD$$

$$N = \beta + \Sigma i=1,^{4} \beta X_i$$

X1 = Marriage duration in years

X2 = Duration of breast feeding in last birth interval

X3 = Proportion of child mortality

X4 = Use of contraceptives

- Cost of fertility regulation (CFR).

Theoretically, the cost of fertility regulation should reflect both the monetary and psychological costs of contraception. However, with the KDHS Data, the cost of fertility regulation has limited information on the cost. The respondent's perception of the distances from her home to the nearest family planning clinic will be used as a proxy. Hence, the closer a respondent is to family planning clinic the lower are her time cost of using the clinic's facilities.

Has 3 categories CFR1, CFR2 and CFR3.

CFR1 refers to 0 - 14 minutes.

CFR2 refers to 15 - 59 minutes.

CFR3 refers to 60+ minutes.

The reference category is CFR1, the other categories take the code 1 if the case 0, otherwise.

INDEPENDENT VARIABLES

CULTURAL FACTORS

- Type of marriage (TMAR).

This variable was got from responses to the question "Does your husband/partner has any other wife besides yourself?".

1 = Yes (Polygamous)

2 = No (Monogamous)

Has 2 categories TMAR1 and TMAR2.

TMAR1 refers to those in polygamous unions and TMAR2 refers to those in monogamous unions. The reference category is TMAR1 the other, TMAR2 take the code 1 if 0 otherwise.

- Ethnicity (ETHN).

The respondents belonging to a particular ethnic group. The question asked was " which ethnic group/tribe do you belong to?".

Has 4 categories ETHN1, ETHN2, ETHN3 and ETHN4.

ETHN1 refers to the Kikuyu.

ETHN2 refers to the Luo.

ETHN3 refers to the Luhya.

ETHN4 refers to the Kisii.

The reference category is ETHN1, the other categories take the code 1 if the case 0, otherwise.

SOCIO-ECONOMIC FACTORS

- Exposure to mass media (EXMAME).

This refers to cumulative sum of answers to questions as to whether the respondent usually reads a newspaper, or listen to the radio at least once a week.

0 = Neither listens to radio nor reads a newspaper

1 = Either listens to radio or reads a newspaper

2 = Listens to radio and also reads a newspaper

Has 3 categories EXMAME1, EXMAME2 and EXMAME3.

EXMAME1 refers to those who neither listen to radio weekly nor read a newspaper at least once a week.

EXMAME2 refers to who either listen to the radio or reads newspaper at least once a week.

EXMAME3 refers to those who listen to radio every week and also read a newspaper at least once a week.

The reference category is EXMAME1, the other categories take the code 1 if the case 0, otherwise.

- Woman's education (WEDU).

Education of the respondent in completed years spent in school.

Has 3 categories WEDU1, WEDU2 and WEDU3.

WEDU1 refers to 0 - 2 years in school.

WEDU2 refers to 3 - 7 years in school.

WEDU3 refers to 8+ years in school.

The reference category is WEDU1, the other categories take the code 1 if the case 0, otherwise.

CHAPTER FOUR: RESEARCH FINDINGS

This chapter gives the frequency distributions, cross tabulation and chi-square results, and the results of the regression analysis. Frequencies are used to show the distribution of characteristics of the study population in the three provinces that is Central, Nyanza and Western provinces.

Frequencies have been used as they show the similarities and or differences between the provinces at a glance. Cross tabulation has been used to determine whether there is any association between selected variables used in the study. These associations have been established by using the column percentages of the cross tabulation tables. The chi-square has been used to test null hypothesis that there is no relationship between the dependent and independent variables. The significance level is at alpha = 0.05 level.

Regression analysis has been used to find out how the various independent variables affect the dependent variables. This method has also been used to control for other confounding factors in order to evaluate the contribution of a specific variable or set of variables. Ever married women who have had at least two births were selected.

4.1 BACKGROUND CHARACTERISTICS OF RESPONDENTS

Table 4.1 Percentage distribution of all women by province according to various characteristics

	CENTRAL			NYANZA			WESTERN		
Total Number of Children Ever-born per woman									
Number of children									
0 - 4	61			54			47		
5 - 9	36			40			46		
10+	3			6			7		
TOTAL	100			100			100		
Duration of breastfeeding.									
Duration									
1 - 15	16			12			10		
16 - 30	38			23			26		
31+	1			2			2		
Never breastfed	2			2			1		
Still breastfeeding	42			53			56		
Breastfed until died	1			8			4		
TOTAL	100			100			100		
The Percentage distribution of Women according to duration of marriage and age									
Age	0 - 4	5 - 19	20+	0 - 4	5 - 19	20+	0 - 4	5 - 19	20+
15 - 19	11	0	0	32	1	0	31	0	0
20 - 24	59	7	0	54	15	0	54	17	0
25 - 29	23	30	0	10	32	0	12	29	0
30 - 34	7	37	0	3	37	0	2	34	0
35 - 39	0	20	8	1	10	24	0	18	0
40 - 44	0	6	49	0	3	44	1	2	38
45 - 49	0	0	43	0	0.	31	0	0	31
TOTAL	100	100	100	100	100	100	100	100	100
Ever use of Contraception									
FP Method									
Never used	25			54			50		
Folkloric	1			1			2		
Traditional	8			11			9		
Modern	66			34			38		
TOTAL	100			100			100		
Number of Children									
Number of children									
0	87			64			71		
1 - 3	12			31			27		
4 - 6	1			4			2		
7+	0			1			0		
TOTAL	100			100			100		
Ideal Number of Children per woman									
Number of children									
0-1	4			1			2		
2-3	45			23			33		
4-5	44			56			48		
6+	4			13			13		
non-numeric response	3			7			4		
TOTAL	100			100			100		
Time taken to get to the nearest family planning services source									
Time (minutes)									
Mobile clinic	0			1			1		
0 - 59	42			34			35		
60 - 119	27			23			32		
120+	25			33			25		
TOTAL	100			100			100		

Cont..

Education in single years			
NO. of years			
0	13	25	18
1 - 7	51	53	52
8 - 11	33	20	27
12+	3	2	3
TOTAL	100	100	100
Exposure to mass media			
Media			
Newspaper			
No	75	70	82
Yes	25	30	18
TOTAL	100	100	100
Radio			
No	31	44	38
Yes	69	56	62
TOTAL	100	100	100

Source: 1993 KDHS data (Sample Size Central N=687, Nyanza N=941, Western N=671)

4.1.1 Children ever-born

The data on children ever-born from KDHS are based on responses to a series of questions designed to obtain maximum information on the number and timing of births. All respondents were asked about the total number of live births and surviving children. In addition, a full birth history was collected from each woman including the name, sex and date of birth for each live birth, the age at birth for children who died and whether or not living children were residing with their mother. As seen in table 4.1, In Central province 61 percent of the total interviewed women had less than 5 children while in Nyanza 54 percent and Western also 47 percent. Those who had between 5 and 9 children in Central province were 36 percent, 40 percent in Nyanza and 46 percent in Western province. Three percent of the interviewed women in Central had more than 10 children, in Nyanza 6 percent and 7 percent in Western province. This therefore shows that women in Central province have fewer children when compared to women in Nyanza and Western provinces. Higher parity women are also more in

›oth Nyanza and Western provinces unlike in Central province for example those with 9 hildren were 3.8 percent of the interviewed women in Central province and 5.4 percent in both Nyanza and Western provinces.

There were also a high percentage of women with no children in both Nyanza (8.2%) and Western provinces (6.3%) when compared with Central province (2.8%). This can be nterpreted as cases of childlessness or infertility and hence the demand for children would be ıigh in these two regions.

4.1.2 Breastfeeding duration

The duration of breastfeeding in the three provinces is almost similar. However, the duration in Central province is slightly longer when compared to Nyanza and Western provinces. Those who breastfed between for less than 16 months were 16 percent in Central province compared to 12 percent in Nyanza and 16 percent in Western provinces. Central province also had a higher percentage of those who breastfed between 16 and 30 months when compared to Nyanza and western provinces.

Breastfeeding duration is one of the intermediate determinants of fertility as it prolongs the postpartum amenorrhea. Longer breastfeeding duration therefore increases the length of postpartum amenorrhea, the length of birth interval and hence reduces fertility.

