THE SOCIO-ECONOMIC DETERMINANTS OF INFANT AND CHILD MORTALITY IN KENYA: EVIDENCE FROM THE 1984 KCPS DATA.

KENNEDY NYABUTI ONDIMU.

A thesis submitted as part of the requirement for the award of the degree of Master of Arts (population studies) at the University of Nairobi.

DECLARATION.

This thesis is my original work and has not been presented for a degree in any University.

Signed 5/10/88

KENNEDY NYABUTI ONDIMU.

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

Signed 5/10/87

J.A.M. OTTIENO PhD.

Signed ..... 7/10/87.

Z.S. MUGANZI PhD

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

DEDICATION.

Dedicated to my loving mother, Salome Nyaboke Ondimu and to the memory of my loving father Stephen M. Ondimu.

Acknowledgment.

I wish to record my sincere gratitude and appreciation to many individuals who have in one way or another contributed to the completion of this work.

I am grateful to the University of Nairobi for awarding me a two-year full time scholarship to pursue a MA course. I owe a debt of gratitude to my supervisors; DR Z.S. Muganzi and DR J.A.M. Ottieno for their guidance and constructive criticism. They gave me the benefit of their suggestions.

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Despite the generous assistence of others, I am solely reponsible for any shortcomings which this study may possess.

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ABSTRACT.
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Infant mortality has traditionally been viewed as an indicator of social and economic well being of a society. At present, the rate of infant mortality in most developing countries is alarmingly high. Kenya, for example, still has high infant and child mortality rates despite the fact that it has achieved some amounts of decline since the first world war. In 1969 the infant mortality rate for Kenya was approximately 113 per 1000, it dropped to 96 per 1000 in 1979 and by 1984 it was approximately 92 per 1000. Several scholars have identified several socio-economic factors as key determinants of childhood mortality in the developing countries.

The present study has four main objectives. First, to estimate mortality levels by different socio-economic groups in Kenya. Second, to estimate mortality levels for different adminstrative regions in Kenya. Third, to establish the possible determinants of infant and child mortality in Kenya. Fourth to suggest areas in need of further reseach and the implications of the present study to policy makers.

The study limitations should hereby be noted. First, the study uses contraceptive prevalence survey data which was basically meant to study contraceptive usage in Kenya. There is therefore a possibility of data being inadequate for mortality studies. Second, the methodologies applied have their own weaknesses and assumptions. Third, most variables used here are meant to act as proxies for others. Hence there is a possibility that the implied meaning derived from the results is not

very perfect. Finally, it should be pointed that the literature search conducted for this study is non-exhaustive. However, the studies reviewed here provided references to the necessary literature from the developing countries.

The organization of this thesis is as follows. Chapter one essentially deals with introduction, statement of the problem, research hypotheses, methodological issues and literature review. Chapters two and three deal with the results obtained by use of indirect techniques for measuring child mortality by Coalle and Trussell. Chapter four on the other hand discusses the results obtained from a multivariate analysis to determine the possible determinants of childhood mortalty in Kenya. Chapter five finally deals with summary and policy implications for further research.

Using the Coale-Trussell method, the study has shown that there exists differential infant and child mortality levels in Kenya. Among the socio-economic variables that we considered, mortality is low when a mother has achieved high level of formal education compared to when she has low or no education. Mortality is also lower for the children whose fathers work in gainful employment outside farms compared to those whose fathers work in farms or do not work at all. The Study also shows that mortality is lower for the children whose mothers are urban residents, married in monogamous unions, have ever used a contraceptive method, and are currently worki-ng. Mortality levels also differ along ethnic grounds and regi-on of residence.

In the multivariate analysis, the study has shown that urban residence, attendance at maternity clinics, high formal education for mothers and gainful employment for fathers are the most important determinants of mortality in Kenya.

We therefore recommend that, the prospect of reducing mortality levels relies on the implementation of policies aimed at not only equitable distribution of the benefits of socio-economic development among the population, but also giving first preferance to high mortality areas. In this context, we also feel that the rural population should be encouraged to make proper use of available medical services so as to avoid unnecessary deaths at infancy and early childhood.

CHAPTER ONE: GENERAL INTRODUCTION.

1.0.0 Introduction.

The estimation of levels and determinants of infant and child mortality in statistically poor countries has of late received attention from many demographers. The recent studies that have been taken in Kenya show a rapid decline in infant mortality rates ever since the first census was conducted in 1948.

While the changing demographics declines in infant mortality it is emphasized that major declines over time must be attributed to environmental causes such as improved food distribution, better access to medical services and perhaps improved health measures (Mott 1979).

The need to conduct a study on the levels and determinants of infant and child mortality in Kenya is self evident. In any search for effective answers to the population problems of developing countries, the policy makers must direct serious attention to the problem of high infant mortality. Infant mortality rate is a sensitive index of cultural milieu of a community. It reflects what the society has done in public health and hygiene, environmental sanitation, socio-economic development and peoples attitudes towards the dignity and value of human life itself.

Economically the cost of a prematurely terminated life is big. This is true when you consider the health, nutritional

and medical resources spent on a child who does not live past early childhood.

Ethically, every infant life which can be saved must be saved. The right of a baby to the longest possible life cannot be questioned in any culture.

Infant mortality should also be reduced if fertility is to go down or family planning is to have meaning. In a developing country where social security systems, and old age benefits are absent, old people expect to be helped in their old age by one or two sons as a matter of filial and familial obligation, (Chandrasekhar, 1972). Many couples opt to have more sons so as to ensure the survival of at least one. Therefore an effective reduction in infant mortality will contribute to a lower birth rate through family planning.

In their analytical frame work for the study of child survival in the developing countries, Mosley and Chen identified socio-economic determinants as independent variables which must operate through more basic proximate determinants that in turn influence the risk of and outcome of disease process (Mosley and Chen, 1984).

The aim of this study is to estimate the levels of mortality using indirect methods. The estimation done here involves a number of socio-economic differentials which includes: maternal education, the parents' work-status, the religion of parents, polygamy status and contraceptive use. The demographic determinants are also examined. These

include ; age of the mother and marital status. Lastly the the geographical differentials will be looked into with emphasises on urban, rural, district and provincial, differentials.

1.1 Statement of the problem.

Demographic estimates are particularly important in the case of Kenya- a nation characterised by extreme regional imbalances in socio-economic development, and increasing concentration of income and heavy rural to urban migration flows.

Several studies have been carried on infant and child mortality in Kenya (Mott, F. 1979, Anker and Knowles 1980, Kibet 1981, Nyamwange 1983, Eelens 1983, Bunyasi 1984 and Kichamu 1986). Although the above studies have achieved a considerable goal, they did not make a rigorous study on all possible socio-economic and demographic differentials. Most of them relied on data obtained from censuses of 1969 and 1979 which indeed include very few differentials.

The present study extends what is already known about infant and child mortalty in Kenya. The results are different from the earlier ones because we rely on a new set of data collected in 1984 by the KCPS. As it shall be seen in the latter chapters, the results are of interest to policy makers because the estimates are derived from the most recent source survey that was conducted in Kenya.

1.2 Justification of the problem.

Information on mortality is very essential for planning and reearch. Some of the most common uses of mortality information include, population forecasting, health planning, evaluation of the success and failure of services. It can also be used as a stepping stone for carrying epidemiological investigations in some particular areas where mortality is very high.

Infant mortality is considered the most important component of mortality in developing countries. This is because;

(i) Its contribution to the total loss of years of human life is subtantial because it occurs early in life and yet its level is relatively high in developing countries.

(ii) The causes of infant mortality tend to be largely distinct from those which operate at older ages of life.

(iii) Its measurement provides a useful index of the standard of living of a society.

(iv) Its prevention has been a major preoccupation of the health authorities both national and international and the degrees of success of health programmes could be ascertained on the basis of the observable decline in infant mortality.

At present about one out of every three Kenyans who dies is below the age of one and perhaps one of every two deaths is a young child below the age of five. If these mortality levels were halved, about 37,000 babies a year who now die before their first birthday would survive(Mott,1979).

