

**DETERMINANTS OF FERTILITY LEVELS IN URBAN AREAS:
A Comparative Case Study of Mathare and Nairobi South**

BY

MONICA IMELDA AOKO

A Research paper submitted to the Department of Economics,
University of Nairobi, in partial fulfillment of the
requirements for the Degree of Master of Arts in Economics.

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DEDICATION

This Paper is dedicated to my late mother

LEONIDA NYAWANDA

This Research Paper is my original work and has not been presented for a degree in another University.



MONICA IMELDA AOKO

This Research Paper has been submitted for examination with our approval as University Supervisors.



DR. THOMAS NZIOKI KIBUA



DR. PAUL JUMI

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ABSTRACT

Population growth, has become a current issue in Kenya because it deters overall development planning. The problem manifests itself in a deficit in the provision for basic needs and low standards of living.

A lot of research has been undertaken in this area with useful results but the policy implications thereof have as yet failed to curb the population growth. Therefore, further research in the area of population growth is required if effective policies are to be designed which will eventually control population growth.

This study aims at throwing more light on socio-economic determinants of fertility levels in urban areas. Regression techniques were applied to cross-sectional data from two areas (Mathare and the Nairobi South area). The sample size was 434. Data was collected from the field by administering a questionnaire.

The study found that socio-economic status (measured by educational levels, occupational status, age of a woman, age of a woman at first marriage, infant mortality and family planning practice), is a major determinant of fertility levels in urban areas. People with low socio-economic status have more children than those with higher socio-economic status.

The findings imply that to achieve a decline in the population, the government must design policies to induce people of low status to reduce their family size. This could be done by way of increasing educational levels, increasing the marriage age, better medical facilities and a more intensified family planning campaign.

CHAPTER 1

INTRODUCTION

1.1 Background

Whereas many developed countries have experienced a decline in their population growth (low fertility and low mortality), the less developed countries have experienced rapid population growth in recent years.

Kenya, like many other developing countries has had very high fertility rates in recent years. In 1969, the population growth rate was 3.3 percent (CBS, 1976), but more recent indications are that population growth is 4 percent (Population Reference Bureau, 1983). Table 1 below gives an indication of what the situation is like.

Mortality on the other hand, is on the decline and a sustained downward trend in mortality has been established (Table 2).

Table 1: Fertility Indicators, 1948 - 1987.

Year	Crude Birth Rate	Total Fertility Rate*	Rate of Natural Increase
1948	50	6.0-7.0	2.5
1962	50	6.8	3.0
1969	50	7.6	3.3
1979	50	7.9	3.8
1984	53	8.1	4.0
1986	54	8.1	4.1
1987	53	7.1	4.0

* Per 1,000 population

Sources: Central Bureau of Statistics, 1966, pp. 69 & 77;
 Central Bureau of Statistics, 1977, pp. 58 & 62;
 Kenya Contraceptive Prevalence Survey, 1984;
 World Development Report 1982, 1986, 1988.

Table 2: Mortality Indicators 1948 - 1987

Year	Crude Death Rate*	Infant Mortality Rate**	Life Expectancy at Birth
1948	25	184	35
1962	20	120	44
1969	17	119	49
1979	14	104	54
1987	13	86	60 and over

* Per 1,000 population

** Per 1,000 live births

Sources: Anker and Knowles, 1977, pp. 3
 Central Bureau of Statistics, 1966, pp. 74
 Central Bureau of Statistics, 1977, pp. 3
 Development Plan 1987 - 1988.

The present rate of population growth in Kenya is said to be one of the highest in the world (table 3)

Table 3: Fertility Indicators For Selected Countries

Country	Total Fertility Rate	Rate of Natural Increase
Chad	5.6	2.4
Bangladesh	5.1	2.6
Ethiopia	6.1	3.0
Mali	6.0	3.0
Japan	1.8	1.2
Zaire	5.8	3.1
Malawi	7.1	3.3
India	2.9	1.5
U.S.A.	1.8	0.8
Pakistan	4.8	2.5
KENYA	7.1	4.1
Sudan	6.0	3.0
Mauritania	5.9	2.8
Yemen	6.2	3.0
Bolivia	4.2	2.2
U.S.S.R.	2.4	0.9
Zimbabwe	7.1	4.0
Nigeria	6.3	3.3
Guatemala	3.4	2.2
Jordan	5.2	3.2
Germany	1.8	-0.2
Panama	2.3	1.5
Oman	3.3	2.1
Saudi Arabia	6.3	3.3
Kuwait	3.0	1.9

Source: World Development Report, 1982 and 1986.

The Demographic Transition Theory has it that as mortality begins to decline markedly, high fertility is no longer necessary for survival and therefore, fertility should begin to decline. In Kenya mortality has declined

markedly because of rising family incomes, remarkable advances in public health care and the provision of other social services. Fertility on the other hand has remained high "so that family size and the rate of population growth have both been rising" (Development Plan, 1979 -1983). The theory implies that there are three stages of transition in population growth and that nations or countries will start from the first stage and then move on to the second and finally to the third stage. The first stage is characterized by high fertility and high mortality (especially infant and child mortality); the second stage by high fertility and low mortality rates (at this stage there is rapid population growth); and the third stage is characterized by low fertility and low mortality and therefore, declining population growth.

The developed nations have gone through the first and second stages of transition and are now in the third stage where fertility is generally declining. The argument is that once high levels of socio-economic development have been attained, fertility should begin to decline without any effort from the government as couples choose to have fewer, but healthier, better educated and better provided for children.

Kenya, like many developing nations, is in the second stage which is characterized by rapid population growth (with the exception of Gabon, Botswana and Morocco who have the resources but their problem is that of a declining population). Population growth becomes a bigger problem because the concern is to make structural changes within the country in order to improve the quality of life. For many nations, the government's major task is to improve quality of life of its people. But a rapid population growth is a hindrance to the quick improvement of human welfare. For this reason, a reduction in fertility levels is of utmost urgency. Even though high fertility is not the primary cause of lack of socio-economic development and low levels of living which characterize most of the developing countries, it acts to perpetuate underdevelopment and postpones indefinitely the prospects of development and improvement of living standards.

Fertility and urbanization are found to have an inverse relationship (Anker and Knowles, 1972) as shown in table 4. Nairobi has the lowest fertility rate of 5.6 as compared with other rural areas.

Table 4: Mean Number of Surviving Children And Children Ever Born

Province	Mean Children Ever Born	Mean Children Surviving	Fertility Rate
Nairobi	2.4	2.1	5.6
Coast	3.4	2.7	6.7
Eastern	3.9	3.3	8.0
Central	3.5	3.1	7.8
Rift Valley	4.1	3.5	8.6
Nyanza	4.0	3.0	8.2
Western	4.1	3.2	6.3

Source: Kenya Contraceptive Prevalence Survey, 1984.

Mortality in urban areas seems to be lower than in rural areas as shown by the table 5. Urban mortality is lower than rural mortality for all ages.

Table 5: Rural-Urban Mortality Differentials

Age	Urban	Rural
1	0.098195	0.123681
2	0.103342	0.125337
3	0.109409	0.135051
5	0.132272	0.164008
10	0.163415	0.192595
15	0.196338	0.223132
20	0.219926	0.255393
IMR	86	104

IMR = Infant Mortality Rate
Source: 1979 Census Data.

1.2 Statement of the Problem.

The government has realized that population growth has become a major problem and is concerned that it will aggravate the unemployment problem and retard the plan for universal primary education, decent housing and medical care (Development Plan, 1979 -1983). Any gains in economic growth are used to cater for the ever growing population and this slows down other development programmes. The country would be better-off if population growth could be slowed down and development speeded up, but the pace of growth of population, impedes the overall development planning and plan implementation. A vicious circle is set in motion in which high fertility and socio-economic stagnation might breed upon each other.

The problem is further aggravated by the fact that the government, realizing the problem of a high population, invested in an expensive family planning programme from 1967, in order to curb population growth, but this has had little or no impact at all on total fertility. In 1969 the population was 10 million, in 1979 it was 15 million and the projections thereafter are shown in table 6.

Table 6: Population Projections to the Year 2000

YEAR	D. FERTILITY D. MORTALITY	C. FERTILITY D. MORTALITY	C. FERTILITY C. MORTALITY
1980	16,667	16,667	16,667
1981	17,342	17,342	17,342
1982	18,035	18,047	18,044
1983	18,748	18,784	18,775
1984	19,482	19,555	19,536
1985	20,241	20,365	20,333
1986	21,021	21,212	21,163
1987	21,826	22,100	22,030
1988	22,657	23,032	22,936
1989	23,513	24,009	23,883
1990	24,397	25,234	24,872
1991	25,308	26,109	25,905
1992	26,247	27,236	26,985
1993	27,214	28,418	28,113
1994	28,211	29,657	29,292
1995	29,237	30,956	30,522
1996	30,292	32,315	31,806
1997	31,375	33,738	33,144
1998	32,487	35,226	34,538
1999	33,626	36,782	35,991
2000	34,792	38,409	37,505

Source: CBS Population Projections to the Year 2000
D = Declining
C = Constant

The actual figures are slightly higher because the situation is that of rising fertility and declining mortality as opposed to the one shown in the table of constant fertility and constant mortality. Recently, the President cited population growth as a problem:

"At the root of all the challenges that face us in the coming years, is the balance that we must strike between our fast growing population and the resources the nation can muster for development. Ten years ago, there were 15 million Kenyans. Today there are more than 22 million. We are adding a million people to our population every year. In another 10 years, we shall number 35 million. (Nyayo Era Address to the Nation. pp. 16).

The implications of these numbers, He said, means that the country must provide more jobs, more schools, more hospitals, more housing and above all, more food for the growing population. The Kenyan economy must grow faster than the population if a better standard of living is to be provided for the population.

Although a long term growth rate of 3.2% is respectable for agriculture, it is less than the population growth rate of 4 percent per annum, so per capita agricultural production is actually declining. Moreover, the composition of the population is such that the number of people of working age relative to those of dependent age is very small and this has reduced the economic capacity of the population because there are too many consumers in relation to producers. There is high population pressure on the land already and this has forced the surplus population to migrate from the rural areas to urban areas in search of employment in the towns. Because capital for creating new production is lacking, the increased unemployment will create more urban social problems. Other sectors of the economy have also been hit by low productivity. There is therefore a big deficit in the provision of basic needs.

Rural to urban migration in search of employment and better prospects in life, transfer the problem of population growth from the rural areas to the urban areas.

Such migrants have fertility levels which are as high as those of the rural environment which they come from. Net migration into Nairobi by 1979 was 524,373 (which is the highest), followed by Nakuru with 195,157 migrants and Mombasa with 167,879 (Table 1, Kenya Population Census, 1979).

The problem in urban areas is that of crowded towns. The low status families have to live in slums with poor sanitation, poor housing and crowded neighbourhoods. In such places there is more need for health facilities, and other social and public facilities. There is also a deficit in the provision for education. Enrolment in primary schools is 86 percent of school age population (Ministry of Education Annual Reports 1971 - 1988), and this is the highest enrolment ratio ever recorded. Similarly, for health the situation is also that of deficit provision. Using the hospital bed per person, a study by A. Juma, "The Impact of the Present Population Growth Rates of Health Expenditures", found that there was an improvement in availability of health facilities up to 1980 and a deterioration thereafter. A study by A. Obonyo (1982), has confirmed a deficit in transport facilities, and the Urban Housing Survey (CBS, 1982) has also confirmed a deficit in the provision for housing. So it can be seen that the government is facing a lot of difficulties in providing essential social and public facilities.

It is therefore important for individual couples to consider very seriously the size of family they wish to have in a bid to reduce family size.

1.3 Objectives of the Study

This study will have three broad objectives which are outlined below.

1. To study the impact of socio-economic status on fertility.
2. To investigate the acceptability of family planning in urban areas and identify whether there is a difference in contraceptive use between the two groups of different socio-economic status and in case there is a difference, find out the reasons why these differences exist.
3. To identify policy instruments that can be used to induce urban households to reduce their family size.

1.4 Significance of the Study.

Since population growth constrains development, examining how to control it, especially in cities is significant. This study compares the fertility of two groups of people with different socio-economic status whereas previous researchers studied one group only.