4.1.3 Marital duration and age

Marital duration was constructed by subtracting the age at first marriage from the age of he respondent at the time of the interview. The duration of marriage is a proxy for exposure to he risk of intercourse and hence pregnancy. Duration of marriage is the single most important ntermediate variable in determining numbers of children ever-born. Early initiation into child-bearing is a major determinant of large family size and rapid population growth. Therefore duration of marriage is expected to be positively related with numbers of children ever-born.

A higher percentage of women aged between 15 - 19 years in Nyanza (32%) and Western (31%) provinces had spent between 0 - 4 years in marriage compared to Central province (10%). There were no women in the same age group who had spent more than 4 years in marriage in Central province as opposed to Western (0.3%) and Nyanza province (0.8%). There were also fewer women in Central province aged between 35 - 39 years (8%) who had spent more than 20 years in marriage unlike 25 percent in Nyanza and 30 percent in Western province.

This therefore shows that majority if women in Western and Nyanza provinces enter into marriage at an early age and also spend more years in marriage than majority of women in Central province. The longer time spent in marriage increases the risk of conception which in turn leads to a higher number of children ever born and hence fertility.

4.1.4 Use of contraception

Fifty four percent of the interviewed women in Nyanza province had never used any family planning method while in Western province 50 percent had never used and in Central 25 percent, the lowest among the three provinces.

Modern methods of family planning are effective as opposed the traditional methods and also folkloric methods. Use of modern contraceptive methods was highest in Central province (66 percent) unlike in Nyanza (34 percent) and Western province (38 percent). Modern methods referred to are the pill, intra-uterine device, injection, diaphragm, foam/jelly, condom and sterilization.

Nyanza province reported the highest use of traditional methods (11 percent), followed by western (9.1 percent) while Central province had the least percentage (8.1 percent) of women using traditional methods.

Folkloric methods refer to those specific methods which may be unique to certain ethnic groups or communities and whose effectiveness has not been proved. This includes methods such as medicinal herbs, taboos associated with pregnancy and child birth, as well as other practices. Western province recorded a higher percentage of the interviewed women using such methods (2.1 percent) while Central and Nyanza had lower percentage 0.6 and 0.7 percent respectively.

Contraceptive use is therefore high among women of Central province. High use of contraceptives can be an indication that women are able to achieve and maintain their desired family size and also the timing of births.

4.1.5 Children dead

Estimates on the number of children dead are based on information from the birth history section of the questionnaire administered to individual women. Questions were asked about the childbearing experiences of respondents, for each birth, information was then collected on sex, month and year of birth, survivorship status and current age, or if the child had died, age at death (NCPD, 1993).

A higher percentage of women in Central province (87%) had no children dead unlike 64 percent in Nyanza and 71 percent in western province. Those who had between 1 - 3 children dead were more in Nyanza province (31%) followed by Western province (27%) and Central province had the least (12%). Women in Nyanza and Western provinces therefore, would have more children ever born as an insurance effect or to replace the lost child.

4.1.6 Desired family size

In order to ascertain what women considered to be the ideal number of children, they were asked, "If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?". For those who did not have children they were asked "If you could choose exactly the number of children to have in your whole life, how many would that be?".

It's important to note that most women have difficulty answering a hypothetical question of this type, especially those for whom control over fertility is not culturally acceptable. Such women normally give non-numeric responses such as "it is up to God", "any number", or "does not know".

Majority of the women in all the 3 provinces preferred to have between 4 and 5 children,

44 percent in Central, 56 percent in Nyanza and 48 percent in Western province. Those who preferred one child or not to have any children at all where more in Central (4%) compared to Nyanza (1%) and Western (2%) provinces. Those who preferred 6 or more children as their ideal family size were more in both Nyanza and western provinces (13%) unlike Central province (4%).

The number of children desired can be thought of as representing a demand for children which is unconstrained by the costs of contraceptive regulation. All other things being equal, a larger number of children desired should lead to a lesser use of contraception.

Therefore, women in Nyanza and Western provinces demand a high number of children than those in Central province. This coupled with a high number of women with no children in these two provinces can explain the differential in fertility.

4.1.7 Distance to family planning services

In the KDHS II, women were asked how long it takes them to travel to the nearest facility that provide family planning services from their homes.

In Central province 42 percent of the interviewed women spend less than one hour to get to the source where they obtain contraceptives while in Nyanza 34 percent and in Western 35 percent spend less than one hour. Those who spend more than 2 hours to get to their source were 25 percent in Central province, 33 percent in Nyanza province and 25 percent in Western. Hence women in Nyanza province when compared to Central and Western province have to travel for longer distances to get to their nearest source of contraceptives.

4.1.8 Education attainment

Education has been known to have a negative effect on fertility. In general, the average number of children per woman declines as the woman's level of education increases. Thirty three percent of the interviewed women in Central province have spent more than 7 years in school while in Nyanza 20 percent and 37 percent in Western province. Those who have spent less than 8 years in school were more in Nyanza (53 percent) followed by western province (52 percent) with Central province having the least (51 percent). This shows that more women in Central province spend more years in school as opposed to those in both Nyanza and Western provinces.

Those with no education among the interviewed women were more in Nyanza province (18 percent) followed by Western province (13 percent) and Central province had the least percentage (8 percent). The percentage distribution of the interviewed women with primary level of education was similar in the three provinces, in Central province they were 58 percent, and 59 percent in both Nyanza and Western provinces.

4.1.9 Exposure to mass media

Family planning information is regularly disseminated through the mass media and therefore exposure to mass media is important as it may facilitate knowledge of family planning methods and providers that are pre-conditions for use. Women were asked if they usually listen to the radio, read newspapers or watch television at least once a week. Use of television will not be used in this study because very few cases reported watching television at least once a week in all the three provinces.

A large percentage (82 percent) of the interviewed women in Western province do not read newspapers. Among the three provinces, Nyanza has a higher percentage (30 percent) of

women who read a newspaper at least once a week. Also a large percentage in Nyanza province (41) and Western province (38) do not listen to the radio as opposed to 31 percent in Central province.

4.2 RESULTS OF BIVARIATE ANALYSIS

Cross tabulation has been used to determine whether there is any association between the variables used in the study. Cross tabulation in conjunction with chi-square test was used to determine whether there is any association between total children ever born and exposure to mass media; education; marital duration; and breastfeeding duration. Also cross tabulation and chi-square test was used to determine association between ever use of contraception and time taken to get to a family planning source; desired family size and number of children dead; as well as between marriage duration and age.

4.2.1 Total children ever-born and breastfeeding duration

Table 4.3 Percentage distribution of women according to total children ever born and breastfeeding duration

CEB	CENTRAL				NYANZA				WESTERN			
	1-10	11-20	21-30	31+	1-10	11-20	21-30	31+	1-10	11-20	21-30	31+
1-3	81.8	57.8	60.0	56.6	53.6	42.7	34.0	44.7	57.3	54.1	46.7	42.6
4-6	18.8	29.9	24.0	31.0	39.3	33.6	34.0	35.1	34.2	23.5	35.4	41.3
7-9	0.0	10.4	7.0	9.7	3.6	19.1	23.4	16.0	7.3	21.7	16.4	14.8
10+	0.0	3.0	9.0	2.7	0.1	0.7	1.2	2.8	1.2	0.7	1.5	1.3
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

Source: computed from 1993 KDHS data

	Chi-square	D.F.	Significance
Central	15.76	9	0.0720
Nyanza	11.80	9	0.2246
Western	21.32	9	0.1324

There is a weak association between total number of children ever born and breastfeeding duration. Respondents who breastfed for a short duration have more children ever born as opposed to those who breastfed for longer duration. The percentage of respondents with the same number of children ever born reduces with an increase in the breastfeeding duration.

Breastfeeding is the principle determinant of the duration of postpartum amenorrhea. In the absence of breastfeeding, menses return shortly after birth. As the duration of breastfeeding increases so does the amenorrhea, approximately one additional month of amenorrhea for each two months' increment in breastfeeding duration (Leridon, H. 1977).