In Kenya, studies have almost exhausted the available data on the study of relationship between socio-economic status and mortality. Mott (1979) and Eelens (1983), relied on data obtained from Kenya fertility survey.

Anker and Knowles (1980), Kibet (1981), Nyamwange (1984), Kichamu(1986) relied on data provided by past cencuses.

The present study uses a different source of data namely the KCPS. It is hoped that the study will add extra information to what is known about mortality in Kenya. This is because, the survey was conducted very recently compared to that used by previous studies. The survey has also some extra socio-economic variables that were not included in the past studies. This includes differentials by religion, contraceptive use, work status of women and husbands and many others that have already been outlined in the hypotheses.

One may probably add that a study of this kind is very appropriate at this time when Kenya has embarked on the programme of "Districts as a focus for rural development". The study will shade light on the present socio-economic structure which is deeply entrenched in historical socio-economic, political administration by the former colonial masters.

This was the time when the government encouraged polarised development with some areas growing at the expense of others. The result was unequal and inbalanced development with rural areas being poorly served by social infrastructure.

This study addresses itself to the regional differentials in infant and child mortality and how they are influenced by socio-economic variables. This can help policy makers decide what steps to take in encouraging equal developme

Even though the recent estimates on mortality show a steady and gradual decline in infant mortality over the years as is shown by Kichamu (1986) there is evidence that Kenya has perhaps reached a level of mortality where further declines will be more difficult to attain, except through intensified socio-economic development. It is therefore necessary to address ourselves to this problem.

1.3 Objectives of the study.

The main objectives of this study ar

1. To estimate the levels and differentials of infant and child mortality by various socio-economic variables that were covered by the KCPS. The study relies on three main measures to attain these objective; 1q0, 4q1 and e(0).
2. To estimate the levels of infant and child mortality for the different adminstrative regions covered by the KCPS. This includes the districts and provinces.
3. To find the strength of the relationship between each of the selected independent variables and infant mortality.

4. To give recommendations for further research and future policy.

1.4 Literature review.

1.4.1 Developing Countries.

Mortality levels in developing countries remain high despite the development of increasingly sophisticated medical technology to combat diseases. A number of studies on infant and child mortality have been carried out not only in Kenya but also in many other developing countries. (Merrick 1970, Wyon and Gordon 1971, Chandrasekhar 1972, De Cavalho and Wood 1978, De Souza and Chen 1980 e.t.c). While it is not possible to provide a complete review of all that has been done, attempts will be made to review those relevant to the problem.

Merrick, T.W. (1970) carried out a study on the effects of piped water on early childhood mortality in Urban Brazil. His findings were that there is a strong correlation between poor nutrition, environmental factors and child morbidity and mortality.

Wyon and Gordon (1971) found that infectious diseases are correlated with family size. The study also showed that sex preference greatly influence infant and child mortality in Punjabi population.

Chandrasekhar, (1972) carried a study on infant mortality, population growth and family planning in India. He pointed out the continued population growth is mainly due to persistent high infant and child mortality. He pointed out that if family planning efforts have to be fully accepted, then it is very necessary first to improve the standard of living and reduce infant and child mortality.

De Cavalho and Wood (1978) carried a study on mortality, income distribution and rural urban residence in Brazil. They used life expectancies to estimate differentials between rural and urban areas. They established that urban life expectancies are below those of rural areas for low income households but then the reverse was true for families in higher income class. City dwellers have a higher probability of a longer life provided they have greater economic resources. Cities are therefore a better place to live but only for those who can pay for adequate protection against hardships that otherwise beset those with fewer financial resources.

D'souza and Chen (1980) in a study in Bangladesh found that male mortality exceeds female only at neonatal period thereafter female mortality exceeds male mortality.

Somoza (1980) in a study on child mortality in Columbia showed that the level of infant and child mortality is determined by age of mother, sex of the child, urban and rural residence and education of the mother.

Meegama (1980) in his study of socio-economic determinants of infant and child mortality in Sri Lanka found out that age of the mother and birth order have a strong influence on neonatal mortality and so does the economic level of the household. Mother's level of education is of little influence on neonatal mortality. However, the post-neonatal and childhood mortality is influenced by economic level of household environmental conditions and mothers education. The study also established rural, urban differentials in mortality -with rural having higher levels. Sex differentials were also shown with males dying more than females at infancy whereas the reverse happened during childhood.

Farah and Preston (1982) in their study in Sudan showed that maternal education plays a major role in influencing levels of child mortality in Sudan. For example, additional years of schooling was associated with proportionate reduction of 0.036 in proportion dead among children, so that five years of schooling is expected to reduce child mortality by 18%. Children whose fathers were employed were found to experience lower mortality. Children of employed women had higher mortality than those whose mothers are housewives. The reasons they gave for this is that employment reduces mothers time for childcare, interupts breastfeeding, increases probabi- of accidents occuring and thus lead to high child mortality.

D'souza and Bhuiya (1982) in their study on rural Bangladesh considered the solid economic differentials of mortality using the variables of education, occupation of parents, size of dwelling, ownership of cows and health practises. There was a clear inverse relationship between education and mortality levels i.e. lower death rates with increased education. The mortality rates also showed declines with increasing socio-economic status. The lowest level of economic group paid the highest price in terms of mortality. The same results were found for those who own no property etc.

Rutstein (1983) carried a cross-national survey on infant and child mortality in developing countries using data from World Fertility Survey (W.F.S). Some of interesting findings from his study were that male mortality is on the average, some 14 per cent in the excess of female mortality below one year but is about the same level or slightly below female mortality at older ages under five years. Age of mother showed the expected U-shaped relationship with mortality, especially for infants. Birth order also influenced mortality rates - children of very high orders are much more likely to die at all ages under five years. Birth spacing also proved to influence infant and child mortality with close intervals experiencing higher mortality levels. The study also showed that children from multiple births are more than four times more likely to die during infancy and substantially more likely to die at older ages.

Blacker, et al (1983) made their estimations from Jordan fertility survey data. Apart from the usual differentials on education and place of residence, - they also examined age at marriage and found that child mortality experience of women marrying below age 20 is significantly worse than those marrying at age 20-29. The study also confirmed the relationship between birth order, child spacing and the level of mortality.

AL-Kabir, (1984) examined effects of community factors on infant and child mortality in rural Bangladesh. He estimated mortality rates by demographic regional and socio-economic characteristics. He concluded that if all mothers in Bangladesh spaced their births by at least three years, infant and child mortality would be reduced, by one third or more. Birth order also determines child survival especially in first year of life. The effect of education was found to be confined within child mortality. The influence of religion on mortality was also very evident. The strongest determinants of infant and child mortality in rural Bangladesh were the length of the previous interval and birth order-of the child. The second factors in importance were distance to a planning clinic, the distance to a primary school, maternal education, religion and region of residence.

Timaeus, (1984) in his study on Lesotho found that the age pattern of infant and childhood mortality in the country was unlike that thought to be typical of sub-saharan

Africa. This is due to the Physical environment, economic and social conditions which are different from those in other parts of Africa. The major factors influencing the levels of mortality in Lesotho are malnutrition and infectious diseases. As expected, education of mothers, births order and the birth intervals were negatively correlated with high levels of child . and infant mortality.

Cleland and Sathar (1984) examined the effect of birth spacing on childhood mortality in Pakistan. They established that children born after interval of two years or less since the last birth are twice as likely to perish at infancy than those born four or more years.

Davanzo (1984), in a study in Malaysia established that mothers ages, birth intervals, sex of child, duration of breastfeeding, house density, the household income and maternal education play a great role in determining the levels of mortalty in the country.

1.4.2. Studies in Kenya.

Few studies have been conducted in Kenya though it is evident that infant mortality has declined dramatically over the recent years. In a study based on birth histories in the fertility survey, Mott (1979) estimated infant mortality rates for women aged 15-34 to be 159 per 1000 prior to 1958, 109 in the period 1958-1967 and 92 per 1000 in the period between

1966-1976.