Lastly the study is important because it will increase our understanding of this subject and help economic planners and policy makers to reformulate population policies which are different for each particular target group.

1.5 The Study Areas

Both study areas are in Nairobi and have been chosen mainly because they are easily accessible and each is representative of the two socio-economic groups under study. In each area, homogeneity exists. Mathare is generally known as a low income area and is the largest slum in Nairobi.

"Mathare lacks many of the social amenities and public utilities provided for legally recognized communities.

It is very crowded, housing is of poor quality and incomes are low

In none of these aspects is Mathare peculiar. It is typical both of other poor sections of Nairobi and all cities all over the world".

(Mathare Valley: a case study of uncontrolled Settlement in Nairobi. pp.12. Housing Research and Development Unit, University of Nairobi.

The Nairobi South area is a middle income area generally comprising of tenant purchase housing (maisonettes, flats and bungalows).

Table 7 shows Nairobi's population by sex and sub-location. The total population for Mathare is approximately three times that of the South and West areas put together. The number of households in Mathare is roughly five times that in the Nairobi South area and yet the Nairobi south area is five times and a half times larger than Mathare. Population density in Mathare is more than ten times that of the Nairobi South area.

Table 7: Nairobi's Population by Sex and Sub-location:

Administrative Area	Population	No. of H.holds	Square K.Metres	Density
Kangemi	21,081	5,950	5	3,933
Kawangware/Riruta N.	24,413	7,512	4	5,261
Riruta Satellite	17,165	4,716	5	3,433
Waithaka	7,365	1,640	4	1,521
Uthiru/Ruthimitu	8,140	1,789	6	1,218
Mutuini	7,627	1,623	4	1,588
Kilimani	45,111	10,601	24	1,805
DAGORETTI	130,902	33,831	56	2,325
Karen/Langata	13,112	2,081	74	176
Kibera/Woodley	63,351	11,769	7	8,515
G.Course/Nrb. Hill	16,670	2,371	5	2,835
Nrb. South & West	28,635	4,635	11	2,432
Industrial Area	9,314	1,198	10	849
Mugomoini	11,750	1,684	124	94
KIBERA	143,196	23,738	234	610

Table 7: Nairobi's Population by Sex and Sub-location
(continued):

Administrative Area	Population	No. of H.holds	Square K.Metres	Density
Embakasi	13,502	3,071	62	217
Dandora	22,672	6,253	162	139
Harambee	16,257	3,034	0	20,321
Lumumba	13,544	2,6201	1	11,286
Makadara	11,931	3,683	1	10,285
Kaloleni	5,120	1,039	0	8,000
Maisha/Makongeni	16,606	4,151	0	27,676
Mbotela	14,073	3,532	0	43,978
Bahati	10,670	2,963	0	20,519
Maringo	13,083	3,2180	3	2,707
Uhuru	23,813	4,4661	1	2,149
MAKADARA	161,271	38,030	235	686
Shauri Moyo	18,858	5,049	1	4,286
Pumwani	14,403	4,413	0	36,007
Ziwani/Kariakor	8,521	1,945	0	12,530
Pangani	17,223	4,088	1	
10,251 City Centre	18,402	3,147	1	15,863
Nairobi Central	8,859	1,888	1	7,382
Spring Valley	18,559	5,011	23	788
Karura	11,031	3,320	36	298
Parklands	23,965	5,461	3	6,886
Ngara West	10,335	2,507	1	8,100
Ngara East	16,335	4,020	1	13,173
PUMWANI	166,200	40,849	72	2,280
Roysambu/Kahawa	30,958	7,458	46	663
Ruaraka/Kasarani	29,881	9,784	16	1,829
Kariobangi	43,349	12,926	12	12,926
Mathare	68,456	20,802	2	9,006
Eastleigh	53,562	13,056	7	7,439
KASARANI	226,206	64,026	85	2,655
NAIROBI	827,775	200,474	684	1,210

Source: Table 1- Kenya Population Census, 1979.
H. Holds = Households.

LITERATURE REVIEW

Economists doing household fertility analysis, have tended to equate a household's demand for children as a function of the price of children and the price and quantity of all other goods demanded by the household and this is subject to a lifetime income constraint. Children are assumed to be normal goods in the economic sense and therefore an increase in income with increase the numbers of children demanded. In the real situation however, it is the low status families that have more children.

There exists a lot of literature which derives a simple model from the above argument where parents derive utility from the number of children, N , and all other goods, Z . They maximize utility subject to a lifetime or permanent income constraint. This can be written as follows

$$\text{Maximize } U = U(N, Z)$$

$$\text{Subject to } P_N + P_Z Z = I$$

where P_N is the prize of N and P_Z is the price Z and I is a lifetime income. The assumptions here are that prices are exogenous, preferences are well behaved and constant over time and income is measured in purely monetary units. It is then possible to perform a comparative static analysis,

as if this were any other consumption decision, to get comparative static conclusions. Differentiation of the budget constraint will show how the behaviour will change as the constraint changes.

The Malthusian assumption is that increased income would bring about an increase in fertility because it would cause a reduction in child mortality and cause more children to survive into adulthood. If the decrease in deaths is not accompanied by a decrease in births, then the number of children would increase in the average family. He also argues that increased incomes would induce people to marry earlier and abstain less while married. Today however, people can control births without necessarily having to abstain.

Becker (1960) thought the theory of the demand for consumer durables was a useful framework in analyzing the demand for children. He assumed that children provide utility like consumer durables would. It is then possible to draw a set of indifference curves to show the utility received from children as compared with that from other goods. The shapes of the indifference curves would be determined by tastes and these in turn by religion, race, age, etc.

Becker also considered the quality of children by considering the amount of money spent on each child. His

assumption was that more expensive children were of higher quality and therefore, as parent's income increases, they will want both more children and higher quality children too. His model is an improvement of the earlier model and can be written as

$$\text{Maximize } U = (N, Q, Z)$$

$$\text{Subject to } P + p_0Q + P_2Z = I$$

where Q represents quality per child.

He further argues that access to contraceptives is directly related to income and that the reason why poor people have more children than rich people is not because they want them but because they don't know about the means to prevent them and also they cannot afford them. Also rich people may choose to have fewer children due to social pressures which force them to spend more on children.

Comparative static analysis assumes fixed income and perfect knowledge of prices and choices. In real life incomes can change and so can prices and these can render Becker's results inconclusive. Nevertheless, demand analysis is a useful framework in analyzing the demand for children.

Mincer (1963) and Becker (1965), using the above model but considering also the opportunity cost of the wife's time, found a negative relationship between the labour

force participation of women and their fertility.

In Becker's later works (1965, 1974), he continues to stress the same theme but incorporated the time constraints of the family into the model. In these works he did not consider the quality of the children because it should not be of concern to parents. He defines full income as

$$wT + Y$$

where w represents the wage rate, T the total time available and Y non-labour income. This is an improvement of the earlier model. It is assumed here that the wife's time can either be used earning extra income or raising children. Therefore, the relationship will be positive if the extra income comes from the spouse who has little child care responsibility and negative in the case of the spouse who spends most time with the children (usually the wife).

More work relating income and the demand for children was done by Simon (1964) and Blake (1968). For Simon the results were positive and for Blake they were negative. The reason for this difference in opinion may be because income is a multi-faceted variable which is highly related to other factors such as education, health, lifestyles and socio-economic status.

Later Simon (1974) confirms his earlier finding. While holding tastes and all other factors constant, he finds that high income families have a larger demand for children than low income families.

Kupinski (1977) and Standing (1978), studying demand for children in developing countries found completely different results and thus rendering the above results inconclusive. Their findings show that in developing countries the negative relationship is questionable because the opportunity cost of children is low. A lot of families have other household members (extended family e.g. aunts, sisters, cousins etc.) who can and do help take care of children. It is also a common practice for families to get a cheap helping hand. Moreover, work and child care need not have a negative relationship especially when work is done around the home or on a family farm or business. In many developing countries, where welfare provisions do not exist, women with children have a relatively strong need for income and this may force them to work. It is possible that the negative relationship exists but the strength of the relationship is unknown.

On the supply side, it can be argued that children cannot be bought in the open market, they must be produced at home. Whereas many families are self sufficient in the production of children, they are not self sufficient in the production of any other commodity.

The literature reviewed so far seems to imply that parents are self sufficient in the production of children. However, parents cannot accurately predict the sex, intelligence, height etc. of their children and for this reason expected utility could be different from actual utility. Let us examine sex preference and suppose a family desires two children, a boy and a girl. If they end up getting two girls, then expected utility is different from actual utility assuming that utility of a female child is not equal to that of a male child in the case of the second child. This may force parents to have an extra child and this may bring them negative utility for as long as they continue getting girls.

Another important reason for considering consumption alongside production (demand and supply) is that the number of children a family can have is determined not only by income and prices but also by their ability to produce children. Here health of the mother could play an important role in determining production ability of the mother. A family may desire, say, four children and may be able to produce only one. Similarly, another family may desire two children and be unable to produce less than four.

The literature relating income and fertility ignores cases where children may yield their parents a net income instead of having a net cost. This is particularly so in

developing countries. In such cases we can apply the theory of investment as well as that of consumption.

Education is another socio-economic variable which economists think has a strong influence on fertility. For females it is supposed to have a negative relationship because education increases women's income earning potential and as a result increases the opportunity cost of their withdrawal from the labour force in order to take care of children.

Hussain (1970) And Goldstein (1972) found that a negative relationship existed between education and fertility. Encarnation (1970) on the other hand argued that education may have little or no effect on fertility until a threshold level has been attained (e.g. high school).

De Tray and Willis (1973), using American data, found a negative relationship between fertility and wife's education. Later De Tray included housing as a proxy for physical wealth and found a positive influence on desired number of children. Further confirmation of the relationship between fertility and wife's education came from Yoram Ben-Porath (1973) who found a negative relationship.

T.W. Schultz (1973) argues that the higher incomes associated with education should result in couples being able to afford more children.

Moreland (1974) found an inverse relationship between fertility and female education and a positive relationship between fertility and male education. D. Freedman (1975) argues differently. He believes that increases in income (associated with higher education) should lower fertility because it would open up possibilities of new lifestyles. It has also been argued that education will reduce fertility by increasing the acceptability and effectiveness of contraceptives, and this would reduce the number of unwanted births.

The threshold hypothesis of income and education was tested by Encarnation (1976). In this hypothesis the relationship between either of the two variables and fertility begins to decline. He found that the marginal impacts of these variables depended on whether or not they fell below certain critical levels.

M.T.R. Sarma (1972) in a study of demand for children in rural India and using data from the All-India sample survey of rural households for 1970-71 found that:

1. The higher the husband's education, the more children are demanded (as measured by children ever born to his wife).

2. The higher the wife's education, the lower is fertility, particularly in landed households.
3. The larger the amount of land cultivated, the higher the demand for children.
4. Fertility is generally higher in households where there has been infant mortality.
5. Households which live furthest from an urban centre have higher fertility.

Other relationships to fertility that have been studied are health status, migration, place of residence and infant and child mortality. The findings are that children born to healthier women have more chance of survival. Migrants are usually more innovative and therefore are likely to have fewer children than non-migrants. Studies on place of residence suggest that the fertility of urban residents is lower than that of their rural counterparts. Yet other studies have indicated that high infant and child mortality will lead to a desire for more children.

Miller (1972) found that the social group to which parents belong to is an important contributor to fertility decisions. Turchi (1975), arguing in the same way, found that there should be differentials in the fertility behaviour of persons of different social backgrounds, even when income and price effects are controlled for.

As regards infant and child mortality, Moreland (1974) found a positive relationship between fertility and child mortality. The same was confirmed by T.P. Schultz (1976, 78) who notes that parent's response to the decline in infant mortality is to have fewer children. This means that parents will almost definitely replace a dead child, but in places where infant and child mortality is high, parents will have more children to make sure that some survive into adulthood.