4.2.2 Total children ever-born and marital duration

Table 4.4 Percentage distribution of women according to total children ever born and marital duration

CEB	CENTRAL				NYANZA				WESTERN			
	Never	0 - 14	15-29	30+	Never	0-14	15-29	30+	Never	0-14	15-29	30+
0	6.5	26.2	33.8	56.3	9.9	31.3	32.5	52.3	9.9	33.5	33.5	52.1
1-3	20.6	31.4	47.2	31.3	16.3	26.9	48.1	36.4	29.8	26.9	35.3	37.5
4-6	27.2	31.2	15.8	10.9	28.2	27.6	15.2	6.8	22.8	22.3	21.6	8.3
7-9	31.0	9.3	2.4	1.6	32.8	10.4	3.5	4.5	29.2	12.2	7.9	2.1
10+	14.2	1.8	0.7	0.0	12.2	3.7	0.7	0.0	17.3	4.8	1.8	0.0
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

Source: Computed from 1993 KDHS data

	Chi-square	D.F.	Significance
Central	1314.76	28	0.0000
Nyanza	1697.50	28	0.0000
Western	1411.58	28	0.0000

The association between number of children ever born and marital duration is highly significant. The number of children ever born increases with an increase in the marital duration. Among respondents with between 1 - 3 children, majority had spent less than 4 years in marriage (88 percent for Central, 75 percent for both Nyanza and western provinces). Respondents with between 7 - 9 children ever born majority had spent between 20 - 24 years in marriage (36 percent Central, 51 percent Nyanza and 47 percent Western province).

Duration of marriage affects fertility as it determines the duration of exposure to risk of conception. On an aggregate level delayed marriage also increases the interval between generations and hence reduces population growth by reducing the proportion of females in the reproductive age as well as reducing in the long run, the proportion of females in the reproductive age relative to the total population. Late marriage may also provide longer opportunities for women to acquire higher education, higher skills and greater perspectives in life (Loza, 1982).

4.2.3 Use of contraception and children dead

Table 4.5. Percentage distribution of women according to ever use of any family planning method and number of children dead to a woman

CEB	CENTRAL				NYANZA				WESTERN			
	Never	0-14	15-29	30+	Never	0-14	15-29	30+	Never	0-14	15-29	30+
0	6.5	26.2	33.8	56.3	9.9	31.3	32.5	52.3	9.9	33.8	33.5	52.1
1-3	20.6	31.4	47.2	31.3	16.3	26.9	49.1	36.4	20.8	26.9	35.3	37.5
4-6	27.2	31.2	15.8	10.9	28.2	27.6	15.2	6.8	22.8	22.3	21.6	8.3
7-9	31.0	9.3	2.4	1.6	32.8	10.4	3.5	4.5	20.2	12.2	7.9	2.1
10+	14.2	1.8	0.7	0.0	12.2	3.7	0.7	0.0	17.3	4.8	1.8	0.0
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

Source: Computed from 1993 KDHS data

	Chi-square	D.F.	Significance
Central	14.40	12	0.2735
Nyanza	86.59	30	0.0000
Western	86.59	30	0.0000

The association between use of any family planning method and the number of children dead to a respondent is highly significant in Nyanza and western provinces (0.0000) but there is a week association in Central province. A higher percentage of respondents who have lost none or less than 1 child use modern contraceptives unlike those who had lost more than one child.

Studies have shown than women who experience infant and child losses are likely to have more additional children for replacement or as a security and they are also less likely to use contraceptives than respondents whose children are alive. Women who have less children living than they want as well as those with more children living than they want, are more likely to be using contraception if they have not experienced infant and child mortality than if they have. Those with the number living equaling the number wanted are more likely to be contracepting if one or more of their offspring have died (Ebanks 1985). The death of a child also truncates the duration of breastfeeding leading to an early resumption of menses and ovulation and to an earlier conception (Jain et al, 1981).

4.2.4 Use of contraception and desired family size

Table 4.6. Percentage distribution of women according to ever use of any family planning method and number of desired children

Method	CENTRAL				NYANZA				WESTERN			
	0	1-3	4-6	7+	0	1-3	4-6	7+	0	1-3	4-6	7+
Never used	23.5	30.0	46.2	0.0	51.2	55.0	66.7	65.5	51.7	49.1	46.5	42.8
Use folkloric	0.7	0.0	0.0	0.0	0.4	1.4	0.0	0.0	1.0	2.6	7.1	28.6
Use traditional	8.3	9.2	0.0	0.0	10.6	12.3	11.7	13.8	8.8	10.1	7.1	0.0
Use modern	67.5	31.3	21.6	20.7	37.8	31.3	21.6	20.7	38.5	38.2	39.3	28.6
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

Source: computed from 1993 KDHS data

	Chi-square	D.F.	Significance
Central	57.00	21	0.0000
Nyanza	192.17	21	0.0000
Western	24.11	21	0.2876

There is a strong negative association between ever use of any family planning method and the ideal number of children desired by a respondent in Central and Nyanza provinces with significance of 0.0000 but not in Western province (0.2876). Respondents who desire fewer children, the percentage using contraceptives is higher compared to those who desire more children. For example respondents who desire between 1 and 3 children, 61 percent in Central province use modern contraceptives, 31 percent in Nyanza province and 38 percent in Western province. More than 40 percent of those who desire more than 6 children, have never used any method in Nyanza and Western provinces. Research done in Thailand and Bangladesh found that women who had reached or exceeded their ideal family size used contraception more than women whose families had not yet attained their ideal family size. Fertility preference was also found to be related to contraceptive use in Pakistan (Palmore, 1979).

4.2.5 Use of contraception and distance to a family planning services source

Table 4.7 Percentage distribution of women according to use of any family planning method and time taken to get to the nearest source of family planning

Use	CENTRAL						NYANZA						WESTERN	
	Mobile	0-59	60-119	120+	DK Time	DK Source	Mobile	0-59	60-119	120+	DK Time	DK Source	Mobile	0-59
Never Used	0.0	24.6	21.7	17.9	44.4	77.2	30.0	51.9	53.7	49.7	62.5	83.5	14.3	37.0
Used folkloric	0.0	0.4	1.1	0.6	0.0	0.0	0.0	0.8	1.1	0.7	0.0	0.0	14.3	1.3
Used tradition	0.0	8.5	7.1	8.7	11.2	11.4	29.9	9.8	11.0	13.8	0.0	8.9	28.6	11.1
Used modern	100.	66.5	70.1	72.8	44.4	11.4	50.0	38.4	34.3	35.8	37.5	7.6	42.8	50.6
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Computed from 1993 KDHS data

	Chi-square	D.F.	Significance
Central	179.82	24	0.0000
Nyanza	670.00	24	0.0000
Western	670.93	24	0.0000

There is a strong negative association between ever use of any family planning method and the time taken to get to the nearest source of family planning methods. Respondents who take less than 60 minutes, a higher percentage tend to use family planning methods when compared with those who take more than 60 minutes. The percentage of respondents who have never used any family planning method and those who use traditional methods increases with an increase in the time taken to get to a source. Those who use modern methods, the percentage decreases with an increase in time taken to get to the nearest source of contraceptives.

Rodriguez using data from WFS of five Nations to assess the association between contraceptive availability and use, found that within countries women reporting accessibility to contraceptive services had higher rates of contraceptive use than women for whom services are inaccessible (Amy, et al 1981). Hammerslough (1990) using various data sets also found that in rural Kenya proximity to contraceptive services led to an increase in knowledge and use of modern methods, and may have led to the onset of fertility transition in Kenya.

Da Vanzo (1986) found that establishment of a family planning clinic nearby significantly increased the probability that contraception is practiced by women who desire more children, the least educated and also for those who desire no more children, the establishment of a clinic increased the probability of using sterilization.