Using brass procedures to estimate mortality rates Anker and Knowles, (1980) showed large differentials to exist among districts. The central province has the lowest mortality, low levels were also found in Rift Valley and Eastern province. On the other hand Nyanza and Western provinces had the highest mortality levels.

Kibet (1981) shows that women's education and malaria are the most discriminating factors of infant and child mortality at macro level. Higher levels of education lead to low mortality whereas low levels of education leads to high levels of mortality at district level. In their regression analysis, of survival of births to age three years, Anker and Knowles (1980) equally showed the importance of endemicity of malaria and education of mother as mortality determinants in Kenya. Besides, those other factors that were conclusive to higher mortality are earlier period of birth, male sex, low household income, traditional medical care and poor health of mothers.

Eelens, (1983) examined the role of breastfeeding on infant and child mortality with varying incidence of malaria in Kenya. Her results were that a reduction in the duration of both full and partial breastfeeding would lead to a significant increase of the mortality probabilities in the early years of life. Effect of shorter or partial breastfeeding duration would be greatest in areas with low or medium endemicity of

malaria because partial breastfeeding does not provide adequate protection against diseases in areas where malaria is hyperendemic. Hence people should be encouraged to breastfeed longer in high malaria areas.

Nyamwange (1983) carried a study on infant and child mortality within Nairobi city. He found that despite the medical technological achievement, due to the high rate of immigration from the high mortality zones of Kenya into Nairobi, the mortality levels of Nairobi continue to be high.

Bunyasi (1984) studied the seasonality of deaths in Kenya. He found out that age patterns of mortality exist. The major causes of deaths were infectious diseases, parasitic diseases and diseases of respiratory system.

Kichamu (1986) used the 1979 and 1969 census to estimate the infant and child mortality in Kenya at national, provincial and district level. The differentials he considered were education, place of residence and marital status. His major finding was that for a substantial reduction in infant mortality to occur, a policy for universal secondary education for girls is essential.

1.5. Summary of the literature review.

The above literature review has clearly depicted that most studies that have been carried on infant and child mortality estimation in the developing countries have entirely relied on data from retrospective surveys. Most focus has

been association between socio-economic status and levels and patterns of mortality in the populations. Correlations between mortality and socio-economic characteristics are mostly used to generate causal inferences about the mortality determinants. Income and Maternal education are two commonly measured correlates of child mortality in developing country population . (Mosley and Chen, 1984), Environmental, cultural and demographic factors have also been identified as major determinants of mortality.

The theoritical framework of our study will be based on the above literature review.

1.6 Theoretical Framework.

From the foregoing literature review, it is evident that reduction in the survival probability of children in any society is due to the operation of socio-economic, environmental, biological and demographic factors. The socio-economic determinants have been isolated as independent variables which however must operate through more basic determinants that in turn influence the risk of disease and at the end mortality. The following theoretical framework can hence be formulated;

Socio-economic and demographic characteristics of the household are likely to affect (determine)the environmental forces which leads to morbidity and infant mortality.

VARIABLES ON INFANT AND CHILD MORTALITY

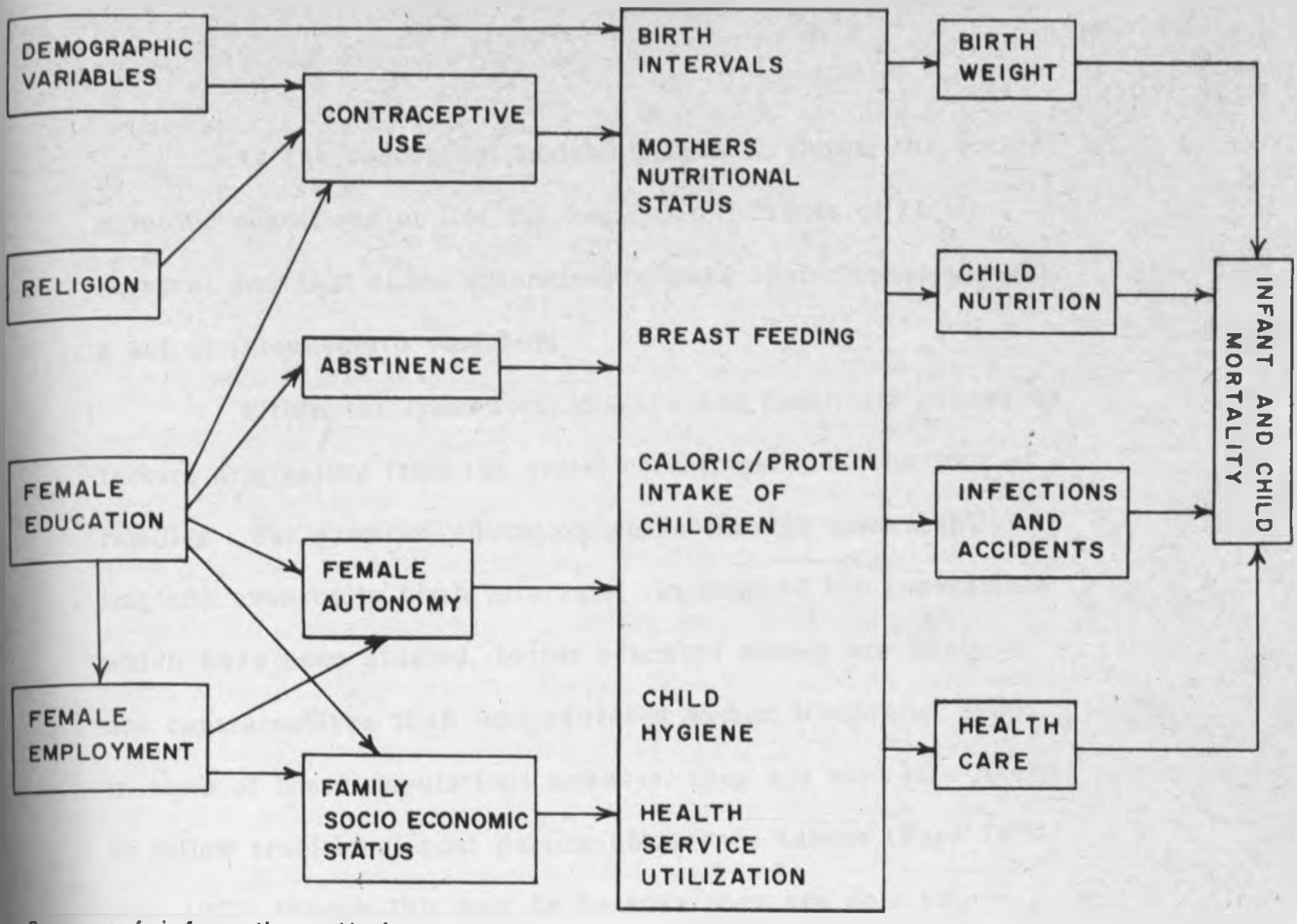

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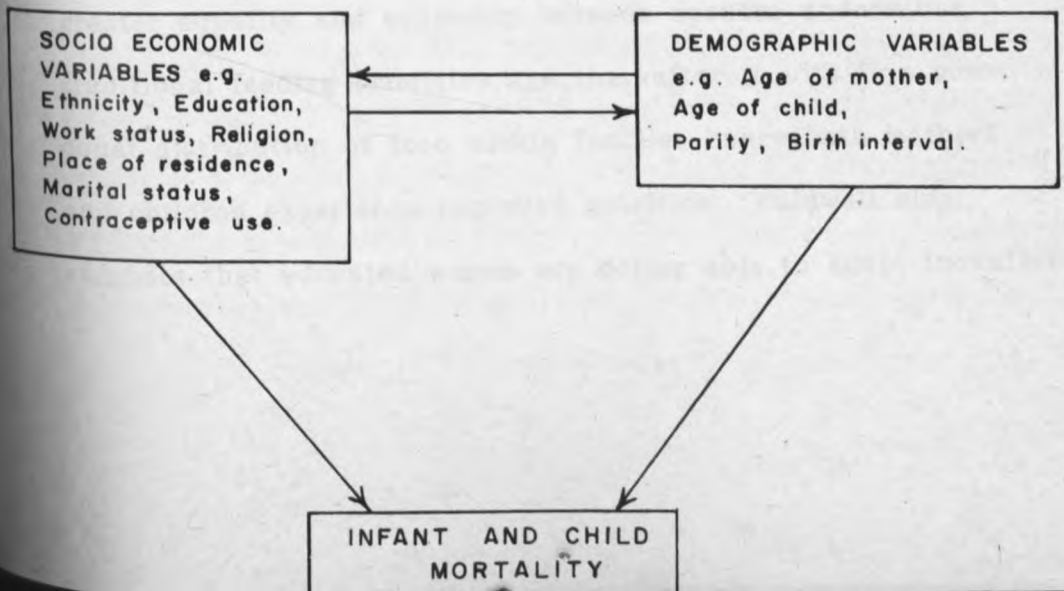
FIG. 2 EFFECT OF SOCIO-ECONOMIC VARIABLES ON CHILDHOOD MORTALITY: SIMPLIFIED MODEL



As the conceptual model in figure 1 shows, the socio-economic conditions of life are major determinants of child survival and that these determinants make their impact through a set of intermediate variables.