The literature reviewed so far has been of studies in the developed countries (except M.T.R. Sarma) and have used comparative static analysis assuming stable utility functions and knowledge of future incomes, occupations etc. In real life, it is difficult to know one's lifetime income because situations change. Moreover, the definition of income is more difficult when the period of measurement is a lifetime than when it is a market period. These studies have not incorporated complications regarding contraceptive failure and mortality of parents. Whereas fertility decisions involve at least two people (in developing countries even more), most utility analysis use a single function. Becker (1974, 1981), discussed this logic but the basic questions still remain. Fertility behaviour is not a market activity and the constraints are difficult to define.

Biological elements of fertility are ignored in most studies. No solution is provided on how to deal with uncertainties of timing and sex that are inherent in the biological nature of fertility.

In Kenya, Heisel (1968), carried out a fertility study of families in rural Kenya. The problem then was that the rapid population growth was posing severe economic strains on the economy. The abnormally high proportion of children in the population (some 45 percent), was increasing the expenditure on consumption, despite the shortage of capital in the economy. He used proportions, averages and percentages and interviewed members of the six largest tribes of Kenya, namely: Kikuyu, Luo, Luhya, Kamba, Gusii and Mijikenda. In each area a sample cluster containing at least 150 adult males was chosen. The main objective of this survey was to determine the state of knowledge, attitudes and practice of fertility control which existed at the time and to make recommendations to government on issues that would make individual couples choose smaller families. The major finding of this survey was that couples were having many children because of lack of information or misinformation about means to achieve control over fertility.

Kibukamusoke and Saxton (1969), in studies in rural Uganda, found that female fertility was 31% higher among women aged 15-45 who had attained five years of primary

education, than among women in the same age range who had no education at all. Once they achieved secondary or higher education, their fertility is much reduced. Fertility among these women was found to be closely proportional to the number of manufactured goods found in the home. Couples with only one child generally were observed not to have a tin roof, radio, cement floor, bicycle, etc. Fertility doubled when there was one such item, trebled for two items, quadrupled for three and was six times as high when all five items were present. This agrees with another observation that all homes having five or more children in these villages were in households where the head was a professional, skilled or semi-skilled worker. The study concludes that there is higher fertility in households where income is high the reason being that infant mortality is higher in households where education is low and incomes low.

I. Livingstone (1975) studied the impact of family planning programmes in Vihiga, Hamisi Division of Kakamega District. The main concern here was with high population densities which existed (Kakamega District being one of the places with the highest density) and with population growth. At the time population growth in Kakamega was 3.5% per annum but it was correctly anticipated that it would rise to 4 percent. Vihiga had been chosen as one of the six areas for the implementation of the Special Rural Development Programme. To this programme supplementary

funds were allocated and a new management system was introduced within the governmental administrative machinery aimed at accelerating development. Experimental programmes and projects were to be undertaken in any aspect of rural development and welfare, from the expansion of rural industries or research in new crops to education and women's programmes. One of the projects initiated in Vihiga was a special intensive family planning project. This project was chosen mainly because population density in Vihiga was by 1969 the highest in any rural area of Kenya (538 per square kilometre). There has been intensive population pressure and family holdings are not much more than two acres on average. The response from this area was considered important because solutions could also be applied elsewhere. From records in the family planning clinics, and using mainly percentages and proportions, his findings are that few women visit these clinics and of those who visit, 33 percent never revisit the clinic after the initial attendance. Education, he found, did not necessarily influence acceptance of family planning. He suggested a reformulation of the programme to discourage non-continuation.

Anker and Knowles (1975) using multiple regression techniques and two independent data sets (one at household level and the other at administrative district level), considered biological, cultural and socio-economic factors and attempted to determine which of these factors are most

significant in affecting fertility. Their findings are that all three of the above broad classes of factors contribute significantly in explaining fertility differentials (although only certain variables in each broad class, have a significant effect). They considered differences in behaviour between various population subgroups (e.g. rural and urban residents). District level data were drawn from Kenya Government publications, especially the 1969 population census, while the micro level analysis data source was the 1974 ILO/ University of Nairobi Household Survey which was obtained by administering two questionnaires to each household (one for the men and the other for women). They found that, at the macro level, male education is positively and significantly related to fertility while female education has virtually no observed relationship to fertility. The micro level analysis confirms the existence of a positive relationship between male education and fertility but contradicts the macro results for wife's education by providing convincing evidence that increases in female education, 'after an initial threshold level', are associated with lower fertility. Urbanization (in both macro and micro analyses) was found to have a significant negative effect on fertility. livestock ownership was found to have no significant effect on fertility while life expectancy is found to have a positive effect on fertility up to the age of forty five and becomes negative thereafter. In addition, rural agricultural incomes, female age at

marriage, family planning participation rate, widowhood and celibacy rate were found not to be significantly related to fertility at the macro level. The micro level analysis revealed a positive relationship between fertility and the woman's age, her husband's educational level and the amount of land owned by rural households and a negative effect with the woman's own educational level and urban residence. There is a positive relationship between fertility and mortality both at the micro and macro level. Micro level analysis indicated that health factors do not have a large impact on fertility while macro results indicated that health has an impact on fertility through sterility. It was confirmed at both the micro and macro levels that women in polygamous marriages and those whose husbands are away, have lower fertility. A number of hypotheses were rejected namely, family planning acceptance, wife's labour force participation (whether at or away from home) and mother's health were all found not to be significantly related to fertility contrary to what was expected. Fertility was found to be lower in urban areas although migrant status and fertility was found to have a positive relationship in urban areas.

T. Kabweggere (1976) in a study of some Akamba families in rural Kenya, found that couples were having more children simply because children are socially desired. Once the children grow up, the benefits also tend to be economic (old age security). Therefore, the more children

a couple has, the more respected and the more economic benefits they can receive.

Walji (1976), in studies in Kangundo, found that parents were having many children because they depended on them for labour as well as for old age security. This is confirmed by Monsted (1977) in a study of the changing division of labour in Western Kenya where his findings are that there is no pressure to have fewer children in areas where children are contributing significantly to family labour.

T.N. Kibua (1977) using econometric analysis and secondary data found a positive relationship between population growth and growth of GDP and urbanization. He found that an inverse relationship exists between population growth and female employment, health, marketed agricultural output and family planning. He found health to be the most important variable at five percent level of significance.

In Kenya high fertility could be associated with the need for child labour especially in the rural areas. Kayongo-Male and Walji (1978) confirm this in a study of different ethnic groups across Kenya.

Muinde and Mukras (1979) studying aspects of determinants of fertility, found that education, female

labour force participation and family income were all negatively related to fertility. But they found polygamy and infant mortality to have a positive relationship with fertility. Their reason for high fertility in polygamy is that there is competition among wives to have more children in order to gain respect.

F.M. Muindi (1980), using econometric analysis found that households' average incomes and fertility have a positive relationship. Contrary to the popular belief of the threshold level of income, the grouped data revealed that income and fertility are positively related throughout. As expected, education of wife and fertility were found to be negatively related. Education of husband and fertility was also found to have a negative relationship. Female labour force participation had a negative effect on fertility as expected. Surprisingly, Muindi's study did not find age a significant determinant of total fertility and family planning was found to have a positive relationship with fertility. Infant and child mortality were found to have a positive relationship with fertility, with infant mortality emerging as the stronger variable. The study also confirms the positive relationship between fertility and land holdings as held by many researchers.

Walji (1980), studied the relationship between socio-economic conditions and fertility behaviour among selected

asian groups in Nairobi and found that the asians, being of a higher socio-economic status than the rest of the Kenyan population (as measured by income, education and occupational as well as levels of living scales), have a small family size (less than four). Their average total fertility is 2.5 and population growth rate is one percent per annum and this is much lower than a total fertility rate of 8.1 and population growth rate of 4 percent per annum for the african population. She analyzed her data using the Statistical Package for Social Science (SPSS) and run frequencies for all variables, as well as cross tabulation and correlation coefficients for the major dependent and independent variables, both for the total sample and for each sub-group within the sample. The statistical tests she run were the gamma, chi-square statistic and multiple regression. For number of children by level of westernization, X^2 was 17.7, degrees of freedom 6, was significant at .005 percent level and gamma was - 0.38. This shows that the degree of westernization will influence the number of children a family has, so that the more westernized families, have fewer children. For nationality versus number of children X^2 was 0.8, gamma 0.09 and was found not to be significant contrary to her hypothesis that non-citizen asians would have fewer children because of their consciousness about the cost of emigration. On the desire for boys X^2 was 39.8 and was significant at .001 level upholding the hypothesis that preference for boys is a widespread phenomenon with the

asian community. However, the degree of westernization was found to affect son preference significantly. Families with high westernization levels did not favour an extra child even if there were no sons. The relationship between womens' employment and the number of children was found to be significant at .05 level, gamma was -0.53 and X^2 was 9.04. This confirms her hypothesis that women in employment have fewer children, although on the whole for the asian community even women who were housewives were having a relatively low total fertility rate as compared with their african counterparts. It was expected that the number of children per family would differ by community but this was not the case. Only one community's fertility was found to differ significantly from the other's. The age at marriage and age of mother were found to have a significant effect on fertility as per hypothesis. Age at marriage for the asian community is low with about 90% of all women marrying by the time they are 24 (2% of those under 15, 37.3% of those between 15-19 and 50% of those between 20-24 are married), and 100% are married by the age of 30. Although it has been argued that low age at marriage will influence fertility positively because of the longer exposure to childbearing, we can only conclude that asian women use contraceptives efficiently and this explains their low fertility. This is supported by the fact that 81.4% approve of family planning while 97.3% know of it and 83.3% use it. Walji paid special attention to education and used multiple regression analysis to test its

relationship with number of children. She found a strong negative relationship between education and number of children with $X^2 = 45.8$, degrees of freedom 6, gamma = $-.6$ and was significant at .001 level but she is quick in pointing out that the relationship maybe an indirect one, there being other intervening variables which might be compounding the relationship. She found that education affected the levels of westernization and also son preference. The more education one has, the more westernized he would tend to be and the lower his preference for sons. The most important findings of Walji's study are presented in the table 8.

Table 8: Multiple Regression Analysis of Number of Children

Social Characteristics	Number of Variables			
	5	4	3	2
Education	.354 ^a	-.298 ^a	-.350 ^a	-.372 ^a
Age	.195 ^a	.220 ^a	.231 ^a	.219 ^a
Age at marriage	-.127 ^a	-.117 ^b	-.109 ^c	
Westernization	-.184 ^a	-.125 ^b		
Exposure	.188 ^a			
R ²	.2746	.2473	.2346	.2232

^a significant at .01% level

^b significant at .05% level

^c significant at .10% level

Source: Walji's Results

Education is found to be the most significant variable in explaining fertility variations as compared to other variables. For instance, one unit change in education, and holding the other four variables constant, will, explain

.35 unit changes in the number of children couples have as compared to, say, age at marriage which explains .13 units of change both with a negative sign meaning that higher education and higher age at marriage is responsible for a decline in fertility.

Later in 1981 T. N. Kibua, using regression analysis, found a positive relationship between fertility and mortality, husbands education, property and income. An increase in any of these variables would increase fertility. He found a negative relationship with the number of livestock, wife's education and land. An increase in any of these three variables would decrease fertility. Mortality was found to be the single most important explanatory variable. A 10% increase in infant and child mortality would increase fertility by 7.2%.

Most Kenyan studies on fertility (and indeed even the general literature reviewed) except Walji's (1980), have been concerned with fertility of the rural population and have tended to ignore urban fertility assuming that it is declining. This is a generalization based on average total fertility of the particular urban area. But if an urban area were to be stratified and fertility studied in each area separately, it would be possible to find different levels of fertility. This is what this study is about. It stresses socio-economic status as a major determinant of fertility. In doing so it supports Walji's argument that

socio-economic status has a lot to do with fertility.

Walji has proved that for Asians, who have high socio-economic status, fertility is low. This study will be a comparative study of two groups with different socio-economic status (one with low socio-economic status and the other with higher status), in order to find out how their fertility differs. For low socio-economic status, a Nairobi slum, Mathare, has been chosen, which is one of the biggest slums in Nairobi and is considered to be one of the lowest in socio-economic status of its residents. The reasons for its selection have already been discussed in the introductory chapter.