4.2.6 Total children ever born and education

Table 4.8 Percentage distribution of women according to total children ever born and education in single years

CEB	CENTRAL				NYANZA				WESTERN			
	0-3	4-7	8-11	12+	0-3	4-7	8-11	12+	0-3	4-7	8-11	12+
0	6.5	26.2	33.8	56.3	9.9	31.3	32.5	52.3	9.9	33.8	33.5	52.1
1-3	20.6	31.4	47.2	31.3	16.3	26.9	48.1	36.4	20.8	26.9	35.3	37.5
4-6	27.2	31.2	15.8	10.9	28.2	27.6	15.2	6.8	22.8	22.3	21.6	8.3
7-9	31.0	9.3	2.4	1.6	32.8	10.4	3.5	4.5	29.2	12.2	7.9	2.1
10+	14.2	1.8	0.7	0.0	12.2	3.7	0.7	0.0	17.3	4.8	1.8	0.0
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Computed from 1993 KDHS data

	Chi-square	D.F.	Significance
Central	281.92	12	0.0000
Nyanza	294.17	12	0.0000
Western	151.53	12	0.0000

There is a very strong negative association between the number of children ever born and the number of years spent in schooling. The number of children ever born decreases with an increase in the number of years spent in school. Respondents who had between 1 - 3 children ever born, majority of them had spent between 8 - 11 years in school (47 percent in Central, 48 percent in Nyanza and 35 percent in Western province). Majority of respondents with between 7 - 9 children ever born had spent less than 3 years in school.

Education has an inverse effect on fertility. The mechanism through which education affects fertility is through the age at marriage. Educated women also have better opportunities to work outside the home leading them to desire small families as large families may interfere with employment. Educated women also have a wider scope of interest in terms of social life and standard of living. They will have knowledge of contraceptives, will appreciate quality of life for children rather than quantity and will take better care of their children thus reducing infant

and child mortality. They are also more likely to participate in decision making in matters related to their sexuality and will also have a sense of planning and less traditionality (Abou-Gamrah 1982).

4.3 REGRESSION ANALYSIS RESULTS

Easterlin's approach involves a three-stage analysis of fertility determination proceeding backward from fertility behaviour to its more remote structural determinants. The first stage consists of an individual-level intermediate variable analysis of the proximate determinants of fertility. In the second stage use of fertility control (an intermediate variable) is selected for analysis in terms of the impact of the differences in motivation and the costs of regulation on fertility control. Finally in the third and last stage the variables entered in the previous stages are treated as dependent variables to be explained by family background characteristics as well as women's cultural values and practices. The fitting of the regression model was done by computer where all the variables were entered, and the computer selected the variables according to the significance.

4.3.2. STAGE 1 ANALYSIS - INTERMEDIATE VARIABLES AS THEY AFFECT THE NUMBER OF CF CHILDREN EVER-BORN

Intermediate variable approach and regression analysis has been used to explain the variation in the number of children ever born (CEB). The intermediate variables used are marriage duration, proportion of children dead, contraceptive use and breastfeeding duration. Marriage duration and proportion of children dead were expected to be positively associated with numbers of children ever born. Contraceptive use was expected to be negatively related. Breastfeeding duration was expected to be negatively associated with numbers of children ever born. The method used for the analysis is least square regression. The results are summarized in

Table 4.11. Coefficients of bivariate regression analysis

VARIABLE	CENTRAL	NYANZA	WESTERN
	B	B	B
Proportion of Child Mortality			
PROPCM3	-0.4973	3.2877	-2.0000
PROPCM2	-3.4492	-1.1093	1.4398
Reference	4.4292	4.7877	4.6721
Marital Duration			
MARDUR3	5.2626	6.1059	6.7602
MARDUR2	2.5688	3.1268	3.4964
Reference	1.5524	1.3720	1.1768
Breastfeeding Duration			
BRESDUR4	-0.8272	0.3351	0.2404
BRESDUR3	-0.5546	0.9303	-0.3190
BRESDUR2	-0.5546	0.3321	0.5810
Reference	4.6894	4.3114	4.6117
Use of Contraceptives			
EVERUSE2	-0.0887	0.7923	1.2290
Reference	4.3313	4.2145	4.1504

Source: Computed from 1993 KDHS data (Sample size Central 648, Nyanza 904, Western 671)

From the bivariate analysis, all the variables were statistically significant in influencing the dependent variable children ever born in all the three provinces as shown by the T - values and the significance.

Duration of breastfeeding showed the expected negative association in the bivariate analysis with numbers of children ever born in Central province and only for those who breastfed between 11-20 months (BRESDUR2) in Western province. Those who breastfed between 11-20 months had between 0.7 children less than those who breastfed between 1-10 months in Central provinces unlike 0.3 in Western province. This results can be interpreted that respondents in Central province breastfeed their children with the conscious knowledge that breastfeeding affects post partum amenorrhea and hence their fertility thus affecting the number of children

ever born. Since breastfeeding extends postpartum amenorrhea and inter-birth intervals (Bongaarts, 1978) the respondents with a longer duration of breastfeeding will have fewer children ever born than those with a shorter duration.

Marital duration showed the expected positive association with the dependent variable children ever born. Those who had spent a longer duration in marriage had more children ever born as opposed to those who had spent a shorter duration. The coefficients for Western and Nyanza provinces were larger than that of Central province. Those who had spent more than 20 years in marriage (MARDUR3) had 6.1 more children than those who had spent 0-4 years in Nyanza province and 6.7 in Western province as opposed to 5.2 in Central province. Those with between 5-19 years in marriage had 3.1 more children ever born in Nyanza province, 3.4 in Western compared to Central province (2.5) that was much lower in the three provinces. Thus respondents who have spent more years in marriage are more exposed to the risk of intercourse and hence pregnancy. They may also enter into marriage without considering the effects of age and the duration of marriage on the number of children they are likely to have or the respondents do consciously choose their age at marriage with fertility effects in mind.

Contraceptive use showed the expected negative association with number of children ever born only in Central province. Those who had ever used any method of family planning had 0.7 fewer children compared to those who had never used any method in Central province. Use of contraceptives did not show the expected negative effect on the number of children ever born in Nyanza and Western provinces. This results therefore show that there is a high use of contraceptives in Central province unlike in Western and Nyanza provinces which can explain the lower number of children ever born and the rapid decline in fertility in Central province.

The results also showed that the higher the proportion of children dead to a respondent,

the higher the number of children ever born. Proportion of child mortality (PRODEAD2) in Central province had the greatest influence on the dependent variable children ever born (-3.4492) when compared to Nyanza (-1.1093) and Western province (-1.4398). The high proportion of children dead in Nyanza and Western provinces can explain why those with proportion ranging between 0.01-0.5 (PROPCM3) had a large influence, -3.2877 and -2.0000 respectively, on the dependent variable as opposed to Central province (-0.4973). The conclusions which can be drawn from this findings are that the death of a child may have resulted in truncated breastfeeding which shorten postpartum amenorrhea and lead to early return of menses and hence risk of conception and or; that respondents with a higher proportion of children dead will have more children ever born because they would want to replace the lost child or as an insurance to possible deaths.

Age of respondent showed the expected negative association with number of children ever born in the three provinces. The coefficients for Western and Nyanza province were much higher than those of Central province. Those aged more than 30 years had 3.4 more children than those aged below in Central province compared to 3.7 in Nyanza and 4.2 in Western province.

The large value of the F - test with a significance of 0.0000 in all the three models in the multiple regression shows the applicability of the models and the overall significance of the models in explaining the dependent variable children ever born. These results are consistent with research carried out in Brazil (Valle, 1990) and in Costa-Rica, Tunisia, Sri-Lanka and Mexico (UN, 1991). The main conclusion that can be drawn is that the rapid decline in fertility in Central province could be because there is low proportion of child mortality, women breastfeed for longer periods, and spend less years in marriage unlike in Nyanza and Western

provinces. The implication of these results based on the demographic transition model would be that the three provinces are in the initial stages of the fertility decline where age at marriage and other intermediate fertility variables still exceed in importance the use of contraception. Another implication could be that the three provinces may not be following the traditional pattern of fertility decline evidenced in Western Europe, and instead may be embarking on their own course of fertility regulation, emphasizing intermediate variables rather than the use of contraception.

4.3.3 STAGE 2 ANALYSIS - COST OF FERTILITY REGULATION, DESIRED FAMILY SIZE AND POTENTIAL SUPPLY OF CHILDREN AS THEY AFFECT USE OF CONTRACEPTIVES

Easterlin-Crimmins contends that the use of contraception is the key to understanding the fertility components of the demographic transition. Use of contraception one of the determinants of numbers of children ever born in stage I analysis is explained using logit regression containing three explanatory variables, cost of fertility regulation number of children desired and potential supply of children.