Within the framework, disease and death are caused by factors originating from the social conditions and behaviour of families. For example, education works through contraceptive use and eventually birth intervals. In most of the populations which have been studied, better educated women are likely to use contraceptives than less educated women (Cochrane, 1983). In some of these populations however, they are also less likely to follow traditional post partum abstinence taboos (Ware 1977, Hull 1977) though this may be because they are able to substitute contraception for abstinence. The use of contraception may in turn lengthen birth intervals and the lenghthening of birth intervals in turn reduces infant and child mortality.

Education also leads to female domestic autonomy, (Dyson and Moore 1983) Caldwell (1979) argues that in Nigeria, greater equality and autonomy between spouses undermines traditional feeding priorities and thereafter results in a more equal distribution of food within families hence both mothers and children experience improved nutrition. Caldwell also suggests that educated women are better able to adapt inovative

behaviours and can stand up to the mother in law's authority more than uneducated women can -this may help them acquire modern medical services and to practise new, more hygenic forms of child care.

Female employment's effect on child mortality is contradictory. Some authors (e.g. Dyson and Moore 1983) emphasize that women who earn money are better able to feed their children than those who operate as family dependents, an effect that presumably reduces infant and child mortality. Other authors have however argued that most of the paid workers usually entails something that often forces women to employ ayahs and this consequently increases the risk of infection and accidents among their children.

Several mortality estimates based on the World Fertility Survey (WFS)have relied on the work status of the father as apossible determinant of mortality (Hobcraft et al 1984, Timaeus 1984, Meegama 1980).The basic assumption here is that, the husband's education can act as an indicator of socio-economic status ,income and living conditions of the household all of which affect mortality at ages 0-4 .

Mortality has also been found to be significantly higher among the rural than urban residents in most developing countries (Hobcraft et al 1984). This is partly attibuted to differential distribution of sicio-economic facilities in rural and urban areas .Better educated and higher income people live in greater proportion in the urban areas. The concentration of

health manpower and facilities in major urban areas and the fact that the urban population is better served with basic community ammenities such as clean piped water and sewerage disposal systems seems conducive to low mortality.

Many studies have correlated effective contraception and family planning with infant and child mortality (Trussell and Pebley 1984, Chen 1983, El-Hassan and Nur 1985). The studies have established significant relationship especially when contraception is effective enough to affect the pace and and pattern of child spacing.

Newland (1981) has postulated that children whose fathers are dead or absent have an additional strike against them. Their mothers bear the entire burden of child care as well as having the sole responsibility for family's income . In most cases therefore, female headed households are likely to be poor hence susceptible to higher mortality rates.

Polygamy status has also in the past been positively correlated with childhood mortality in Kenya (Mott, 1982). Polygamy might be related statistically to income differences, it is less common in urban areas and may be related to cultural and religious differences. Children of polygamous unions are given on the average less attention than those in monogamous unions.It is therefore possible that their general level of well-being may be lower and hence reduced chances of survival.

1.7 Operational Hypotheses.

The followinng hypotheses can be formulated:

(1) Infant mortality is likely to be lower when maternal level of education is high. High level of education therefore negatively influences infant mortality.

(2) Infant mortality is likely to be higher in rural areas than urban areas. Urban residence has therefore a negative effect on infant mortality.

(3) Children whose mothers attend maternity clinics during pregnancy are likely to have low mortality experience. Attendance of maternity clinics has therefore a negative effect on mortality during infancy and early childhood.

(4) Children from unstable unions (divorced, separated and widowed) are likely to have high mortality experience. Unstable unions therefore have a positive effect on infant mortality.

(5) Children whose mothers have used at least a contraceptive method are likely to have low mortality experience. Contraceptive use therefore has a negative effect on infant mortality.

(6) children born of polygamous unions are likely to have high mortality experience. Polygamy has therefore a positive effect on infant mortality.

(7) Children whose mothers are currently working are likely to have high risks of death. Active work for mothers therefore has a positive effect on infant mortality.

(8) Children whose fathers work in businesses outside farms are likely to have low mortality experience. Active employment for father therefore has a negative effect on infant mortality.

1.8. Definition of Key Concepts used

(i) A "determinant" of mortality is variable that would change a population's mortality level if its own value were altered. This definition encompasses the biological determinants (e.g. nutritional intake, exposure to disease etc) and socio-economic and cultural factors.

(ii) Socio-economic determinants include individual level variables (e.g. education, work status (or occupation) income, polygamy status, religion, contraceptive use, and place of residence.

(iii) Demographic determinants are mainly measured by, age of the mother and child, birth order, parity, birth interval. marital status etc.

(iv) Environmental determinants are mainly measured by place of residence, i.e. whether urban or rural) the region of residence which will also determine the ecological setting, sanitation, housing and acess to medical facilities.

(v) Infant mortality is the mortality of live born children who have not yet reached their first birth day.

(vi) Child mortality is death to live born children between age 1 and age 5.