To compare with Mathare, housing estates in Nairobi south "B" and "C" areas have been chosen. This area houses a middle income group of higher socio-economic status. The middle income group is preferred to the high income group because their residences are more easily accessible and are generally in one place making data collection easier. The high income group's homes are scattered over a very large area or areas and would require a longer period in order to collect sufficient data for the study.

It would have been possible to use Walji's methodology and variables (e.g. income, exposure, westernization etc.) if the study was being conducted only in the area with higher socio-economic status but because the other group is

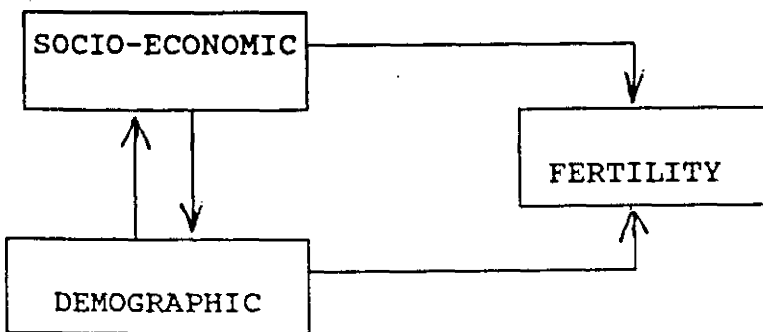
of low status, the variables that will be used are, age of the woman, age at first marriage, education of the woman, education of the husband, occupation of the woman, occupation of the husband, infant mortality, family planning practice and marital status. Also Walji interviewed both men and women but in this study mainly women will be interviewed (and the men if they happen to be in the home at the time of the interview, but if they are not around, their wives will provide their particulars) and because in most cases women do not know their husband's pay or income, income will not be used as a study variable. The economic variables which will be most relevant to this study are occupational status and education. These are deemed sufficient and will be used as proxies for income (there exists a lot of literature where education and occupation have been used as proxies for income even among the literature we have reviewed).

CHAPTER 3

THEORETICAL FRAMEWORK AND HYPOTHESES

The main factors affecting fertility decisions of couples are socio-economic, demographic and cultural in nature. This study is mainly concerned with the first two, namely, socio-economic and demographic determinants of fertility (Diagram 1).

Diagram 1



Source: Derived from the 1987 Population Studies Research Institute (PSRI), Chart.

The concept of fertility used in this study is number of births (including infant mortality but excluding premature births and miscarriages) a woman has had at the time of taking her observations.

The socio-economic variables to be considered in this study are education and occupation or labour force

participation. It has already been mentioned that income will not be considered as a study variable. Demographic variables include age of the mother, marital status, age at first marriage and infant and child mortality. Family planning will also be considered as one of the variables affecting the supply of children.

Education

The literature we have reviewed has confirmed that the level of education of parents can influence the number of children they have. The influence of the husband's education can be said to be indeterminate because some researchers have found it to have a positive relationship while others have found it to have a negative relationship. However most studies conducted have tended to be in agreement that the education of the wife has a negative influence on fertility because education will lead to higher income in the labour force and as such the opportunity cost of her withdrawal from the labour force will be great. The wife will therefore want to spread most of her time earning income and since childbearing may affect her performance, she will choose to have fewer children. The alternative argument is that education could simply equip parents with new values, making them prefer better quality children in terms of education, health, clothing, etc. Because this can only be achieved at a cost, it will limit the number of children they wish to have. Several studies have confirmed the negative

relationship between wife's education and fertility. Yuken's study in Egypt found that women with secondary education had an average 3.1 births in urban areas and 3.4 births in rural areas after 20 to 29 years of marriage while women who never went to school had 7.4 births in urban areas and 6.7 births in rural areas after the same period of marriage. In Nigeria Caldwell and Okonjo (1968) found a small family size of 4 or 5 was reported by professional women who had been to university and whose husbands had university education also. Women with secondary education reported 5.4 births while those who never went to school reported 7.5 births. Studies in Kenya have also confirmed this relationship (Walji, Kabwegyere). They confirmed that education beyond secondary school reduces fertility dramatically. Indeed, as Kabwegyere puts it, the necessary condition for a decline in fertility is education for both men and women. Education also postpones the age at which a woman enters marriage and reduces her period of fecundity. Schultz (1970), in studies of the Arab Middle East, found that the more education a woman receives, the later she tends to marry and the fewer years she has left for childbearing. Education may also improve a couples understanding in the use of contraceptives, making them accept and be able to use them more effectively. Rizk (1976), in Jordan, found that the highest number of contraceptors were university graduates, followed by secondary graduates, then by primary graduates and finally the illiterate. We can see here that the

findings imply that education is one of the most important factors that will influence fertility decline in Kenya with the education of women having a stronger effect than that of men.

Occupations

Occupation is correlated with education in that education determines one's occupation and income. The higher one's education, the higher his occupational status and the higher the income he earns. This is particularly true in urban areas where most people are in wage occupations. The literature we have reviewed confirms this relationship, namely a positive relationship to fertility with male occupational status but negative in the case of the women. This is because it is the woman who bears most of the burden of childbearing and rearing and if coupled with this a woman has a responsible job outside the home, the two roles of childbearing and participation in the labour market (or wage employment) are seen to be conflicting. Having too many children may interfere with her efficiency and productivity in her employment and may even jeopardize her chances of promotion. At the same time the opportunity cost of her withdrawal from the labour force in order to care for children may be too high, and so she will stay in the labour force and decide to have fewer children. Here again the occupational status of the woman has more influence on family size than that of the man.

Age of the Woman

Age of the woman is an important variable in demographic analysis and most fertility measures are calculated using age of the woman (mainly in five year age groups). Age of the woman is related to the number of children women have, their ability to have children and it also influences the attitudes regarding family size and family planning. Younger women are expected to have fewer children than older women for the simple reason that older women have been exposed to childbearing for a longer period.

Marital Status

Earlier studies in fertility which were based on the Malthusian assumption (it assumed that fertility is confined only to marriage) considered marriage one of the most important variables in fertility analysis because it signified entry into sexual union and activity. According to this assumption, once a woman has entered sexual union (through marriage), she is exposed to pregnancy risk for the rest of her fecund life (which ends at approximately 49 years of age), and unless she deliberately controls her fertility, then she can have children up to a biological maximum. This assumption is no longer valid because it ignores the fertility of divorcees, widows and, more important, pre-marital pregnancies. Studies have shown that pre-marital pregnancies are becoming a major concern in Kenya today (Omondi Ahawo , 1981), and most of these are

adolescent pregnancies. Edward K. Mburugu (1986) notes that pre-marital births are increasingly being accepted and tolerated as reflected in the increasing number of school girls who get pregnant but are permitted to go on with school unlike some years back. The same can be said of older women who for some reason or other have resolved to remain single but decide to have children. This being the case fertility will be examined whether in marriage or outside it, although more attention will be paid to marital fertility.

Age at First Marriage and Age at First Birth

As we have already noted, for most people marriage represents the socially sanctioned initiation of sexual activity and childbearing for a woman. We can therefore argue that early marriage leads to high fertility and late marriage to relatively lower fertility. Indeed for western countries where fertility has declined, the decline has been associated with delayed marriage. The three main reasons why early marriage is associated with high fertility are:

1. early marriage causes a woman to have sexual intercourse more often in her fecund years and thus increasing her chances of becoming pregnant.
2. it makes a woman begin childbearing early and thus have a longer exposure to pregnancy.

3. the interval before the next generation is born is shortened.

For women who are not married, an early age at first birth would lead to high fertility for the same reasons. Of course the above argument does not hold in conditions where there is widespread use of contraceptives.

Infant and Child Mortality

This variable strongly reflects the public health and medical health care situation. Socio-economic development reduces the level of infant mortality by increasing the surviving probability of children to adulthood. It is therefore expected that infant and child mortality is higher for low status families and lower for higher status families. This is because, as we have already mentioned, poorer people live under conditions of poor sanitation, malnutrition and crowding. This is bound to raise mortality in their communities. It has been shown that parents who lose a child will almost definitely replace it. Infant and child mortality therefore, plays an important role in household fertility decisions. As a result, when infant mortality is high, parents will adjust their family size upwards in order to make sure that a good number survive into adulthood. This could result in a bigger actual family size as compared with desired family size in cases where infant mortality has generally declined. For this reason, it is believed that infant mortality has a

positive effect on fertility.

Family Planning Knowledge and Practice

This is the main source of birth control available to the population. Family planning clinics provide access to the means of fertility control at reasonably low cost. Most family planning clinics in Kenya are run by public funds and their services are available at a highly subsidized cost. The cost of fertility regulation need not therefore be expensive. Despite this, the family planning programme has had no major impact. Contraceptive knowledge and use is not widespread. In fact in rural areas, women do not use contraceptives because of lack of information (Heisel, 1968). In urban areas more people are using contraceptives (Kenya Contraceptive Prevalence Survey, 1984), especially those of higher socio-economic status. The extent to which people of lower socio-economic status in urban areas use contraceptives is not known and if they do, it is questionable whether they use them efficiently and effectively.

In this study, contraceptive use will be used as a variable and its effect on fertility examined. The use of modern contraceptives allows couples to control their fertility fairly effectively. As a result, couples who use modern contraceptives should have fewer unwanted births, thus causing family planning acceptance and fertility to be negatively related.

The attitudes of those interviewed towards family planning will also be examined to see whether these influence the use of contraceptives. One's attitude to contraceptive use is seen as important because it influences the decision or willingness to practice family planning and if willing, it also influences the method one chooses and continuity. Although attitude will not be a variable in the study, analysis will be done on it from the data collected.

Based on the above theoretical considerations, we can make the following hypotheses:

1. Socio-economic conditions are a major determinant of fertility with high socio-economic status having a negative influence and low socio-economic status having a positive influence on fertility.
2. A woman's education has a strong influence on her fertility and therefore the higher the education of the woman, the lower her fertility with women without education having the highest fertility.
3. Low age at first marriage and low age at first birth will result in higher fertility.
4. Female labour force participation is negatively related to fertility.
5. Contraceptive use should have a negative influence on fertility.

In this study it is hypothesized that fertility can be determined by the following factors:

- X_1 = Education of female
- X_2 = Education of husband
- X_3 = Occupation of female
- X_4 = Occupation of husband
- X_5 = Age of the woman
- X_6 = Marital status
- X_7 = Age of woman at first marriage
- X_8 = Infant mortality
- X_9 = Family planning practice

Hypothesized relationships between fertility and the above variables are as follows:

$$dY/dX_1 < 0$$

The marginal effect of the female's education on actual fertility is negative. This means that the higher the woman's education, the fewer children she will have.

$$dY/dX_2 < 0$$

The husband's education has a negative effect on fertility. The higher the husband's education the fewer children his wife will tend to have.

$$dY/dX_3 < 0$$

Female labour force participation is expected to affect fertility negatively. Women who are in wage employment are expected to have fewer children because employment is seen as conflicting with child rearing. The higher the occupational status of the female, the greater the opportunity cost of leaving employment, and therefore the lower is fertility.

$$dY/dX_4 < 0$$

The marginal effect of the husband's occupation on fertility is negative. The higher the occupational status of the man (given that higher occupational status is reached through higher education) the lower the fertility of his wife.

$$dY/dX_5 > 0$$

The woman's age will exert a positive influence on fertility. Older women are expected to have more children because they have been exposed to childbearing for a longer period.

$$dY/dX_6 > 0$$

Marriage is expected to have a positive effect on

fertility.

$$dY/dX_7 < 0$$

The higher the age at first marriage, the lower is fertility.

$$dY/dX_8 > 0$$

Infant and child mortality affects fertility positively. This is because parents will almost certainly replace a dead child.

$$dY/dX_9 < 0$$

Contraceptive use has a negative influence on fertility. Women who use contraceptive do so because they want to limit their family size.