Contraceptive use should vary inversely with the cost of fertility regulation. Theoretically, cost of fertility regulation should reflect both the monetary and psychological costs of contraception. However, because of the nature of KDHS data, the distance to family planning source or clinic will be used as a proxy for cost of fertility regulation. The closer a respondent is to a family planning clinic the lower are time costs of using the clinic facilities. This measure however is far from ideal because it refers to a situation subsequent to the decision to use contraception hence reflecting the effect of that decision.

Potential supply of surviving children is the supply counterpart to the demand for numbers of children. A larger surviving potential family size should lead to a greater use of contraception. Also a larger number of children desired should lead to a lower use of contraception. Easterlin-Crimmins combined numbers of children desired and potential supply of surviving children into a single variable motivation for use of contraception. Higher levels of motivation lead to the use of contraception.

Table 4.12 Results of Bivariate Logistic Regression Analysis by province

VARIABLE	CENTRAL	NYANZA	WESTERN
Cost of Fertility Regulation			
CFR3			
B	0.57477	0.2543	-0.6266
Reference	(0.8186)	(-0.3191)	(0.3389)
B (Exp)	1.7766	1.2896	0.5344
Sign	0.0206	0.0000	0.0000
Motivation for Use of Contraceptives			
MOTIV2			
B	3.0841	0.5850	1.0338
Reference	(1.0947)	(-0.2665)	(-0.2059)
B (Exp)	21.8476	1.7949	2.8117
Sign	0.0110	0.0000	0.0000
Motivation for Use of Contraceptives			
MOTIV3			
B	0.1842	0.1601	0.3497
Reference	(1.0395)	(-0.1601)	(-0.0525)
B (Exp)	1.2023	1.1739	1.4887
Sign	0.0112	0.0000	0.0000
Cost of Fertility Regulation			
CFR2			
B	-0.3170	0.0057	0.5650
Reference	(1.1074)	(-0.1611)	(-0.1749)
B (Exp)	0.9688	1.0057	1.7950
Sign	0.0106	0.0000	0.0000

Source: Computed from 1993 KDHS data

Table 4.13. Results of Multivariate Logistic Regression Analysis by province

CENTRAL	NYANZA		WESTERN			
VARIABLE	B	B(EXP)	B	B(EXP)	B	B(EXP)
CFR2	0.7566	2.1311	0.4540	1.5745	0.1305	1.1395
CFR3	1.0537	2.8684	0.5514	1.7357	0.5048	0.6036
MOTIV2	2.6337	13.9258	0.5514	1.7482	1.0265	2.7913
MOTIV3	0.4150	1.0424	0.2072	1.2303	0.6291	2.7913
AGE2	-0.4330	0.6486	-0.0322	0.9683	0.2318	1.8759
Reference (e)	0.4913		-0.7099		-0.0921	
Sign	0.0404		0.0000		0.0000	
-2 L.L	746.774		1279.349		885.350	
D.F.	681		935		665	

Note CFR=Cost of fertility regulation MOTIV= Motivaton for use of contraceptive

Source: Computed from 1993 KDHS data.

There was a positive association between the cost of fertility regulation (CFR3) and use of contraceptives. The further one is from a family planning clinic, the less likely she will be a contraceptive user. Those who spend more than 60 minutes to get to a source (CFR3) increases the chance of them being non-users of contraceptives by 0.5 in Central province compared to 0.2 in Nyanza province and -0.6 in Western province. Those who spent between 15 -59 minutes to get to a source increased their chance of being non-users by -0.3 in Central province unlike -0.005 in Nyanza and 0.5 in Western province. This results show that respondents in Central province had a lower cost of fertility regulation, that is, they are closer to sources of contraceptives unlike those in Nyanza and Western provinces. This therefore leads to a high use of contraceptives hence lower number of children ever born thus explaining the more rapid decline in fertility in Central province unlike Western and Nyanza provinces.

These findings can be interpreted that those who stay far away from family planning clinics or sources of contraceptives are less likely to use contraceptives than those who stay closer to a source of or a family planning clinic. This can also be interpreted that in most rural settings, it is the women who does most of the domestic work and hence may not be able to spare time to go for long distances in search of contraceptives. Also most rural homes do not have house helps or servants hence the women cannot be away from home for a long time.

Also being further away from a family planning clinic or source of contraceptives, one might not come in contact with correct information of family planning as most of the information is normally provided in family planning and maternal and child health clinics and other delivery points. Lack of information therefore increases the chances of one being a non-user of contraceptives.

A positive association emerged between motivation to control fertility and use of

contraceptives. The odds of being a non user of contraceptives increased with a decrease in motivation to control fertility. Those who were highly motivated to control their fertility increased their chance of being non-users of contraceptives by 0.1 in Central province, 0.2 in Nyanza, and 0.3 in Western province in respect to those who were least motivated (MOTIV1). Those whose motivation was moderate (MOTIV2), increased their chance of being non-users of contraceptives by 3.0 in Central, 0.5 in Nyanza, and 1.0 in Western province. This finding can be interpreted that women in Central province have a high potential supply of surviving children and desire fewer children hence are more motivated to use contraceptives unlike those in Western and Nyanza provinces. This can therefore explain the rapid decline in fertility in Central province unlike the other two provinces. Those who have a lower potential supply of surviving children and also desire more children are less likely to use contraceptives than those who desire fewer children and have a higher potential of surviving children. This is because, contraceptives would interfere with their fertility desires and the total number of children they would eventually have. Their proportion of children dead is also high hence are less likely to use contraceptives.

From these results it can be concluded that respondents in Central province may have been using contraceptives as a reaction to pressures brought about by high levels of potential family size and were probably not waiting until their desired family size was reached before commencing their contraceptive use.

STAGE 3 ANALYSIS - SOCIO-ECONOMIC AND CULTURAL DETERMINANTS OF FERTILITY AS THEY AFFECT COST OF FERTILITY REGULATION, POTENTIAL SUPPLY OF CHILDREN AND DEMAND FOR CHILDREN

Stage three of the Easterlin-Crimmins model takes potential supply of children, child demand (desired family size) and the cost of fertility regulation and regresses each one on various socio-economic variables. Potential supply of children refers to potential family size in the absence of any deliberate regulation of fertility and it is not directly observable but has been calculated (See definition of variables). It involves the analysis of socio-economic and cultural determinants of fertility control as they affect the basic proximate factors that is the cost of fertility regulation, the motivation for fertility control, potential supply of surviving children and child demand.

Education in terms of number of years in school, and exposure to mass media variables are considered to be dealing with the various aspects of the modernization process. The type of marriage and ethnicity were taken as cultural determinants.

The mean number of children dead was much lower for Central province (.268) when compared to Nyanza (.858) and Western provinces (.624). Also the index mean potential supply of surviving children was higher for Central province (21.43) as opposed to Nyanza (-4.925) and Western (-.941) provinces. Therefore, women in Central province have more surviving children hence higher supply of children which almost, or equals the children they desire unlike women in Nyanza and Western provinces.

The mean time taken to get to nearest source of family planning is less for Central province when compared with Nyanza and Western provinces. More women in Central province therefore are more likely to use contraceptives because of less cost (psychic) as opposed to women in Nyanza and Western provinces.

Table 4.14 Cost of Fertility Regulation as the Dependent Variable

VARIABLE	CENTRAL	NYANZA	WESTERN
	B	B	B
Education			
WEDU3	-0.5032	-0.8492	-1.2260
WEDU2	-0.0244	-0.3634	-0.3833
Reference	4.4292	4.4292	4.7260
Ethnicity			
ETHN4		-0.0853	-0.0530
ETHN3	-0.6315	0.6849	-0.5530
ETHN2	-0.5482	0.0875	0.4362
Reference	1.5524	4.5853	3.8030
Exposure to Mass Media			
EXMAME3	-0.1616	-0.4128	-0.5818
EXMAME2	-0.5544	-0.1322	-0.8781
Reference	4.2912	4.7618	4.4236
Type of Marriage			
TMAR2	-0.0236	-0.1031	-0.2140
Reference	4.1388	4.7272	4.3600

Source: Computed from 1993 KDHS data

Almost all variables were statistically significant in influencing the cost of fertility regulation in individual contribution (bivariate) and not in the multiple regression.