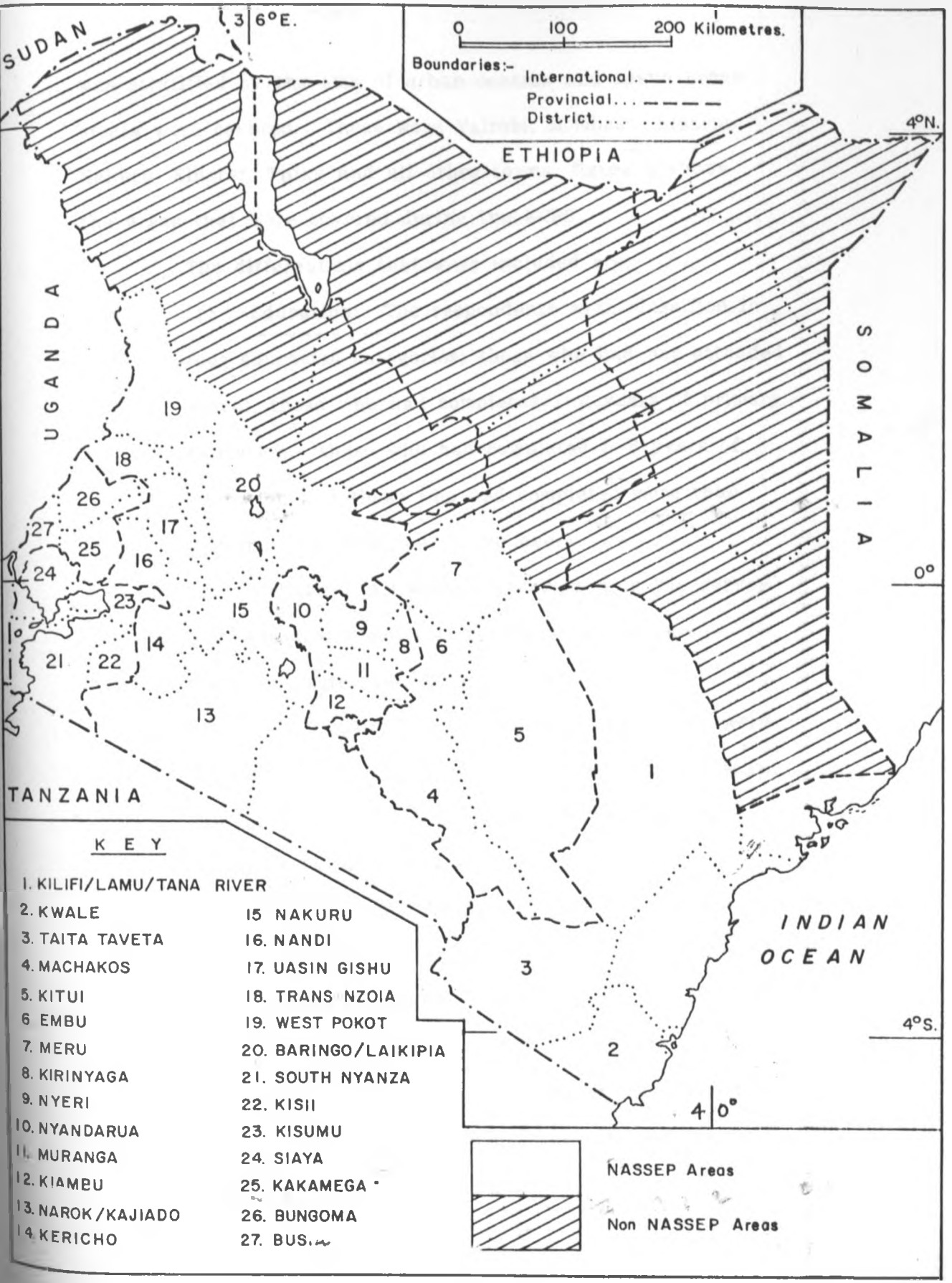
A detailed definition of the variables is given in the next section on data sources.

1.9 Data sources.

The study relies on secondary data. This data was collected in 1984 by the Kenya Government, Central Bureau of Statistics (CBS). The CBS conducted the Kenya Contraceptive Prevalence Survey (KCPS) using a probability sample in which 6,581 women between the ages of 15-49 years were interviewed. The survey was originally intended to provide up to date information on the knowledge, use and availability of contraceptives as well as other background characteristics of the respondents and other information on fertility. The survey however ended up also collecting a wealth of information on a number of other topics, such as infant and child mortality. The survey does not contain pregnancy or birth histories, however, it does contain summary information about past fertility including the total number of children ever born by sex, the number still living and the number dead by sex. This enables us use indirect methods of estimation because the data can be transformed into proportion death statistics. The sampling procedure that KCPS adopted was stratified multi-stage cluster design based on Kenya national sample survey and evaluation programme. The sample was divided into rural and urban areas. Fig 3 shows the area covered by KCPS.

The rural areas were sub-divided by adminstrative districts which totalled 27. The urban centres were defined as places with a population of 2,000 or over. The urban frame

FIG: 3 MAP SHOWING AREAS COVERED BY KCPS (1984)



KEY

1. KILIFI/LAMU/TANA RIVER
2. KWALE
3. TAITA TAVETA
4. MACHAKOS
5. KITUI
6. EMBU
7. MERU
8. KIRINYAGA
9. NYERI
10. NYANDARUA
11. MURANGA
12. KIAMBU
13. NAROK/KAJIADO
14. KERICHO
15. NAKURU
16. NANDI
17. UASIN GISHU
18. TRANS NZOIA
19. WEST POKOT
20. BARINGO/LAIKIPIA
21. SOUTH NYANZA
22. KISII
23. KISUMU
24. SIAYA
25. KAKAMEGA
26. BUNGOMA
27. BUSIA

was stratified by the size of urban centres and seven urban strata were covered. These were Nairobi, Mombasa, Kisumu, Nakuru, Eldoret, Thika and all other towns. figure 3 shows the areas that were covered during the KCPS.

The differentials that were included are;

(1) Education: The respondents were classified in four education categories: those who had not attended school, those who had completed 1-4 years of primary education, those who had completed 5-8 years of education and those who had completed more than primary education (i.e. 9 and over).

(2) Religion: All women interviewed in the survey were classified into five religious categories: Catholic, Protestant, Moslem, none and other.

(3) Ethnic group: Respondents in the survey were grouped into ten major ethnic groups namely: Kikuyu, Luhya, Luo, Kamba, Meru-Embu, Kisii, Mijikenda, Kalenjin, Taita-Taveta and other.

(4) Work-status: The respondents were grouped into three categories currently working, worked in the past and never worked.

(5) Work status of Husband: These were classified as (a) working on their own farms or (b) someone else farm, (c) in their own business or (d) some other business or (e) not working.

(6) Marital Status: These were classified into either, married, separated, divorced or widowed.

(7) Polygamy Status: The respondents are classified into those whose husbands have other wives and those whose husbands have no other wife.

(8) Users of Contraceptives: Classified by those who accepted to have used contraceptives and those who had used none.

1.10 Quality Of Data

The data obtained from KCPS cannot be taken to be very accurate. It could suffer from several defficiencies which could lead to biased interpretation of the results. The errors which may be present are omissions of births and deaths, mis-reporting of deaths and ages at death and mis-reporting of mothers age.

The omission of vital events is the most serious error that may be present. It is usually thought more frequently for children who are no longer living with their mother, children living away and children who have died -and especially for women with many children or whose children died several years before the survey. Additionally there is a problem of definition as regards children who died at very early ages, say within few hours of birth since they may not have been considered live births.

Data on mortality from contraceptive prevalence surveys conducted elsewhere has been found to be good for making mortality estimates especially when one employs the indirect techniques (Cross and Sullivan 1983).

The KCPS questionnaire was modified in such a way that it can produce improved results, the changes in questions on fertility and mortality can be summarised as follows;

(a) The question on children ever born was divided into three parts i.e. the number of children now living at home, the number of children now living elsewhere and the number of children who have died.

The introduction of the special question on children living elsewhere was made because it is widely believed that many women tend to omit children who have grown up and left the home.

1.11. Methodology Of Data Analysis.

Reluctance to answer the questions about the dead is a common phenomena among populations for which data are lacking and this makes mortality estimates to remain the least reliable of all demographic statistics.

Methods for deriving mortality indices have therefore been designed to take advantage of indirect information that can be gathered more easily.

Several methods have been formulated to estimate infant and child mortality. We shall not discuss all these methods here because this is done elsewhere (Manual X UN, 1983). We shall however briefly look at two i.e. Brass method and Coale and Trussell method.

1.12.1. Brass Method.

The methodology of transforming statistics on the proportion dead among children ever born into infant and child mortality probabilities was first developed by Brass (1968) and later modified by Trussell (1975).

Brass recognised that taking proportions of children dead of women in a standard age group D(i), would after multiplication by a factor which depends on the fertility function yield values of life table q(1) mortality rates. The theory behind the method is that the proportion dead among children ever born to women aged 15-19 is approximately equal to the probability of dying between birth and exact age 1, and the proportion dead among children ever born to women 20-24 is equal to the probability of dying before exact age 2 The basic form of the estimation is:-

$$q(x) = K(i)\ D(i)$$

where the multiplier K(i) is meant to adjust for non mortality factors determining the value D(i)

1.12.2. Trussell's technique.

Trussell (1975) refined the Brass technique and came up with a method which devised multipliers that incorporate both P_1/P_2 and P_2/P_3 and therefore describe the fertility schedule more adequately. The presumption here is that data for women aged over 35 years suffer from under-reporting of dead children whereas the data for women aged 15-19 reflect relatively higher infant mortalityof young mothers.We have used the trussell's modification in this study.

The formula requires the following information:-

(i) Children ever born (CEB) classified by sex and five year age group of mother.

(ii) The number of children dead (CD) classified by sex and five year age group of mother.