CHAPTER 4

MATHEMATICAL MODEL AND SAMPLING METHODOLOGY

4.1 Mathematical Model

Regression techniques are applied to examine the effects of explanatory variables (Xs) on number of births serving as the dependent variable (Y). The estimated equation will take the following form of a linear relationship:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, U)$$

where

Y = number of births

U = the error term

The variables entering the equation will be measured as follows:

- Y = The number of births a woman has had at the time of the interview. It includes still births and children who have died.
- X₁ = is measured by the number of school years completed.
- X₂ = Measured by the number of school years completed.
- X₃ = Dummy variable which takes the value of 1 if one is working and 0 if not working.
- X₄ = Dummy variable which takes the value of 1 if one is working and 0 if not working.
- X₅ = Measured in years.

- X_6 = Dummy variables which takes the value of 1 if the woman is married and 0 if not.
- X_7 = Measured in years.
- X_8 = The actual number of dead children a woman has had.
- X_9 = Dummy variable which takes the value of 1 if currently practicing family planning and 0 if not.

The equation is run separately for each group of respondents and then all the observations will be put together and a final regression run.

The possibility of including a 10th variable (X_{10} = duration of marriage) was explored. The hypothesis being that the duration of marriage and number of births are positively related. The results are reported in chapter 5. However this variable had to be dropped eventually and did not enter the final regression because the results produced were not statistically significant.

A number of variables are expected to exhibit a collinear relationship with each other. For instance, the education of the female (X_1) and occupation of the female (X_3). The female's education will determine her occupation. Therefore,

$$X_3 = f(X_1).$$

similarly, education of the husband (X_2) will determine his occupation (X_4). Therefore,

$$X_4 = f(X_2).$$

Education of female (X_1) is also expected to influence her family planning practice (X_3). More educated women are expected to accept family planning methods more easily and use them more widely, effectively and efficiently. Therefore,

$$X_3 = f(X_1)$$

Having recognized that multicollinearity might pose a serious problem in the study, a priori information from the data collected is used to correct it. It is possible to use information from the data collected, and by running separate regressions, to calculate a priori the strength of the relationship between collinear variables. We can in this way get an estimate of the postulated marginal effects between collinear variables. Once we have obtained a value for a postulated relationship between variables, we can use this value in the equation. Then we can proceed using stepwise regression. This work will be done by computer using the Time Series Package (TSP).

4.2 SAMPLING METHODOLOGY

Data was collected from the field by administering a

questionnaire. Simple random sampling cannot be used because there is no register with a complete list of names for both areas. The telephone directory and the electoral register was not found useful either because these do not list names by place of residence but lists them in alphabetical order and a physical address is not provided. Alternative sampling methods had therefore to be used.

The minimum sample size is expected to be about 408 households (it could be more). Of these 204 were collected from Mathare (this is about one percent of all households in Mathare using information from the 1979 population census) and 204 from the Nairobi South area (this is about 10 percent of all households in this area using information from the 1979 population census). Mathare has 12 electoral wards and 17 observations will be collected from each ward using the systematic sampling method. This is a method of selection in which every K^{th} unit of population, in this case the household, is selected with a random start until 17 observations have been collected in each ward. K is the sampling interval and random start is a number between 1 and K . For the purpose of this study K will be 10, and therefore our sampling interval is 10. Similarly for the Nairobi South area, there are six major estates (Mugoya, Belleview, Akiba, Tyson, Golden Gate and Plainsview). Thirty four observations were taken from each of these estates.

CHAPTER 5

DATA ANALYSIS AND RESULTS

5.1 Description of the data collected

A total of 450 women were interviewed, 225 in the Nairobi South area and 225 in Mathare. 16 questionnaires were eliminated because they were found to have been inaccurately filled. Therefore the total sample size for the analysis is 434 observations, 229 from Mathare and 204 from the Nairobi South area.

The mean age for the total sample is 34.9 years, for Mathare it is 33.8 years (the minimum being 17 years and maximum is 62 years) and for the Nairobi South area it is 35.4 years (the minimum is 24 years and maximum is 53 years). For Mathare, 71.2% of the women interviewed were married and living with their husbands and for the Nairobi South area 86.8% of all women interviewed were married and were living with their husbands. Single women formed 20.96 of the Mathare sample while in the Nairobi South area, single women interviewed were 8.3% of the sample. The rest of the women interviewed were either separated from their husbands divorced or widowed and these consisted of 6.1% in Mathare and 4.4% in the Nairobi South area.

The mean age at first marriage for the total sample is 23.3 years, however, for Mathare it is 19.1 years (the minimum is 13 years and the maximum is 27 years) while for

the Nairobi South area the mean age at first marriage is 25.2 years (the minimum is 17 years and the maximum is 34 years). The mean age at first birth for the total sample is 21.5 years, for Mathare it is 17.9 (the minimum is 12 years and the maximum is 26 years) and for the Nairobi South area it is 25.1 years (the minimum is 16 years and the maximum is 35 years).

Of those married in the entire sample, 92.1% are still in their first marriage. For Mathare those women who are still in their first marriage are 84.7% and in the Nairobi South area 96.7% of the women interviewed are still in their first marriage. Of the entire sample, 12.3% have been married more than once, in Mathare 12.4% of those interviewed have been married more than once while in the Nairobi South area those who had been married more than once were only 3.2% of those interviewed. In both places the mean number of years married was around 11.5 years. A total of 79 women (18.2%) were found to be in polygamous unions. Of these 54 cases were from Mathare (23.6%) and 25 (11.96%) were from the Nairobi South area. There were 59 currently pregnant women in Mathare and 22 in the Nairobi South area.

The interviewees had lived in their respective areas of residence for a mean of 7 years but those in Mathare seemed to have lived there longer (10.07 years) and those of the Nairobi South area had lived there for an average of

5.7 years.

The mean number of years of schooling for women is 10.3 considering the whole sample. Taking Mathare alone, the mean number of years of school that the women have had is 5.4 years (the minimum is 0 years and the maximum is 14 years). In the Nairobi South area, the women interviewed have gone to school for an average of 15.3 years (the minimum is 10 years and the maximum is 21 years). The husbands on the other hand have gone to school for an average of 13.5 years. The mean school years for Mathare husbands is 7.04 years (minimum is 0 years and the maximum is 11 years) and the mean school years for the Nairobi South husbands is 16.4 years (the minimum is 11 years and the maximum is 21 years).

76.7% of all women interviewed were in employment. In Mathare, the women who were employed at the time of the interview were 61.1% (140 women) as given in table 9.

Table 9: Occupations of Currently Employed Women in Mathare

OCCUPATIONS	NUMBER OF RESPONDENTS
Barmaids	12
Vegetable sellers	25
Sellers of 2nd hand clothes	9
Kiosk attendants	20
Canteen workers	2
Ciondo sellers	2
Sweepers	6
Tailors	9
Fish sellers	9
Kerosine sellers	3
Business women	8
Ayahs	3
Market women	7
Messengers	3
Youth winger	1
Sweater knitters	3
Meat roasters	1
Goat sellers	1
Charcoal sellers	2
Cooks	1
Casual workers	6
Teachers (untrained)	1
Shop attendants	4
Waste paper collectors	1
Chicken sellers	1
Church cleaners	1
Nursing auxiliaries	1
Pot sellers	1
Total	133

Source: Survey Data, 1989.

There were 89 unemployed women in Mathare and of these 72 (80.9%), said they depended on their husbands for a living, 9 got support from their children, 1 got support from parents and friends, 1 got support from the church and other philanthropists, 2 were landladies and lived on rents

from their houses, 2 got support from their men friends and one admitted that she sold changaa (nubian gin) to earn a living. 20 of the women currently unemployed in Mathare said they had worked before, 5 as barmaids, 3 selling vegetables, 5 as ayahs, one as a messenger, 1 employed in a kiosk, 2 as a market woman, one as a shop attendant, one selling chicken and one as a hotel cleaner.

In the Nairobi south area a total of 10 women were found to be unemployed but 8 of them had worked previously, one as a nurse, one as a tailor, 2 as secretaries, one doing business and three of them as teachers. The occupations of currently working women in the Nairobi South area are given in table 10.

Table 10: Occupations of Currently Working Women in the Nairobi South Area

OCCUPATIONS	NUMBER OF RESPONDENTS
Secretaries	21
Administration officers	15
Computer programmers	7
Personnel officers	16
Customs officers	1
Pharmacists	4
Own business	11
Production officers	2
Nurses	12
Environment protection officers	1
Teachers	24
Dentists	9
Advertizing officers	1
Doctors	4
Lawyers	5
Supervisors	3
Bankers	6
Veterinary doctors	2
Receptionists	3
Education officers	6
Economists/statisticians	10
Standards officers	2
Lecturers	3
Company secretaries	2
Insurance agents	1
Airline ticketing officers	1
Marketing managers	1
Social workers	1
Meteorological officers	1
Electricians	1
Designers	1
Hairdressers	1
Clerks	4
Physical planners	1
Laboratory technicians	2
Quantity surveyors	1
Librarians	2
Accountants	3
Research officers	1
Architect	1
Agriculturalists	1
Total	195

Source: Survey Data, 1989.

The husband's in Mathare were all employed in the following occupations (table 11).

Table 11: Occupations of Mathare Husbands

OCCUPATIONS	NUMBER OF RESPONDENTS
Hawkers	7
Masons	10
Canteen workers	1
Messengers	6
Carpenters	11
Casual workers	13
Mechanics	13
Butchers	8
Watchmen	11
Matatu operators and drivers	38
Businessmen	6
Charcoal sellers	2
Farmers	2
Sweepers	3
Bar workers	1
Tailors	2
Bus conductors	2
Goat rearers and sellers	4
Kiosk attendants	4
Cooks	1
Shop attendants	2
Chicken sellers	1
Vegetable sellers	4
Shoe shiners	4
Messengers	4
Dry cleaners	2
Petrol pump attendants	2
Clerks	2
Wood carvers	2
Painters	1
Brick layers	4
Railway porters	1
Soldiers	1
Mkokoteni drivers	1
Sellers of car spare parts	1
Total	177

Source: Survey Data, 1989.

The Nairobi south area husbands were all employed as shown

in table 12.

Table 12: Occupations of Nairobi South Husbands

OCCUPATIONS	NUMBER OF RESPONDENTS
Doctors	13
Accountants	15
Administrative officers	15
Marketing officers	6
Engineers	17
Auditors	5
Businessmen	24
Pastors	2
Teachers	5
Architects	2
Advertizing officers	1
Education officers	3
Dentists	2
Clerks	1
Electricians	4
Lawyers	11
Captains (army)	2
Foresters	1
Chemists	3
Production managers	1
Bankers	4
Sales officers	1
Secretaries	1
Lecturers	7
Research officers	2
Agriculturalists	2
Quantity surveyors	5
Physical planners	3
Financial analysts	1
Games directors	1
Personnel officers	3
Laboratory technicians	2
Mechanics	1
Opticians	1
Pharmacists	3
Librarians	1
Auctioneers	1
Economists/statisticians	2
Police officers	1
Total	175

Source: Survey Data, 1989.

The mean number of births for all women in the sample is 4.1, for Mathare the mean number of total births is 5.6 (minimum is 1 and maximum is 12), while for the Nairobi South area it is 3.1 (minimum is 1 and maximum is 8). The mean number of surviving children is 3.7 for the entire sample (minimum is 1 and maximum is 9) for Mathare it is 4.4 and for the Nairobi South area it is 2.9 (minimum is 1 and maximum is 8). There are on average 0.4 children who have died in the whole sample, for Mathare it is 0.8 (minimum is 1 and maximum is 4), in the Nairobi south area it is 0.2 (minimum is 1 and maximum is 2). Of these 87.3% died in their first year of life and 11.1% between the first and fifth year.

In general, the mean desired number of children is higher than mean number of actual births. The mean number of children desired by women in the whole sample is 5.6, however, the mean number of children desired by Mathare women is 6.2 while the mean number of children desired by women in the Nairobi south area is 3.7.

Table 13: Desired, Mean Number of Surviving and Children Ever Born

	Mean Children Ever Born	Mean Children Surviving	Mean Desire for Children (women)	Mean Desire for Children (husbands)
Mathare	5.6	4.5	12	9.5
South	3.1	2.9	3.7	4.1
Whole	4.1	3.8	9.0	7.0

Source: Survey Data, 1989.