Woman's education showed the expected negative association the dependent variable cost of fertility regulation. In Central province those who had spent more than 8 years in school (WEDU3) their cost of regulation was 0.5 less than those who had spent less than 2 years in school compared to Nyanza (-0.8) and Western province (-1.2). For those who had spent between 3-7 years in school (WEDU2), in Central province their cost of fertility regulation was 0.02 less than those who had spent less than 2 years in school unlike in Nyanza and Western provinces which was both -0.3. This therefore shows that the physic cost of fertility regulation is higher for women in Nyanza and Western provinces unlike those of Central province and this

can therefore explain the rapid decline in fertility in Central and not in Nyanza and Western provinces. This shows that the more years one has spent in school the lesser is the psychic cost of fertility regulation.

This finding can be explained in that, women who spend more years in school are more likely to disregard the obstacles involved in obtaining contraceptives which was physical distance to the nearest FP clinic or place where one can obtain any of the family planning methods. Also the more years one spends in school, the more likely she is able to understand the importance or advantages of fertility regulation. Hence, they are more likely to use contraceptives than those who have spent few or no years in school. One who has spent more years in school is also more likely to come in contact with information on family planning and she is therefore more likely to use contraceptives than one who has no or less than two years in schooling.

Exposure to mass media was negatively associated with cost of fertility regulation. Hence, those women who were exposed to any form of mass media, their psychic cost of fertility regulation was lesser than those women who were not exposed to any form of mass media. Those who were exposed to the two forms of mass media used in the study that is radio and newspaper (EXMAME3) with respect to those who were not exposed at all, had less cost of fertility regulation by about -0.1 in Central province when compared to Nyanza which was less by -0.4 and -0.5 in Western province. This can be concluded that more women in Central province are more exposed to mass media hence information on family planning and other related issues which therefore reduces their physic cost of fertility regulation. They are therefore more likely to use family planning methods unlike those on Nyanza and Western provinces which can explain the rapid decline in fertility in Central province.

The interpretation of this finding is that women who are exposed to various forms of mass media namely radio (EXMAME2) or both radio and newspaper (EXMAME3) are more likely to be exposed to family planning information. In Kenya, the mass media especially the radio disseminates family planning information such as advantages of family planning, the various methods used to regulate fertility and also where to obtain the methods. Lack of exposure to "correct" information about family planning and the various methods can lead to misconception and or misuse of any method. Therefore, those who are exposed to various forms of mass media are more likely to get the correct information about family planning which thus increases the probability of them using contraceptives.

Mass media may expose audiences to modern ideas that can compete with traditional norms of marriage and child bearing. Such ideas can include the consumer culture, the autonomy of women, secular rather than religious values, the cost of children, individualism and the value of education. These ideas can be communicated in advertising and music as well as news stories, drama and documentaries. Such ideas can penetrate without structural economic transformations; without changes in income; and even without changes in the status of women. The frequency or regularity of media exposure is a measure of its potential modernizing influence.

The Luo of Nyanza province (ETHN2) had a higher cost of fertility regulation (0.8) when compared to the Kikuyu ethnic group (ETHN1). In Western province, the Luhya (ETHN3) had a higher cost of fertility regulation by about (0.4) when compared to the Kikuyu ethnic group. This can also explain the rapid decline in fertility among the Kikuyu if Central province unlike the other ethnic groups of Nyanza and Western provinces. This can be explained in that the Kikuyu ethnic group have less barriers towards use of contraceptives unlike

:he Luo and Luhya ethnic groups.

The explanation could be that the Luhya and Luo ethnic groups occupy areas were accessibility to contraceptives discourages usage Also poor infrastructure such as transportation can discourage contraceptive usage. The attitude towards contraceptives can also discourage usage hence the Luo and Luhya ethnic groups have negative attitudes towards contraceptives.

)ESIRED FAMILY SIZE

:ble 4.15 Desired Family Size as the Dependent Variable

'ARIABLE	CENTRAL	NYANZA	WESTERN
	B	B	B
Education			
WEDU3	-0.9852	-0.8342	-0.4497
WEDU2	-0.6338	-0.3237	-0.1880
Reference	4.1061	4.5220	4.1164
Ethnicity			
ETHN4		0.0238	-0.0833
ETHN3	0.2212	0.0329	-0.2708
ETHN2	0.1378	0.6428	0.0726
Reference	3.4454	3.8048	3.8333
Exposure to Mass Media			
EXMAME3	0.0058	-0.0635	-0.6181
EXMAME2	-0.4578	-0.2088	0.2327
Reference	3.5631	4.2376	3.9490
Type of Marriage			
TMAR2	-0.4927	-0.1427	-0.2742
Reference	3.9166	4.3116	4.1333

Source: Computed from 1993 KDHS data

Most of the variables used were statistically significant in influencing the dependent variable desired family size (DFS) in the bivariate analysis and not in the multivariate analysis. In all the provinces, education, exposure to mass media type of marriage and ethnicity were statistically significant.

Education has a negative association with desired family size. Those who have spent more than 8 years in school (WEDU3) desired -0.9 children less than those who had spent less than 2 years in Central province, unlike -0.8 in Nyanza and -0.4 in Western province. for those who had spent between 3-7 years in school (WEDU2), they desired -0.6 children less than those who had spent between 0-2 in Central province unlike 0.3 children less in Nyanza and 0.1 in

Western province. This therefore shows that education had a greater effect on desired family size in Central province when compared to Nyanza and Western provinces.

The negative association between education and desired family size can be interpreted that women who spend more years in school will desire less children than those who have spent no or fewer years because they are more likely to take their children to school than those who have spent no or less than two years in school. They therefore understand the cost of education hence will desire fewer children. Women who spend more years in school also look at children in terms of quality and not quantity unlike those who spend no or less than 2 years in school. Women who spend more years in school are also more likely to be career women hence child bearing could interfere with their careers leading them to desire fewer children. The aspirations of such women is also much higher going beyond child bearing unlike those who have not spent any years in school. A negative association emerged between exposure to mass media and desired family size. The women who listen to radio or read newspapers at least once a week (EXMAME2) or both (EXMAME3) desired fewer children than women who were not exposed to any form of mass media (EXMAME1). Women who listened to radio or read a newspaper at least once a week (EXMAME2) desired 0.4 children less than those who neither read a newspaper or listened to radio in Central province and 0.2 children less in both Nyanza and Western provinces. Therefore because of the high exposure to mass media in Central province, women are more likely exposed to information on family planning hence leading to use of contraception.

This can be interpreted that women who are exposed to various forms of mass media are likely to get information on family planning. Also, the various socio-economic issues which are disseminated through the mass media can discourage one to have large families and hence desire

smaller families.

Type of marriage was significant in influencing the desired family size. A negative association emerged between type of marriage and desired family size. Those in monogamous union (TMAR2) desired fewer children than those in polygamous union (TMAR1). In Central province women in monogamous unions (TMAR2) desired 0.4 children less than those in polygamous unions while in Nyanza province it was less by 0.1 and in Western province less by 0.2. This shows that type of union in Central province had a greater effect on the desired family size unlike in Nyanza and Western provinces. This can be interpreted that women in Nyanza and Western province still follow their traditional attitudes towards family size hence the slower rate of fertility decline in these two provinces. This can be explained in that women in polygamous unions compete amongst their co-wives on the number of children they will have hence desire larger families. Also, women in polygamous marriages still follow their traditional values and attitudes towards children therefore desire larger families.

In terms of ethnicity also the Luo ethnic group of Nyanza province (ETHN2) desire more children by about 0.6 when compared to the Kikuyu ethnic group. Likewise, the Luhya of Western province desired more children than the Kikuyu by about 0.007. Every ethnic community has beliefs and attitudes in favour or against large families. The Luo and Luhya ethnic groups may strongly hold the belief that it is a duty one owes to God and ancestors to produce as many children as possible, stopping a possible birth may be preventing a future king from coming to existence, that renaming ancestors on one's children is a universal duty, that sexual issues are personal and any attempt to talk about them publicly or disturb natural sexual habits by artificial means is immoral etc. Also, the issue of gender mix and witchcraft could still be held strongly in this communities (Oruka O. 1991). One or a combination of these reasons

therefore explain why the Luo and Kisii ethnic groups desire large families when compared the Kikuyu ethnic group.