(iii) The total number of women (FPOP) aged between 15-49 classified by 5 year age group (irrespective of marital status).

Step 1 The calculation of the average parity per woman, where p(1) refers to age 15-19 P(2) to age 20-24 P(3) to age 25-29. The formula is;

$$P(i) = CEB(i)/FPOP(i)$$

where CEB (i) denotes the number of children ever born by women in age group (i) and FPOP(i) is the total number of women in that age group (i).

Step 2 The proportion of children dead in each age group of mother D(i), is based on the formula below;

$$D(i) = CD(i) / CEB(i)$$

where CD(i) is the number of children dead reported by women in age group (i), whereas CEB(i) is children ever born in the same age group (i).

Step 3 Trussell's multipliers have the functional form;

$$K(1) = a(i) + b(i)\ (P(1)/P(2) + C(i)\ (P(2)/P(2)$$

where a(i), b(i) and C(i) are Trussell coefficients for estimating child mortality.

Step 4 The probability of dying at age x is given by the formula;

$$qx = K(i)\ D(i)$$

for x = 1,2,3,5,10,15 and 20

and i = 1,2,3,4,5,6 and 7 representing age groups 15-19, 20-24, ... 45-49.

1.13. Statistical Analysis.

A univariate or bivariate analysis is not adequate to making true generalizations in any social problem. This is so because there is no single variable that can be said to be the

"cause" Rather there are likely to be many variables that affect any situation. The social universe is in itself multivariate and many variables are involved in a particular situation (Herzon and Hooper 1976). It therefore becomes very important for a researcher to address himself to which is the most important variable. This requires assessing the degree to which the dependent variables are related to the independent variables and determining which independent variable is most strongly related to the dependent variable.

In our study we are looking at the socio-economic and demographic factors that determine infant and child mortality in kenya. The study uses different variables as proxies of socio-economic status of house holds.In order to find the significant predictors of mortality, we adopt a multivariate regression analysis.

The basic hypothesis derivable from the theoretical frame work that we formulated in section 1.6 is that; " the socio-economic status of the family determines the rates of both infant and child mortality in Kenya". In using the multivariate regression analysis to investigate this proposition, socio-economic conditons will be taken as independent variables whereas the mortality measure will be the dependent variable.

In the linear regression, the prediction is based in the formula for a straight line that best fits the data. The general formula for this regression is;

$$Y = a + bx$$

Where:

Y= dependent variable

a&b = regression coefficients

X = the independent variable

This basic regression model can be extended to situation where two or more independent variables are used to predict the scores of one dependent variable. In this case the regression model will be as follows;

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_r X_r$$

Where ;

Y = dependent variable

X_1 =first independent variable

r = the ith independent variable.

In a multiple regression analysis, there are three different sets of cofficients that yields information about the relation of the independent variables to the dependent variable. These are:

(i) Partial slopes - which are the unstandardised regression coefficients . The slopes tell us how much a 1-unit (unstandardised) change in this independent variable will affect the dependent variable when other independent variables are controlled.

(ii) Beta weights which is a standardised Partial slope. A partial slope for a particular independent variable is standardised by deviding the standard

deviation of the dependent variable and multiplying the partial slope by the result.THe beta weight tells us how much change in the dependent variable will take place as a result of a standardised change in one of the independent variables controlling for all other variables.The beta weights can be used to assess the relative importance of independent variables on the dependent variable.

(iii) the partial correlation coefficients which measures how much of the variation in the dependent variable is associated with an independent variable after the effect of other variables have been removed.

1.13.1 Assumptions in Multiple Regression.

There are three major assumptions in linear multi-regression analysis that makes it not applicable in all situations.First,it imposes an assumption that the independent variables are linearly related to the dependent variable. Secondly,it assumes that the independent variables are not highly inter-correlated with each other. Unfortunately, it often happens that independent variables in a problem display high inter-correlations. Finally, multiple regression assumes that while the independent variable affects the dependent variable, there is no feedback from changes in the dependent variable that affect the independent variables.

CHAPTER 2

MORTALITY LEVELS AND DIFFERENTIALS AT NATIONAL LEVEL.

2.1 Introduction.

In this chapter, we have made estimates of infant and child mortality by socio-economic differentials at the national level. The differentials included are; education, work status, place of residence, contraceptive use, marital status, type of union and religious identification.

Education has been split into four categories based on the years of schooling the respondents have spent. This are; those with no education, 1-4 years of schooling, 5-8 years of schooling, and 9+ years of schooling. The working status of mother has been classified into three categories namely; not working, currently working and worked in the past. The work status of father has been classified according to the place of work. These are; working on his own farm, working on other peoples farm, working on his own business, working on other peoples business and finally not working.

Place of residence is classified into three categories namely; metropolitan, other urban and rural areas. The variable of contraceptive use was classified into those who have ever used any contraceptive method and those who have never used any contraceptive method. This variable did not take into consideration whether the method used was traditional or modern. On the other hand the variable of union status was classified into two categories; those who are in polygamous

unions and those who have no co-wives (monogamous unions). The variable of marital status described the mothers status at the time of the survey. There were five categories; single, married, separated, divorced and widowed. All the women who were interviewed were classified into five categories; catholics; protestants, muslims, others, and no religion. The protestants included all the christians except catholics.

The infant mortality estimates are measured in terms of the probability of dying between age 0 and 1. This estimate is denoted by either 1q0 in the life table or simply as IMR which is derived by multiplying 1q0 by 1000. For the case of child mortality the study will rely on two measurements;q(x) which is the probability of dying at age x whose values are 1, 2, 3, 5, 10, 15 and 20. Another child mortality estimate is 4q1 this is obtained from the life table and it is the probability of dying between ages 1 and 5. All these estimates ment above are obtained using the Trussell's technique, an extension of the Brass child mortality technique. The coefficients applied are those of north model of the Coale-Demeny life-tables. What follows below is a brief description of the method.

2.2 Brass-Trussell technique for estimating child mortality.

Trussell (1975) refined the Brass technique and came up with a method which devised multipliers that incorporate both P_1/P_2 and P_2/P_3 and therefore describe the fertility

schedule more adequately. We shall use Trussell's formula to make our estimates.

The formula requires the following information:-

(i) Children ever born (CEB) classified by sex and five year age group mother.

(ii) The number of children dead (CD) classified by sex and five year age group of mother.

(iii) The total number of women (FPOP) aged between 15-49 classified by 5 year age group (irrespective of marital status).

Step 1 The calculation of the average parity per woman, where P(1) refers to age 15-19 P(2) to age 20-24 P(3) to age 25-29. The formula is;

$$P(i) = CEB\ (i)/FPOP(i)$$

where CEB (i) denotes the number of children ever born by women in age group (i) and FPOP(i) is the total number of women in that age group (i).

Step 2 The proportion of children dead in each age group of mother D(i), is based on the formula below;

$$D(i) = CD(i) / CEB(i)$$

where CD(i) is the number of children dead reported by women in age group (i), whereas CEB(i) is children ever born in the same age group (i).

Step 3 Trussell's multipliers have the functional form;

K(1)=a(i)+b(i)(p(1)/p(2)+ c(i)(p(2)/p(3)

where a(i), b(i) and C(i) are Trussell coefficients for estimating child mortality.

Step 4 The probability of dying at age x is given by the formula;

$$q(x) = k(i)\ D(i)$$

for x = 1,2,3,5,10,15 and 20

and i = 1,2,3,4,5,6 and 7 representing age groups 15-19, 20-24, ..., 45-49.

The coefficients a(i),b(i) and c(i) are given here below for the North model.

Table 2.1.0

Coefficients for estimating child mortality: North model.

AGE GROUP	index i	a(i)	b(i)	c(i)
15-19	1	1.1119	-2.9287	0.8507
20-24	2	1.239	-0.6865	-0.2745
25-29	3	1.1884	0.0421	-0.5156
30-34	4	1.2046	0.3037	-0.5656
35-39	5	1.2586	0.4236	-0.5898
40-44	6	1.224	0.4222	-0.5456
45-49	7	1.1772	0.3486	-0.4624

Suorce: U.N Manual X P.77.