Women were generally observed to prefer more girls while men preferred more boys. The mean number of children desired by women in the entire sample is 5.9 girls and 4.2 boys while the mean number of children desired by men in the whole sample is 2.5 girls and 4.5 boys. In Mathare the mean number of children desired by women is 7.8 girls and 5.4 boys while the mean number of children desired by the Mathare men is 3.2 girls and 6.3 boys. In the Nairobi south area the mean number of children desired by women is 3.9 girls and 2.8 boys while the mean number of children desired by men in this area is 1.6 girls and 2.5 boys.

In the entire sample there were 13 cases of women who had no children. Three of these were in mathare and 10 were in the Nairobi south area. Of the ones in Mathare, one was pregnant at the time of the interview, one had had repeated miscarriages and the other one had had no children at all. Of the ten women in the Nairobi South area, 2 were pregnant while the other 8 just could not get children. Two of them had decided to adopt children while the rest were still hoping to get children.

There were 82 women who answered that not all their children of school going age go to school. Of these, 81 cases were in Mathare and only one in the Nairobi South area. Most of those in Mathare (55 women) gave lack of school fees as the reason why their children of school going age could not go to school, 13 said their children

just refuse to go to school, 2 said the children leave school to get married, 6 said that for girls school had no meaning, 3 cited bad company and 2 said that the older children left school in order to look after their younger sisters and brothers. The only respondent in the Nairobi South area said her child had spinal injury and as such could not attend school.

Overall the attitude to family planning of the women interviewed is positive. Of the whole sample, only 37 women (8.5%) had a negative attitude to family planning, 34 of the women (14.8%) were from Mathare and only three women (1.4%) were from the Nairobi South area. For Mathare this can be explained by their low education and low labour force participation. The three women in the Nairobi south area who had a negative attitude to family planning were all infertile and this may have caused their negative attitude. The husbands who approved of family planning in the whole sample numbered 62 (14.2%) and of these 51 (82.3%) were from Mathare and only 11 (17.7%) were from the Nairobi South area.

There is 100% knowledge of family planning in the entire sample (both in Mathare and the Nairobi South area). However, those women who were actually practicing family planning at the time of the interview were only 57.8%. In Mathare, only 45.4% were practicing family planning whilst in the Nairobi South area 72.1% of the women were

practicing family planning at the time of the interview. 21.2% of women in the entire sample had never practiced family planning at all. In Mathare those who had never practiced were 31% and in the Nairobi South area only 10.3% of the women had never practiced family planning. The reasons they gave for not practicing family planning were wanting more children, husbands' disapproval, side effects and old age. In the whole sample, 18.2% of women had practiced family planning in the past but had stopped. In Mathare alone 21.4% (49 women) had practiced family planning but had stopped while in the Nairobi South area those women who had practiced family planning and stopped were 14.8% (31 women). The reasons for stopping family planning practice are given in Table 14.

Table 14: Reasons for Stopping Family Planning Practice

REASON	NUMBER OF RESPONDENTS	
Wants more children	24 ^M	25 ^S
Against religion	5 ^M	
Wants boys	1 ^M	
To replace dead children	1 ^M	
Old age	5 ^M	1 ^S
Husband disapproves	2 ^M	
Side effects	7 ^M	
Breastfeeding	1 ^M	
Got pregnant with coil	1 ^M	
Forgot to take the pill	1 ^M	
Not necessary	1 ^M	
Infertile		2 ^S
Not resumed clinic visits		1 ^S
No husband		1 ^S

Source: Survey Data, 1989.

^M = Mathare
^S = South

of those who had stopped family planning, 62.2% were willing to resume the practice in Mathare while the rest were not willing. In the Nairobi South area 73.5% of those who had stopped family planning practice were willing to resume. 44.1% of those who had never practiced family planning were willing to start and 35.8% were not willing to start the practice in the entire area for the same reasons already given. In Mathare 55.2% of the women who had never practiced family planning were willing to start family planning practice and the rest were not while in the Nairobi South area 45% of the women who had never practiced family planning were willing to start and the rest (55%) were unwilling.

Housing in Mathare comprises of huts, kibandas and row houses. There were 209 families living in kibandas 15 in row houses and 5 in huts. The majority of the people interviewed lived in single rooms (71.6%), 21.6% had 2 rooms and only 4 families (1.3%) had 3 rooms. Most of the houses have mud floors (85.6%), 13.5% have wooden floors and the rest (about 1%) have cement floors. 64.2% of the walls were made of mud, 4.4% are made of cartons or papers, 8.3% are made of wood, 13.97% are made of sticks and the rest are made from old tins and plastics. 29.3% of roofs are made with tins, 57.2% are made with corrugated iron sheets and the remainder are made of sticks, plastics and paper. Only 13.1% of the Mathare sample had a kitchen of their own, 68.9% of them did not have a kitchen at all

and the rest had a kitchen but had to share it with other families. 1.7% of the people were found to have a toilet of their own while the rest either shared toilets or used public city council toilets. Likewise, only 1.3% of the people sampled had a bathroom of their own, the rest used public city council bathrooms. 5.2% of those interviewed had electricity and the rest did not have it. For cooking 48.5% were using charcoal, 42.4% used kerosine, 4.4% used firewood, 1.3% used electricity and about 1% used gas.

In the Nairobi South area housing comprises of maisonettes, flats and bungalows. Of those interviewed 66 lived in maisonettes, 102 in flats and 37 in bungalows. Most of the houses had wooden tiles on the floors, the walls were made of stone or blocks, all the roofs were made of tiles. All the households have their own toilets, kitchen, bathroom and electricity. For cooking, 79.4% use gas and the rest use electricity. In addition to a lounge most of the houses have 3 or 4 bedrooms.

5.2 Analysis of regression Results

First, elementary regressions were run on each variable separately for the whole sample, Mathare and the Nairobi south area. The variable X_4 (occupation of the husband) was eliminated because it produced a near singular matrix in all three cases. This is because all the husbands in the sample were working and being a dummy variable the data entry was 1 for all respondents. A problem of multicollinearity was suspected as the cause and

therefore this variable was not included in the final equation for regression. The results of the elementary regressions for the remaining variables are given in table 15.

Table 15: Results of Elementary Regressions

VAR	COEFFICIENT	STD. ERROR	T-STAT
X_1^W	-0.2364378	0.0161992	-14.596*
X_1^M	-0.4261422	0.0504931	-8.440*
X_1^S	-0.1705529	0.0418394	-4.076*
X_2^W	-0.2380376	0.0195072	-12.202*
X_2^M	-0.2543357	0.0665984	-3.819*
X_2^S	-0.1805005	0.0505840	-3.568*
X_3^W	-0.8303115	0.2568306	-3.233*
X_3^M	0.4086662	0.3203505	1.276
X_3^S	1.2252747	0.4317574	-2.838*
X_5^W	0.1315707	0.0121337	10.843*
X_5^M	0.1557380	0.0134595	11.571*
X_5^S	0.1873400	0.0121852	15.374*
X_6^W	0.0457890	0.2689809	-0.144
X_6^M	0.1979933	0.3453634	-0.573
X_6^S	0.0626289	0.3380254	-0.783
X_7^W	-0.2038823	0.0268230	-7.601*
X_7^M	-0.0535047	0.0619464	0.864
X_7^S	-0.1915489	0.0365587	-5.240*
X_8^W	1.5459149	0.0924636	16.719*
X_8^M	1.2369128	0.1189282	10.401*
X_8^S	1.7267504	0.2143441	8.056*
X_9^W	-0.9819545	0.2203604	-4.456*
X_9^M	-0.7575662	0.2546976	-2.446*
X_9^S	-0.2176871	0.2546976	0.854
X_{10}^W	0.2008398	0.1745468	15.020*
X_{10}^M	0.2000201	0.0182076	10.986*
X_{10}^S	0.1781839	0.0105899	16.826*

Source: Survey Data, 1989.
 W Whole Sample
 M Mathare
 S Nairobi South Area
 * Significant at 0.01 level
 ** Significant at 0.05 level

The most important variable in the elementary regressions was infant mortality. It was found to influence births positively meaning that those families who lose a child will always want to have more children to replace the dead one and this is in agreement with our hypothesis. The results imply that when one child dies in a family, the parents will replace him/her with 1.5 births for the whole sample, 1.2 in Mathare and 1.7 for Nairobi south. The urge to replace a dead child is by more than one birth in all cases.

The next important variable was the age of the woman. A positive relationship was found between the age of the woman and the number of births to the woman as had been hypothesized. This means that older women have more children than younger women. One extra year for a woman is responsible for adding 0.13 births for the whole sample, 0.16 births in Mathare and 0.19 in the Nairobi south area.

The education of the female was found to be statistically significant in all cases. It was found to have a negative effect on the number of births to a woman as had been hypothesized. The direct implications are that an extra year of education for a woman will reduce number of births by 0.24 considering the whole sample, by 0.43 in Mathare and by 0.17 in the Nairobi south area.

The education of the husband was also found to be

statistically significant in explaining fertility variations. A negative relationship was found to exist between the husbands education and the number of births to his wife. The higher the husband's education the lower the number of births to his wife. An extra year of education for a husband will reduce the number of births to his wife by 0.24 considering the whole sample, by 0.25 in Mathare and by 0.18 in the Nairobi south area.

Age of the woman at first marriage was statistically significant in explaining fertility variations when considering the whole sample and for the Nairobi south area. For Mathare the age of the woman at first marriage was not found to be statistically significant. In all three cases, however, a negative relationship exists between the age at first marriage and the number of births to a woman as had been hypothesized. The implication is that the older a woman is at first marriage, the fewer children she will have. Postponing marriage by one year will reduce births by 0.2 births considering the whole sample, by 0.05 births in Mathare and 0.19 births in the Nairobi south area.

Family planning practice is found to be statistically significant in explaining fertility variations only for the whole sample and for Mathare. For the Nairobi south area, this variable is not statistically significant maybe because the majority of women are contraceptors and family

size is low anyway in this area. However, the results indicate that a negative relationship does exist between the number of births to a woman and family planning meaning that women who are contraceptors have a smaller family size. The direct implication of this result is that for the whole sample women who practice family planning will have 0.98 fewer births than those women who are non-contraceptors. In Mathare, contracepting women will have 0.76 fewer births than women who are non-contraceptors. In the Nairobi south area contracepting women will be expected to have 0.22 fewer births than women who do not practice family planning.

Occupation of the female is found to be statistically significant in explaining fertility behaviour when considering the whole sample and for the Nairobi south area only. In these two cases the occupation of the female exerts a negative influence on fertility as had been hypothesized. This means that women who are in wage employment are expected to have 0.83 fewer births overall and 1.22 fewer births in the Nairobi south area. On the other hand, for Mathare, the results showed that a positive relationship exists between number of births and the occupation of the female. This means that in Mathare women who are in employment are expected to have 0.41 more births than women who are not in employment. This may be because these women will use the extra income they receive to raise more children as was explained by the demand literature

reviewed.

Although marriage was found to have a positive influence on the number of births a woman can have, as had been hypothesized, the results were not statistically significant meaning that they do not significantly differ from zero in all cases. The meaning of these results is that when considering the whole sample, married women are expected to have 0.05 more births than unmarried women and in Mathare married women are expected to have 0.2 more births than unmarried women while in the Nairobi south area married women are expected to have 0.06 more births than unmarried women.

Lastly, the variable "duration of marriage" was regressed giving results which were statistically significant at 0.01% level in all three cases. When considering the whole sample, the results imply that an extra year of marriage is responsible for 0.2 extra births while for Mathare an extra year of marriage is also responsible for an extra 0.2 births and for the Nairobi south area an extra year of marriage is responsible for an extra 0.18 births.

The results of the elementary regressions have been given in order of importance. Next stepwise regression will be run beginning with the most important variable in the elementary regressions and adding one variable at a

size until a suitable model specification is found for the final regression.

Starting with infant mortality whose results were found to be the most statistically significant in the elementary regressions, (already explained), we add the variable "age of the woman" which was the next most significant and these produce results which are statistically significant in all three cases and conform to the hypotheses made earlier regarding these two variables. The results are reported in table 16.