POTENTIAL SUPPLY OF CHILDREN

Table 4.16 Potential Supply of Children as the Dependent Variable

VARIABLE	CENTRAL	NYANZA	WESTERN
	B	B	B
Education			
WEDU3	-9.5692	2.6247	0.7839
WEDU2	-5.0069	1.2499	0.4623
Reference	27.4269	-6.9393	-1.9119
Ethnicity			
ETHN4		0.2167	0.5444
ETHN3	1.2355	1.1639	0.4204
ETHN2	1.2588	-0.3186	-0.2357
Reference	21.2259	-5.5628	-1.2262
Exposure to Mass Media			
EXMAME3	1.3094	0.2576	-0.4846
EXMAME2	-4.2231	0.1945	0.8056
Reference	3.5631	-5.7195	-1.4874
Type of Marriage			
TMAR2	-0.9444	-0.0930	0.6770
Reference	22.1603	-5.5199	-2.0236

Source: Computed from 1993 KDHS data.

Education showed the expected negative association with potential supply of surviving children only in Central province. Therefore the longer the time spent in school, the lower the potential family size. The potential family size for those with more than 8 years in school was 9.5 less than for those who had spent less than 2 years in school. In Western province it was more by 0.7 while in Nyanza province it was more by 2.6 children. This can be interpreted in that those who spend more time in school are more likely to come in contact with family planning information and hence the advantages of small families.

Exposure to mass media also showed a negative association with potential supply of children. So, the higher the exposure the lower the potential supply of children only in Central province. Those who listened to radio or read a newspaper at least once a week (EXMAME2) their potential family size was 4.2 less than those who neither listen to radio or read newspaper at

least once a week. Therefore, those who are exposed to mass media are more likely to come in contact with information such as on family planning, nutrition, hygiene, which are likely to influence their attitude towards family planning and family size leading to lower potential supply of surviving children.

Type of marriage also showed the expected negative association with potential surviving children in Central and Nyanza provinces only. In Central province those in monogamous unions (TMAR2) their potential family size was 0.9 compared to those in polygamous union unlike 0.09 less in Nyanza province. Type of marriage therefore had a higher effect on potential family size in Central and not in Nyanza and Western provinces.

Most of the variables used in the stage three analysis did not produce the expected results especially in Nyanza and Western provinces. These findings show that socio-economic factors are important in influencing the cost of fertility regulation, desired family size and potential supply of children. The socio-economic factors used were education, exposure to mass media, ethnicity and region of respondent. The coefficients generated by Central province when compared to Nyanza and Western provinces shows that Central province is more advanced in socio-economic aspects than the other two provinces.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter gives a brief summary of the study, the conclusions, recommendation and policy implication based on the findings.

5.1 SUMMARY OF THE STUDY

The main objective of the study was to determine factors that may have contributed to the differentials in the rate of fertility decline between Central, Nyanza and Western provinces. The Easterlin/Crimmins theoretical framework was adopted to determine the factors that could have led to the differential in the three provinces. The analysis was done in three stages. In the first stage, intermediate variables were regressed against the dependent variable children ever born. The empirical intermediate variables were duration of breastfeeding, use of contraception, marriage duration and proportion of child mortality. Ordinary least squares method was used to account for the variation in the number of children ever born through exposure to the intermediate variables.

Several factors, both socio-economic and demographic, indicated variation between the three provinces. The background information showed that the three areas differ in many aspects. Central province appeared to be more advanced or developed in terms of economic, social and demographic aspects, for example, education, transport and communication, health, agriculture and so on, when compared to Nyanza and Western provinces. In demographic factors such as age at marriage, infant and child mortality, total fertility rate, awareness, use and the met need of contraceptives. Central province was also more advanced than the other two provinces. These

differences also appeared in the frequency distributions.

In the second stage the dependent variable contraceptive use was regressed against cost of fertility regulation; and desired family size and potential supply of surviving children (motivation to control fertility). The emphasis on this stage was on understanding the determinants of use of contraceptives. Logistic regression was the chosen statistical technique. In the final stage of the analysis, socio-economic variables were regressed against potential supply of surviving children, desired family size and cost of fertility regulation. The independent variables refer to socio-economic characteristics of the respondent such as education, region of residence, type of marriage, ethnicity and exposure to mass media. The end result of the three stages was a model that links the supply of children, the demand for children and the cost of fertility regulation.

From the stage one analysis, marriage duration, age and proportion of children dead had the greatest impact on the number of variable children ever born in all the three provinces followed by breastfeeding duration. In the stage two analysis, cost of fertility regulation and motivation to control fertility were important in determining the use of contraceptives. In the third stage of analysis, the socio-economic variables which were highly significant in influencing the dependent variables (desired family size, cost of fertility regulation and potential supply of surviving children) were education and exposure to mass media in the three provinces. Ethnicity was significant in influencing desired family size in Nyanza province while type of marriage was significant in Central province.

5.2 CONCLUSION

Easterlin/Crimmins framework emphasizes the importance of mechanisms through which modernization affects fertility. The various aspect of modernization can explain the differential in the rate of fertility decline in Central, Nyanza and Western provinces. The three provinces appear to be in different stages of modernization in the Easterlin/Crimmins framework (Figure 2.1).

All the three provinces have passed stages "M" and "H" (see figure 2.1) as evidenced by declining total fertility rate, infant and child mortality and the number of children desired. However, the difference could have risen in the stage of modernization the provinces have reached between "H" and "P". Central province could be closer to "P" when compared to Nyanza and Western provinces. In Central province, the number of children desired could be equaling or almost equaling the actual number of children born. Women are desiring smaller families because they spend more years in school and are more exposed to mass media than in Nyanza and western provinces. This was evident in the frequency distributions and was further confirmed in the cross tabulation and regression results. Fertility change arises as a result of modification of behaviour due to dissemination of new information and attitudes, which lead to innovation in terms of fertility control.

The low number of children dead or the low proportion of children dead in Central province could have also led to the rapid decline in fertility in this province unlike in Nyanza and Western provinces. Women are able to achieve their desired family size without having to give birth to many children, as insurance against possible deaths or to replace a dead child like would be the case in Nyanza and Western provinces. On average marital duration, another indicator of modernization was much lower in Central province compared to Nyanza and Western provinces,

which further explains the differential in rate of fertility decline.

The difference in the supply of children, demand for children and cost of fertility regulation further explains the difference in the rate of fertility decline. Supply of children is much higher in Central province thus encouraging women to use contraceptives. Low number of desired family size and low cost of fertility regulation further enforce use of contraceptives.

High socio-economic status apparently leads to a later age at marriage and a lower infant and child death rates and hence causing development to be associated with reductions in fertility. These indicators were evident in Central province.

5.3 POLICY IMPLICATION

From the findings it is evident that modernization has a role to play in the decline of fertility. Therefore, policies should be aimed at rapid socio-economic development stressing education, health and equitable distribution of resources to improve standards of living, which will trigger a further decline in fertility in all regions.

The study also found out that marital duration greatly influence fertility as it leads to a wider period of exposure to the risk of conception. However, recent change in nuptiality pattern, such move towards consensual unions and dissemination of several freedom values seems to operate in the direction of increasing early exposures to intercourse. If this is accompanied by favourable attitude towards, and greater knowledge and use of contraception, it might balance the aggregate effect of early entry into union.

Education was found to closely associated with the various aspects of fertility such as desired family size, contraception, and potential supply of surviving children. Policies that are aimed at increasing the time spent by women in school and the overall percentage of women

population in education should be encouraged. Also increasing Women's participation in various spheres of action and discussion e.g. neighbourhood associations special education program, health assistance centres and even Labour Unions and political parties should be consequential for the process of fertility transition.

The study found out that high proportion of child loss greatly influenced the variation in the rate of fertility decline in the three provinces probably because of the replacement effect and insurance effect of child loss. Therefore, investment in improving the quality of life is required if further reductions are to take place. Public health measures and some general improvement in the standard of living can reduce IMR these includes investment in child care, maternal care, nutritional and generalized improvement in the quality of life should be greatly emphasized. It also calls for the provision of more and better medical care for mothers and infants, pure water, adequate shelter, education and all those things, which are associated with a good quality life style.