2.3 Calculation of the Mortality Level.

In determining mortality level of a region, use is made of the complement of q(x), P(x) = 1-q(x), which is the probability of surviving upto age x from birth. Where x = 1, 2, 3, 5, 10, 15 and 20. The implied level of mortality is made by considering q(2), q(3), and q(5). This mortality level

will lie somewhere between levels derived by Coale-Demeny. To get the needed P(x), we interpolate between the higher and lower level. The linear interpolation is based on the concept of the gradient of a line. Suppose that the rectangular coordinate (x(1), y(1)) refers to the lower mortality level with its corresponding proabability of survival. Further (x(2), y(2)) is the upper mortality level with its corresponding probability of survival. Now suppose (x,y) is a point in between, then:

$$(y(2)-y(1))/(x(2)-x(1)) = y-y(1)/x-x(1) \quad ----(1)$$

normally $x(2)-x(1) = 1$ since x(2) and x(1) represent two consecutive mortality levels. Thus if y is known then:

$$x = x(1) + (y-y(1))/(y(2)-y(1) \quad ----------(2)$$

If however, x is known then, y is easily determined by the formula:

$$y = y(1) + (y(2)-y(1))(x-x(1) \quad ----------(3)$$

The average mortality level obtained from the steps outlined above helps in the construction of the life table as shown in the discussion below.

2.4 Costruction of the Life Table.

First the probability of survival y=p(x) is calculated using formula (3).Each p(x) is then multiplied by the radix l(0) to obtain the number of survivors at age x i.e l(x).

Other life table functions can be obtained following the steps shown below:

(i) nPx, is the probability of surviving between age x and x+n, and is given by,

$$nPx = l(x+n)/l(x)$$

(ii) nqx, is the probability of dying in the interval (x, x+n), and is given by,

$$nqx = 1-npx$$

(iii) ndx, is the number of persons who die in the interval (x, x+n), and is given by,

$$ndx = l(x)-l(x+n)$$

(iv) nLx is the number of person years lived between the age x and x+n, and is generally denoted by

$$nLx = \frac{n}{2}\,(L(x) + l(x+n))$$

where n is the length of the interval, special formulae are given for those aged (0-1): (1-4), and beyond 75 years:

$$1L0 = 0.3\ l0 + 0.7l1: \text{ for } 0-1$$

$$4L1 = 1.3l1 + 2.7l5; \text{ for ages } 1-4$$

$$L_{75} = l_{75}\ \log 10\ l_{75}$$

(v) T(x), total number of people from age x, and is given by:

T(x) = T(x+n) +nLx, for ages except the last age

i.e 75

at age 75, Tx = Lx

(vi) e(x), the expectation of life at age x, is given by:

$$ex = T(x)/l(x).$$

2.5 Application of the Trussell method to the KCPS data

Table 2.1.0 presents the coefficients are according to the Trussell's North model technique. Hill (1981) has found out that the north model is the most appropriate for the study of mortality in Kenya. Table 2.1.0 shall therefore be used for all estimations done in this study.

Table 2.1.1 below shows the q(x) values for Kenya by 1984. Column 1 represents for age groups i=1, 2,.....,7 i.e. 15-19, 20-24,.... up to 45-49. The other columns are as labelled and are obtained using the method discussed previously.

TABLE 2.1.1 CHILDHOOD MOTALITY ESTIMATES FOR KENYA 1984:ALL CASES COMBINED.

AGE GROUP	FPOP	CEB	CD	P(i)	D(i)	K(i)	q(x)
15-19	1329	472	60	0.355154	0.127118	1.004039	0.127631
20-24	1468	2881	339	1.962534	0.117667	0.978552	0.115143
25-29	1154	4564	708	3.954939	0.155127	0.940165	0.145884
30-34	948	5404	750	5.700421	0.138786	0.978895	0.135856
35-39	728	5102	944	7.008241	0.185025	1.042584	0.192904
40-44	578	4518	966	7.816608	0.213800	1.029664	0.022015
45-49	376	3032	681	8.063829	0.224604	1.010831	0.227036

P(1)/P(2)	P(2)/P(3)
0.180967	0.496223

Table 2.1.2 below shows the steps that lead us to obtain the average mortality level. The x values in column 2 stands for the ages of children who are 1, 2, 3, 5, 10 15, and 20 years.

Column 3 is the complement of p(x) which is simply defined as the probability of surviving from birth to exact age x. Column 4 presents the upper 1(x) values (for the three age groups 20-24, 25-29 and 30-34) in the North Model life tables which are used of their 1(x) values in Column 3. It should be noted that the 1(x) values therefore lie between the upper and lower values of 1(x) obtained form the Coale-Demeny life tables. The lower level is taken to be the base of the calculation.

In order to obtain average level representing the 1(x) value, interpolation is done between the upper 1(x) and lower 1(x) values.

The formula applied in this case is:

$$\text{interpolated level} = \text{lower value} + \frac{(1(x) - \text{lower value})}{\text{upper} - \text{lower}}$$

For example in table 2.1.2

$$1(2) = 15 + \frac{(.884857 - .88329)}{(.89785 - .88329)}$$

The interpolated levels are then calculated for only three age groups i.e 2, 3, and 5. This is because the age groups are assumed to be fairly accurate and do not suffer from errors in births and age misreporting which are common in other age-groups. After obtaining the interpolated levels, an average is obtained. For our case the average is 15.01837.

TABLE 2.1.2 DETERMNING THE MORTALITY LEVEL.

AGE GROUP	x	l(x)	upper l(x)	lower l(x)	lower level	interpolated level	
15-19	1	0.872369					
20-24	2	0.884857	0.89785	0.88329	15	15.10762	
25-29	3	0.854115	0.8686	0.85139	14	14.15837	15.01837
30-34	5	0.864144	0.86818	0.84904	15	15.78913	
35-39	10	0.807096					
40-44	15	0.977985					
45-49	20	0.772964					

Table 2.1.3 below shows the values of the survivorship probabilities for each age group in the life table. The probabilities are obtained by using the average mortality level. The first column represents the age groups which are used for the calculation of survivorship probabilities. These age groups are similar to those in the life table. The second and third columns represents the upper and lower mortality levels from the north model life table. The fourth column presents the survivorship probabilities.

TABLE 2.1.3 CALCULATION OF THE P(x) VALUES FROM THE OBTAINED L(X) VALUE.

x	15	16	p(x)
1	0.90699	0.9175	0.907183
5	0.84904	0.86818	0.849391
10	0.82525	0.84751	0.825659
15	0.8122	0.83592	0.812635
20	0.79668	0.82169	0.797139
25	0.77646	0.80298	0.776947
30	0.75495	0.78306	0.755466
35	0.73191	0.76166	0.732456
40	0.70651	0.738	0.707088
45	0.67745	0.71053	0.678057
50	0.64466	0.67915	0.645293
55	0.60372	0.63915	0.604371
60	0.55332	0.58955	0.553985
65	0.48651	0.52279	0.487176
70	0.39967	0.43442	0.400308
75+	0.29308	0.32398	0.293647

Table 2.1.4 gives the values of the Life Table functions which were obtained by using the method discussed in section 2.4. Once we have the survivorhip probabilities from table 2.1.3, other life table function are easily obtained. The radix (or 1(o) is in this case 100000.

TABLE 2.1.4 CONSTRUCTION OF THE LIFE TABLE FOR KENYA 1984:ALL CASES.