Table 16: Stepwise Regression Results (X_6 and X_5)

VAR	COEFFICIENT	STD. ERROR	T-STAT
X_6^W	1.4298826	0.0801625	17.837*
X_6^M	0.9897419	0.0974132	10.160*
X_6^S	1.1723236	0.1494835	7.842*
X_5^W	0.1197009	0.0092197	12.145*
X_5^M	0.1297119	0.0114433	11.335*
X_5^S	0.1663125	0.0109650	15.168*

Source: Survey Data, 1989.
 Significant at 0.01 level.
 W Whole Sample
 M Mathare
 S Nairobi South Area

These results confirm that a positive relationship exists between infant mortality and the number of births to a woman. They also show that there is also a positive relationship between the age of the woman and her fertility.

The third variable to be added to the equation was the "education of female". Here again all three variables were found to be statistically significant and conformed to the hypotheses we had made. The results are reported in table 17.

Table 17: Stepwise Regression Results (X_0, X_5, X_1)

VAR	COEFFICIENT	STD. ERROR	T-STAT
$X_{0,W}$	0.9910665	0.0766820	12.901*
$X_{0,M}$	0.9577865	0.0981810	9.755*
$X_{0,S}$	1.0906539	0.1449380	7.524*
$X_{5,W}$	0.1162678	0.0078762	14.762*
$X_{5,M}$	0.1142891	0.0138488	8.253*
$X_{5,S}$	0.1633776	0.0105612	15.470*
$X_{1,W}$	-0.1591048	0.0127110	-12.517*
$X_{1,M}$	-0.0930402	0.0476798	-1.961*
$X_{1,S}$	-0.1034918	0.0248231	-4.169*

W = whole sample
 M = Mathare
 S = Nairobi South Area
 $*$ = Significant at 0.01 level
 $*$ = Significant at 0.05 level
 Source: Survey Data, 1989.

The education of the husband was then added to the equation and regressed. All the variables were found to conform to the hypotheses we had made earlier. However, only infant mortality and the age of the woman remained statistically significant in all three cases (whole sample, Mathare and the Nairobi South area). In addition when considering the whole sample, the education of the female and education of the husband remained statistically

significant. In Mathare, education of the female and that of the husband were not of any statistical significance while in the Nairobi south area, education of the female was statistically significant at 1% level while that of the husband was not statistically significant. The results are reported in table 18.

Table 18: Stepwise Regression Results (X_0, X_3, X_1, X_2)

VAR	COEFFICIENT	STD. ERROR	T-STAT
X_0^W	0.9794214	0.0793399	12.345
X_0^M	0.9440188	0.1042554	9.055
X_0^S	1.1227348	0.1497221	7.499
X_1^W	0.1292728	0.0088389	14.625
X_1^M	0.1418931	0.0164999	8.600
X_1^S	0.1554359	0.0113683	13.673
X_2^W	-0.1146963	0.0255635	-4.486
X_2^M	-0.0381352	0.0555431	-0.687
X_2^S	-0.0816738	0.0299569	-2.726
X_3^W	-0.0743922	0.0258327	-2.880
X_3^M	-0.0038922	0.0479953	-0.081
X_3^S	-0.0473672	0.0332716	-1.423

W = whole sample
 M = Mathare
 S = Nairobi South Area
 * = Significant at 0.01 level

Source: Survey Data.

Age at first marriage was next added to the equation and regressed and for the whole sample all the variables were found to be statistically significant and conformed to the hypotheses made. For Mathare only infant mortality and age of the woman were statistically significant and in conformity with the earlier hypotheses. Education of the

female and of the husband were not statistically significant, moreover, the education of the husband was found to have a positive effect on fertility. In the Nairobi south area, all the variables except the education of the female and education of the husband were statistically significant. The results are reported in table 19.

Table 19: Stepwise Regression Results (X_0, X_3, X_1, X_2, X_7)

VAR	COEFFICIENT	STD. ERROR	T-STAT
X_0^W	1.0195034	0.0886915	11.495 [*]
X_0^M	1.0035051	0.1268239	7.913 [*]
X_0^S	0.9767821	0.1421548	6.871 [*]
X_1^W	0.1465802	0.0093235	15.722 [*]
X_1^M	0.1577355	0.0183003	8.619 [*]
X_1^S	0.1589750	0.0106640	14.908 [*]
X_2^W	-0.0731679	0.0274900	-2.662 [*]
X_2^M	-0.0258661	0.0607263	-0.426
X_2^S	-0.0179063	0.0305454	-0.586
X_3^W	-0.0509814	0.0260092	-1.960 ^{**}
X_3^M	0.0232777	0.0528689	0.440
X_3^S	-0.0405573	0.0311167	-1.303
X_7^W	-0.1124079	0.0219957	-5.110 [*]
X_7^M	-0.0687883	0.0407546	-1.688 ^{***}
X_7^S	-0.1298246	0.0239480	-5.421 [*]

W = Whole sample
 M = Mathare
 S = Nairobi south area
^{*} = Significant at 0.01% level
^{**} = Significant at 0.05% level
^{***} = Significant at 0.10% level
Source: = Survey Data, 1989.

When female employment and marital status were added to the equation they produced a near singular matrix in both cases and therefore they were left out. Since a

problem of multicollinearity was suspected between female education and female occupation, it is in order to drop the female occupation variable since it had been explained that a woman's education influences her occupation. Moreover, a priori we know that female occupation should influence fertility negatively and the elementary regressions have given us a coefficient of -0.8303115 for the whole sample, -0.4086662 for Mathare and -1.2252747 for the Nairobi south area which are statistically significant except for Mathare. This result for Mathare is understandable especially in light of the fact that there was more unemployed women in Mathare. Besides, since the variable "female occupation" is a dummy variable it does not capture female occupational status, neither can we work out the partial derivatives of the variable with the dependent variable.

Similarly, marital status was not statistically significant in the elementary regressions in all three cases and therefore it is in order to leave it out. However, a priori we know that being married should influence fertility positively and the elementary regressions have given coefficients of 0.0457890 for the whole sample, 0.0979933 for Mathare and 0.0626289 for the Nairobi south area.

Finally, family planning practice and duration of marriage were added to the equation together. The results

are reported in Table 20. These results are statistically significant at 0.01% and 0.05% level for the whole sample and conform to the hypothesized relationships for all variables except family planning practice which is neither statistically significant nor does it conform to the hypothesized relationship. Here contracepting women are expected to have 0.13 more births than non-contracepting women. In Mathare, the results were statistically significant at 0.01% and 0.05% level only in the case of infant mortality and duration of marriage and at the same time they also conformed to the hypothesized relationships. The education of the female and that of the husband in this area were neither significant nor did they conform to the hypothesis that they are negatively related to number of births. Both were found to have a positive relationship with number of births. Age at first marriage and family planning practice, although had the right coefficients as had been hypothesized, were not of any statistical significance. In the Nairobi south area, only infant mortality, age of the woman and family planning practice were statistically significant at 0.01% level.

Table 20: Stepwise Regression ($X_1, X_2, X_3, X_7, X_8, X_9, X_{10}$)

VAR	COEFFICIENT	STD. ERROR	T-STAT
X_1^W	0.0626620	0.0275922	-2.271**
X_1^M	0.0190509	0.0619675	0.307
X_1^S	-0.0140979	0.03-1455	-0.467
X_2^W	-0.0586356	0.0258005	-2.273**
X_2^M	0.0341476	0.0519868	0.657
X_2^S	-0.0514414	0.0305451	-1.684
X_3^W	0.0780823	0.0237783	3.283*
X_3^M	0.0514904	0.0406860	1.266
X_4^S	0.1236696	0.0251861	4.910*
X_7^W	-0.0601480	0.0272324	-2.207**
X_7^M	-0.0058849	0.0453738	-0.130
X_7^S	-0.0957319	0.0322126	-2.972*
X_8^W	1.0420153	0.0896564	11.622*
X_8^M	0.9910181	0.1315684	7.532*
X_8^S	0.9631684	0.1395019	6.904*
X_9^W	0.1339801	0.1484898	0.902
X_9^M	-0.2273633	0.2879505	-0.790
X_9^S	0.3694915	0.1350062	2.737*
X_{10}^W	0.0756414	0.0247993	3.050*
X_{10}^M	0.1343479	0.0453923	2.960*
X_{10}^S	0.0377888	0.0254270	1.486

Source: Survey data.
 W = Whole Sample
 M = Mathare
 S = Nairobi South Area
 $*$ = Significant at 0.01% level
 $**$ = Significant at 0.05% level

However, only infant mortality, age of the woman and duration of marriage were of the hypothesized relationship while family planning practice did not conform to the hypothesized relationship. The results for family planning in this area imply that family planning practice among women in this area would increase the number of births. The rest of the variables had the right coefficients as had been hypothesized but were not statistically significant.

Inclusion of the variable "duration of marriage" did not produce good results and so it was decided to leave it out of the final equation. Therefore, only six variables were used for the final analysis. The final equation includes variables X_1 , X_2 , X_5 , X_7 , X_8 and X_9 . This model was fully explained in chapter 4. The results of the final regression are reported in table 21.

Table 21: Regression Analysis ($Y = X_1, X_2, X_5, X_7, X_8, X_9$)

VAR	COEFFICIENT	STD. ERROR	T-STAT
X_1^W	-0.0764924	0.2758620	-2.777*
X_1^M	-0.0232005	0.0620479	-0.373
X_1^S	-0.0821585	0.0299173	-2.967*
X_2^W	-0.1899819	0.1493491	-2.078**
X_2^M	0.0246388	0.0246388	0.461
X_2^S	-0.1952390	0.0306461	-2.143**
X_5^W	0.1451496	0.0908666	15.388*
X_5^M	0.1588277	0.0189764	8.370*
X_5^S	0.1577538	0.0104476	15.100*
X_7^W	-0.1101254	0.0220466	-4.100*
X_7^M	-0.1140455	0.0410846	-5.137*
X_7^S	-0.1286949	0.0234457	-5.489*
X_8^W	1.0451496	0.0908666	11.502*
X_8^M	0.9929538	0.0135787	7.335*
X_8^S	0.9856271	0.1391880	7.081*
X_9^W	-0.1899819	0.1493491	1.282
X_9^M	0.0665587	0.2909715	-0.229
X_9^S	-0.3873475	0.1349622	-2.870*

W = Whole sample
M = Mathare
S = Nairobi south area
* = Significant at 0.01% level
** = Significant at 0.05% level

Source: Survey data, 1989.

Education of the Female (X_1)

For the whole sample education of the female is statistically significant at 0.01% level and conforms with the hypothesis that it is negatively associated with the number of births a woman has. The coefficient of -0.076 implies that an extra year of female education will reduce the number of births by 0.08. For Mathare, although the results conform with our hypothesis that female education is negatively related to number of births, the results are not statistically significant. They imply that an extra year of female education will reduce births by 0.02 only. This may be because female education in this area was found to be so low that an extra year would not make a lot of difference. In the Nairobi south area, female education is statistically significant at 0.01% level and is negatively related to number of births as per our hypothesis. The results imply that in this area, female education is an important determinant of fertility and that an extra year of education for the female will reduce the number of births by 0.08.

Education of the Husband (X_2)

The overall results are that this variable is statistically significant at the 0.05% level and is in conformity with our hypothesis that a negative relationship exists between the education of the husband and the number of births to his wife. The results imply that an extra year of school for the husband will reduce his wife's

number of births by 0.19. For Mathare, however, the results are neither statistically significant nor do they conform to our hypothesis of a negative relationship between this variable and the number of births. Here an extra year of school for the husband will induce his wife to have 0.02 more births. The extra income earned through better education is used to raise more children especially when the wife is not working (almost half the Mathare wives were housewives). Although this result is not statistically significant, it has important policy implications which will be discussed later. In the Nairobi south area, the education of the husband was statistically significant at 0.05% level and also conformed to our hypothesis that there is a negative relationship between a husband's education and the number of births to his wife. An extra year of husband's education will reduce the number of births to his wife by 0.2.