An important contribution to success in reducing fertility is the availability of sufficient resources to permit the full extension of family planning information, services and supplies. Because family planning availability can make a significant difference in the contraceptive use and fertility reduction, population pressures can be eased sufficiently to permit an acceleration of progress toward attaining national development goals. In addition, reproductive rights should be brought to the forefront of public debate.

Because of the importance of marital duration in fertility, a shift from early to late age at marriage occurs within a milieu of broad social change involving changes in the role of women, education, family and economic structure and more particularly, change in the relationship of parents and their children.

5.4 RECOMMENDATION FOR FURTHER STUDIES

More research should be carried out applying Easterlin and Crimmins theory including other indicators as this study did not exhaust all the socio-ecomomic and cultural indicators as well as the proximate determinants of fertility. Further research should also be carried out to find out other factors that contributed to the differential in fertility between the provinces Central, Nyanza and Western.

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APPENDIX

Appendix 1 MULTIVARIATE REGRESSION ANALYSIS RESULTS WITH COST OF FERTILITY REGULATION AS THE DEPENDENT VARIABLE

CENTRAL PROVINCE

Variable	B	Beta	T	Sign T
AGE2	-0.0730	-0.0195	-0.470	0.6382
WEDU2	0.0282	0.0077	0.134	0.8932
ETHN3	-0.6726	-0.0342	-0.896	0.3704
ETHN2	-0.4048	-0.0290	-0.763	0.4460
TMAR2	0.0356	0.0043	0.114	0.9094
EXMAME2	-0.4549	-0.1079	-1.064	0.2876
WEDU3	-0.2557	-0.0672	-1.065	0.2870
EXMAME3	-0.1511	-0.3443	-0.342	0.7327
CONSTANT	4.3506		12.050	0.0000
R^2	0.0344			
F	3.0226			
Sign F	0.0024			

NYANZA PROVINCE

Variable	B	Beta	T	Sign T
AGE2	0.0934	0.0243	0.668	0.5042
ETHN3	0.7347	0.0793	1.819	0.0692
TMAR2	0.0806	-0.0122	0.378	0.7056
WEDU2	-0.2602	-0.0721	-1.685	0.0924
ETHN4	-0.1609	0.0425	-1.543	0.5873
EXMAME3	-0.3567	-0.0814	-1.513	0.1306
WEDU3	-0.6211	-0.1421	-2.949	0.0033
EXMAME2	-0.0089	-0.0022	-0.040	0.9680
ETHN2	0.0346	-0.0095	0.120	0.9045
CONSTANT	4.931868			0.0000
R^2	0.0404			
F	4.3476			
Sign F	0.0000			

WESTERN PROVINCE

Variable	B	Beta	T	Sign T
AGE2	0.0846	0.0220	0.554	0.5799
EXMAME3	-0.3672	-0.0734	-0.653	0.5142
ETHN4	0.1773	0.0073	0.195	0.8453
ETHN2	0.0712	-0.0058	0.144	0.8856
WEDU2	-0.2671	-0.0720	-1.454	0.1464
TMAR2	0.1148	0.0195	1.509	0.6108
ETHN3	0.3507	0.0633	-1.522	0.1284
WEDU3	-0.7753	-0.1926	-3.566	0.0004
EXMAME2		-0.1564	-1.400	0.1621
CONSTANT	4.2879			0.0000
R^2	0.11242			
F	9.3404			
Sign F	0.0000			

Source: Computed from 1993 KDHS data

Appendix 2 MULTIVARIATE REGRESSION ANALYSIS RESULTS WITH DESIRED FAMILY SIZE AS THE DEPENDENT VARIABLE

CENTRAL PROVINCE

Variable	B	Beta	T	Sign T
AGE2	0.5071	0.1880	4.769	0.0000
WEDU2	-0.3778	-0.1433	-2.584	0.0100
ETHN3	0.3309	0.0233	0.634	0.5260
ETHN2	0.4181	0.0416	1.133	0.2576
TMAR2	-0.3263	0.0552	-1.498	0.1346
EXMAME2	-0.2467	-0.0812	-0.830	0.4066
WEDU3	-0.5893	-0.2150	-3.532	0.0004
EXMAME3	0.0476	-0.0150	0.155	0.8768
CONSTANT	3.9934		11.880	0.0000
R^2	0.1017			
F	9.6021			
Sign F	0.000			

NYANZA PROVINCE

Variable	B	Beta	T	Sign T
AGE2	0.3714	0.1282	3.650	0.0003
ETHN3	0.0230	0.0032	0.078	0.9376
TMAR2	0.0099	0.0020	0.064	0.9491
WEDU2	-0.0797	-0.0293	-0.709	0.4783
ETHN4	-0.0696	-0.0244	-0.323	0.7469
EXMAME3	0.0476	0.0144	0.279	0.7802
WEDU3	-0.4091	-0.1243	-2.669	0.0077
EXMAME2	0.2379	-0.0804	-1.470	0.1418
ETHN2	0.5809	0.2117	2.761	0.0059
CONSTANT	3.9325		15.149	0.0000
R^2	0.1049			
F	12.122			
Sign F	0.0000			

WESTERN PROVINCE

Variable	B	Beta	T	Sign T
AGE2	0.1356	0.0456	1.094	0.2743
EXMAME3	-0.5879	-0.1521	-1.287	0.1984
ETHN4	0.0034	0.0018	0.005	0.9963
ETHN2	-0.0801	0.0442	-0.199	0.8421
WEDU2	-0.1268	0.0298	-0.850	0.3954
TMAR2	-0.1357	0.0077	-0.741	0.4588
ETHN3	0.0332	-0.0891	0.178	0.8590
WEDU3	-0.2774	-0.0873	-1.572	0.1164
EXMAME2	0.3249		0.744	0.4572
CONSTANT	4.1162		15.218	0.0000
R^2	0.0212			
F	1.5968			
Sign F	0.1123			

Source: Computed from 1993 KDHS data

Appendix 3 MULTIVARIATE REGRESSION ANALYSIS RESULTS WITH POTENTIAL SUPPLY OF SURVIVING CHILDREN AS THE DEPENDENT VARIABLE

CENTRAL PROVINCE

Variable	B	Beta	T	Sign T
AGE2	8.6866	0.4819	7.123	0.0000
TMAR2	0.6221	0.0159	0.260	0.7951
WEDU2	0.3948	0.0256	0.246	0.8070
ETHN2	4.4592	0.0772	1.342	0.1810
EXMAME2	-4.4127	-0.2381	-1.632	0.1041
ETHN3	10.1084	0.0881	1.377	0.1700
WEDU3	-2.7774	-0.1755	-1.542	0.1245
EXMAME3	3.9707	0.2024	1.411	0.1597
	19.5434			0.0000
CONSTANT	0.30504			
R^2				
F	13.2576			
Sign F	0.0000			

NYANZA PROVINCE

Variable	B	Beta	T	Sign T
AGE2	-2.6350	-0.5329	-9.487	0.0000
ETHN4	0.1724	0.0392	.320	0.7494
TMAR2	-1.8519	-0.1018	-1.999	0.0468
ETHN3	1.0531	0.0766	1.243	0.2152
WEDU2	0.4944	0.1136	1.608	0.1093
EXMAME3	0.0278	0.0052	0.067	0.9466
WEDU3	1.5672	0.3278	4.112	0.0001
EXMAME2	-0.6736	-0.1438	-1.693	0.0918
ETHN2	0.0965	0.0222	0.184	0.8539
CONSTANT	-4.7565			0.0000
R^2	0.4455			
F	20.0859			
Sign F	0.0000			

WESTERN PROVINCE

Variable	B	Beta	T	Sign T
AGE2	-0.8050	-0.4544	-7.059	0.0000
EXMAME3	-0.3486	-0.1699	-0.828	0.4088
ETHN4	0.7296	0.0622	1.008	0.3148
ETHN3	0.2303	0.0511	0.755	0.4513
TMAR2	0.3779	0.1307	2.077	0.0392
WEDU2	0.1574	0.0938	1.076	0.2834
ETHN3	-0.1785	-0.0770	-1.127	0.2613
WEDU3	0.3102	0.1808	1.821	0.0703
EXMAME2	0.4792	0.2396	1.189	0.2358
CONSTANT	-0.5688			0.0000
R^2	0.3549			
F	11.433			
Sign F	0.0000			

Source: Computed from 1993 KDHS data