Age of the Woman (X_5)

The age of the woman was found to be statistically significant at 0.01% level and also conformed to our hypothesis that it is positively related to the number of births in all three cases (whole sample, Mathare and the Nairobi south area). The results imply that older women will have more children than younger women. Considering the whole sample, one extra year in a woman's age is responsible for an addition in births of 0.15, in Mathare it adds 0.16 births and in the Nairobi south area an extra

is responsible for an extra 0.16 births.

Age of the Woman at First Marriage (X_1)

The age of the woman at first marriage is found to be statistically significant at 0.01% level and conforms to the hypothesis that it is negatively related to the number of births a woman can have in all three cases. This means that the older a woman is at first marriage the fewer children she will have. The reasons why this should be so have already been discussed. The direct implications of the results are that in the whole sample postponing marriage by one year will reduce number of births by 0.11, in Mathare by 0.11 and in the Nairobi south area by 0.13.

Infant Mortality (X_2)

The results show that infant mortality has a positive influence on fertility and this is in conformity with our hypothesis in all cases (whole sample, Mathare and the Nairobi south area). The results are also statistically significant at 1% level in all cases. They imply that when one child dies in a family, he/she will be replaced by 1.05 other children when considering the overall sample. This means that one dead child will be replaced by more than one child. In Mathare, one dead child will be replaced by another one (0.99) and in the Nairobi south area one dead child will also be replaced with another one (0.98).

Family Planning Practice (X₉)

In all three cases, the results indicate that family planning will influence number of births negatively as had been hypothesized. The relationship is statistically significant at 0.01% level only for the Nairobi south area. For Mathare the results do not differ significantly from zero. The reason may be because in Mathare there are a few contraceptors and as such family planning may not be an important variable in fertility decisions. Likewise for the whole sample the results are not statistically significant. However, the results imply that for the whole sample women who practice family planning are expected to have 0.19 fewer births than women who do not practice family planning. In Mathare women who practice family planning are expected to have 0.07 fewer births than those who do not practice family planning while in the Nairobi south area those women who practice family planning are expected to have 0.39 fewer births than those who do not practice family planning. The policy implications of these results will be discussed in the concluding section.

CHAPTER 6

CONCLUSIONS, RECOMMENDATIONS AND POLICY IMPLICATIONS

6.1 Conclusions:

When the whole sample was considered all the variables were found to be statistically significant at 0.01% and 0.05% levels. For Mathare, infant mortality, age at first marriage and the age of the woman were statistically significant and for the Nairobi south area again all the six variables were found to be statistically significant.

It is observed that the education of the woman moves in the same direction as family planning practice. In Mathare where the education of the woman is not statistically significant, family planning is also not statistically significant but in the Nairobi south area the education of the female is statistically significant and so is family planning practice. This implies that more educated women use contraceptives more and also efficiently and this reduces their family size considerably.

Although both the education of the woman and of the husband were found to be important in fertility decisions in the Nairobi south area, it is the education of the woman which is more important and reduces births by a bigger percentage (0.07 vs 0.05).

This study has established that people of low socio-economic status give birth to more children (5.6) than those of higher socio-economic status (3.1). There is a difference of two and a half children between the groups. There is more infant mortality in the Mathare area (0.8) than in the Nairobi South area (0.2). Family planning practice is higher in the Nairobi South area than in Mathare. There were more working women in the Nairobi South area than in Mathare. Occupational status was also found to be higher in the Nairobi South area (mainly semi professional and professional) both for men and women than in Mathare area where occupational status was found to be low (unskilled and semi skilled). Mean age at first marriage is higher in the Nairobi South area (25.2 years) than in Mathare (19.1 years) and the mean age at first birth is also higher in the Nairobi South area (25.1 years) than in Mathare where it is 17.9 years. The people in the Nairobi South area have received more years of education (15.3 years for women and 16.4 years for their husbands) than the people living in Mathare (5.4 years for women and 7.04 years for men). Housing is more spacious in the Nairobi South area (at least 4 rooms) than in Mathare where more than 80% of families live in single rooms.

Therefore on the whole, this study has managed to prove that socio-economic status is a major determinant of fertility levels in urban areas with low socio-economic status being responsible for high fertility and high socio-

economic status being responsible for lower fertility.

6.2 Recommendations and Policy Implications:

The findings show that the government in its endeavour to reduce population should direct more effort and funds to the low income, low status groups. These should be considered the target group for future population policies. The findings also imply that the government should formulate target group oriented policies for population control. General population policies may not be applicable to all groups of people.

For low income families the government may consider the following policy recommendations:

1. Since infant mortality was one of the most important factors affecting fertility, the government should improve medical care especially primary medical health care in low income areas. This will eliminate the desire to have many children for survival purposes.
2. The government should provide adequate educational facilities and classroom places for all eligible school age children with a view to getting all school age children to go to school. Coupled with this the government should impose a directive forcing all children to go to school until they have received 12 years of education (8 and 4 of our present educational system).

3. The present family planning programme should be intensified and expanded in low income areas by way of educational campaigns to ensure propagation of correct information, widespread and efficient use.
4. The government should raise the age of marriage. The delay in marriage for low status families will ensure a decline in fertility as the findings show.
5. Since mens' desire for children was observed to be lower than that of the women, the family planning campaign should encourage more men to practice family planning (vasectomy, the male pill, etc.), and this will compliment the above recommendations. So far family planning has been a woman's affair which it should not be.

These policies should be effective in reducing urban population growth because they relate to and affect each other in a manner that will bring about the required results without having to spend a lot of extra funds.

6.3 Limitations:

There were several limitations in this study. The first one is that it was not possible to assess male fertility. Men knew only of the children that were born by their wives but did not know how many other children they had had outside marriage. For this reason, proper

recording and assessment of male fertility cannot be very accurate.

It was not possible to do a thorough analysis of miscarriages and so they were left out of the analysis. It is highly desirable to do proper analysis on this aspect of fertility since it could be a significant determinant of fertility levels.

The effects of infertility on total births could not be studied. It is possible that infertility may induce men to marry more wives to ensure that they have children and as a result they may end up having a large family. Economists have not so far considered seriously studying infertility since it does not immediately pose itself as an economic problem. However, it could work through other variables in such a manner as to make it a problem for economists to pay attention to.

In a few cases the people interviewed were hostile and did not want to answer questions because they considered them a bit personal. This made the work take longer than anticipated and led to the destroying of some questionnaires which were incomplete.

The study could not cover more areas because of limited funds for research. With more funds it would have been possible to do more work in other areas.

The time the researcher had was also too short to enable the researcher do more work. With more time this study would have been able to go into more details than presently considered in this paper.

The effects of polygamy on fertility levels could not be studied because this would have required more time.

However, the researcher recognizes the importance of this variable and suggests its association with fertility for further research.

6.4 Suggestions for Further Research:

The first area for further research that can be suggested from this study is the relationship between marital status and fertility in low income areas. This study has shown that although there is a positive relationship, it is not statistically significant. Following directly from this suggestion, the fertility of single women should be investigated.

The other area that needs further research is "the relationship between family planning practice and fertility in low income areas". This area is suggested because the present study's findings show that family planning and fertility, are not statistically significantly related in low income areas even though the relationship is negative as had been hypothesized. However, in high income areas, the negative association is found to be statistically

significant.

Male fertility should also be given further attention than it presently receives. More research into male fertility might be able to offer beneficial suggestions for achieving a reduced population. Here research into polygamy would also be beneficial both on male and female fertility.

Economists should try and analyze the effects of miscarriages on total fertility. A thorough economic study on miscarriages may offer desired and useful solutions for fertility analysis.

The study of infertility should also begin to receive attention by economists because of the economic implications that it might have on the behaviour of the husband.

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APPENDIX

RESEARCH QUESTIONNAIRE

SELF

- 1) Name: _____
- 2) Age: _____ Date of Birth _____
- 3) How long have you been living in this area _____
- 4) Are you Married? Yes _____ No _____
- 5) a. When did you get married? _____
b. Number of years married, _____
c. Is this your first marriage? Yes _____ No _____
- 6) a. What is your educational attainment?
No education _____
Primary I - IV _____
Primary V - VII/VIII _____
Secondary I - IV _____
Secondary V - VI _____
University _____
Other (specify) _____
b. Number of school years completed _____
- 7) a. Are you currently working? Yes _____ No _____
b. If yes, what is your occupation? _____
c. If no, have you worked in the past? Yes _____ No _____
d. If you have worked before, what was your occupation? _____
e. If not working, what do you do for your living currently? _____

8. a. Do you have any children? Yes _____ No _____
- b. If yes, how many? _____
- c. When did you have your first child? Year _____
- d. How old were you when you had your first child?

- e. Please give the following details about your children:

Order of Birth	Sex	Date of Birth	Age	Alive	Dead When Died
----------------	-----	---------------	-----	-------	----------------

1st

2nd

3rd

4th

5th

6th

7th

8th

9th

10th

11th

12th

- f. Do all your children of school going age go to school? Yes _____ No _____
- g. If no, why not? _____

H. In Summary:

You have given birth to _____ children
in total.

_____ are alive

_____ have died

_____ are boys

_____ are girls

- 9) a. Have you had all the children you desire?
Yes _____ No _____
- b. If no, how many more children do you desire? _____
- c. How many children do you wish to have in
total? _____ Girls _____ Boys _____
- d. Is this also the number your husband desires?
Yes _____ No _____ Don't know _____
- e. If no, how many children does he want? Total _____
Girls _____ Boys _____
- 10) a. Have you heard anything about family planning?
Yes _____ No _____
- b. What is your attitude towards it? _____
- c. Have you practiced family planning in the past?
Yes _____ No _____
- d. Are you currently practicing any method?
Yes _____ No _____
- e. If you have practice family planning in the past
and have now stopped,
(i) Why have you stopped? _____
(ii) Are you willing to resume family planning
practice? _____

(iii) If no, give reasons why _____

f. If currently practicing family planning, what method do you use?

I. Rhythm

II. Withdrawal

III. Pill

IV. Loop (coil)

V. Condom

VI. Injection

VII. T.L.

VIII. Other (specify)

g. For interviewees who have not practiced family planning in the past and are currently not practicing any method;

(i) Why are you not practicing family planning?

(ii) Are you willing to start family planning practice? Willing _____ Not Willing _____

11) How far is the nearest Family Planning Clinic/hospital/dispensary from your house?

1 - 5 Km. _____ Over 5 Km. _____

12) How do you get there?

Walk _____ Bus _____

Matatu _____ Other (specify) _____

13) a. How old is your husband? _____

b. How old was he when you married him? _____

c. Does he have any other wives? No _____

Yes _____ Number _____

- d. How many other children does he have? _____
- 14) a. What is his educational level?
- No education _____
- Primary I - IV _____
- Primary V - VII/VIII _____
- Secondary I - IV _____
- Secondary V - VI _____
- University _____
- Other (specify) _____
- b. Number of school years completed _____
- 15) a. Is he working? Yes _____ No _____
- b. If yes what is his occupation? _____
- 16) Does he approve of your using family planning methods?
- Yes _____ No _____

GENERAL:

- 17) What kind of house do you live in?
- A. Maisonette/Flat/Bungalow
- B. Hut/Landhy/Kibanda
- (i) 1 room _____ 2 rooms _____
- 3 rooms _____ 4 rooms _____
- (ii) Do you have a kitchen? Yes _____ No _____
- Own _____ Shared _____
- if shared, by how many families? _____
- (iii) Do you have a toilet? Yes _____ No _____
- Own _____ Shared _____
- (iv) Do you have a bathroom? Yes _____ No _____
- Own _____ Shared _____

(v) Structure of the House:Floor: Wooden _____ Cement _____ Mud _____Walls: Block _____ Wooden _____ Stone _____

Mud _____ Paper _____ Plastics _____

Roof: Wooden _____ Grass _____ Sticks _____

Paper _____ Plastic _____ Tiles _____

Tin _____ Corrugated iron Sheets _____

(vi) Where do you get your water from?

Own Tap _____ Piped (communal) _____

Rain water _____ River _____

Other (specify) _____

(vii) Do you have electricity? Yes _____ No _____

(viii) What do you use for cooking? Electricity _____

Gas _____ Charcoal _____ Kerosine _____

Firewood _____ Other (specify) _____

COMMENTS BY THE INTERVIEWER