(1) AGE GROUP	(2) nPx	(3) nQx	(4) lx	(5) nDx	(6) nLx	(7) Tx	(8) ex
0-1	0.907183	0.092816	100000	9281.686	93781.27	5246601.	52.46601
1-4	0.936295	0.063704	90718.31	5779.141	347570.0	5152820.	56.80022
5-9	0.972059	0.027940	84939.17	2373.266	418762.6	4805250.	56.57284
10-14	0.984226	0.015773	82565.90	1302.317	409573.7	4386487.	53.12710
15-19	0.980930	0.019069	81263.58	1549.629	402443.8	3976914.	48.93844
20-24	0.974669	0.025330	79713.95	2019.225	393521.7	3574470.	44.84120
25-29	0.972352	0.027647	77694.73	2148.078	383103.4	3180948.	40.94162
30-34	0.969542	0.030457	75546.65	2300.986	371980.8	2797844.	37.03466
35-39	0.965365	0.034634	73245.66	2536.802	359886.3	2425864.	33.11955
40-44	0.958943	0.041056	70708.86	2903.078	346286.6	2065977.	29.21808
45-49	0.951679	0.048320	67805.78	3276.408	330837.9	1719691.	25.36201
50-54	0.936582	0.063417	64529.38	4092.272	312416.2	1388853.	21.52280
55-59	0.916631	0.083368	60437.10	5038.529	289589.2	1076437.	17.81086
60-64	0.879402	0.120597	55398.57	6680.908	260290.6	786847.8	14.20339
65-69	0.821690	0.178309	48717.66	8686.811	221871.3	526557.1	10.80834
70-74	0.733553	0.266446	40030.85	10666.07	173489.1	304685.8	7.611274
75+	0	1	29364.78	29364.78	131196.7	131196.7	4.467826

2.6 MORTALITY ESTIMATION BY MATERNAL EDUCATION

In the KCPS maternal education was measured by the number of years of schooling completed by the respondents (avoiding those that she repeated in one single class). The durations are classified into five categories which have been discussed in section 2.1. From the survey 35 percent of the respondents had no formal education, 16 percent had attained 1-4 years of schooling, 32 percent had 5-8 years of schooling, 48 percent had 5-8 years of schooling while 17 percent had at least secondary education i.e 9+ years.

Table 2.1.5 below presents the estimates for infant and child mortality for maternal education.

Table 2.1.5 Mortality estimates by Maternal education. 1984.

Education level	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
None	106.54	77.99	120.91	182.02	163.94	44.52
1-4yrs	98.30	69.3	133.43	142.53	145.12	51.28
5-8	73.93	45.95	104.81	109.74	89.60	56.75
9+	39.63	17.25	52.45	70.83	25.26	65.27

*expressed per 1000

The estimates in table 2.1.5 shows that mortality levels varies greatly with the educational attainment of the mother. The infant mortality rate in column 2 is very high for those whose mothers who had no education at all. These infants have a life expectancy at birth of 44.50 years only. The level further drops for those whose mothers had 1-4 years of formal education and these have a life expectancy at birth of 51.28 years. This shows a gain of approximately 6.76 years.

It is clear that the infant mortality rate for those children whose mothers have no education is almost thrice as much as those whose mothers have attained secondary education (i.e 9+ years) the life expectancy at birth of the latter is 65.27 as compared to 44.52 for the former. This shows a gain of 20.75 years.

The same trend is also potrayed in the case of child mortality (i.e 1000, 4q1) in column 3 of table 2.1.5. Child mortality is highest for those whose mothers with no formal education and this level drops sharply with years of maternal schooling. It is lowest for those whose mothers have secondary education and above.

Whether considering q(2), q(3) or q(5) values, our estimates have shown that there exists some strong link between maternal education and child survival. The children with mothers who have higher formal education have higher chances of survival compared to those whose mothers have low or no formal education at all.

There are several possible reasons that can be raised to support our findings. In the first case mothers are considered first level health care providers for children. Their activities and attitudes influence the health of children and all family members (Caldwell, 1986). The mechanism through which maternal education could affect infant and child mortality has been discussed by many scholars. This includes; a heightened perception of health problems and an increased sense of ones capacity to solve the problem; creation of better

knowledge on positive health sanitary practises; and changing of the relative status of women in the household. Improved maternal education can also reduce child mortality by changing the patterns of childbearing, assuming that educated mothers are likely to space births and control them.

Besides the mechanism discussed above, education of the mother influences child survival in Kenya because it influences place of residence, the proportion of KCPS respondents with no formal schooling is considerably higher in the rural areas, (Kenya, 1984 p.26). This is not surprising in view of the fact that educational opportunities for rural women are more limited than those of urban women. Rural women who have education are also more likely to move to urban areas in search of employment. The fact most women with high education are urban residents is another advantage for they are likely to enjoy the socio-infrastructural ammenities in urban areas thus increasing child survival.

2.7 MORTALITY ESTIMATION BY WORKSTATUS OF MØTHER

In the KCPS, work was defined as doing of jobs other than own household work for payment in either cash or kind; making things for sale or having business of whatever size where income is accrued. Of all the women who were interviewed 18 percent never worked and 17 percent had worked in the past. Table 2.1.6 below shows the detailed mortality estimates that we obtained for this differential.

Table 2.1.6 Mortality Estimates by Workstatus of Mother 1984.

Work Status	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
Currently Working	82.30	53.57	105.02	124.99	116.02	54.8
Worked in the Past	92.25	66.16	137.10	125.96	143.05	51.94
Never Worked	96.20	67.14	108.87	167.56	138.87	51.74

* expressed per 1000

The infant mortality rates portrayed in column 2 shows that the levels are lowest for those whose mothers are currently working. The life expectancy at birth is 54.80 years. The infant mortality rates rises to 92 per 1000 for those whose mothers worked in the past and it is highest for those whose mothers have never worked. However, the life expectancy at birth for those whose mothers never worked and those who worked in the past is almost the same (i.e approximately 51 years). This implies that what really determines child survival is the current work status of mother and not the past experience.

The results in the table 2.1.6 also portray the same trend for child mortality rate (i.e 4q1) the child mortality rate is low for those whose mothers are currently working. This level rises sharply for those whose mothers worked in the past and it is highest for those whose mothers have never worked. The difference in mortality between those who worked is however very small and insignificant.

The estimates in table 2.1.6 have also shown that child survival in Kenya is determined by the mothers current work status rather than her past status. There are several reasons which can be put forward to explain our findings. Firstly, mothers who engage themselves working outside the farm

earn extra income and hence they are able to subsidise family's income. Mothers who are currently working are therefore in a position to nourish their children better and hence prevent parasitic and infectious diseases that threaten a mulnourished child.

Another possible reason for low infant and child mortality for those whose mothers are currently working is that most of them reside in the urban areas. In the KCPS, the proportion of women who have never worked is higher in the rural areas than urban areas (Kenya, 1984 p.33). The majority of the women currently working reside in the urban areas - these areas are well served with social and physical infrastructure as compared to their rural counterparts. This anables women who currently work (and reside in urban areas) to enjoy proximity to hospitals, clean water, good communication to markets and other social ammenities.

Finally, it is also important to note that the proportion of currently working women increase with education attainment. Table 2.1.7 below illustrates that except for those with

Table 2.1.7. Percent Distribution of All Women 15-49 by Education Level & Work Status 1984.

Education Level	Total	Currently Working	Worked in the Past	Never Worked
Total	100.0	18.3	11.7	70.0
None	100.0	15.6	11.2	73.6
1-4yrs	100.0	18.9	13.2	67.9
5-8	100.0	16.8	11.8	71.4
9+	100.0	25.6	11.2	63.2

SOURCE: Kenya 1984 p34 table 3.13

with 5-8 years of education, the proposition of currently working women increases with education attainment. 16 percent of those respondents who had no formal education were working to 26 percent of those with some secondary education. This implies that, women currently working have an extra advantage of being more educated and hence are in a position to understand more about society and health.

2.8 MORTALITY ESTIMATION BY WORK STATUS OF FATHER.

The validity of this variable is subject to debate because it only represents the mothers current or most recent husband. It does not necessarily refer to the mothers partner at the time of childbirth or during subsequent five years. Moreover the occupation that is used is the current one and does not represent the relevant five year period. We shall however rely on this variable as an indicator of socio-economic status, income and living conditions of the household.

Table 2.1.8. Percent Distribution of Currently Married Women 15-49 by Work Status of Husband & Place of Residence 1984.

Work Status of Husband	Total	Metropolitan	Other Urban	Rural
Total	100.0	100.0	100.0	100.0
Own farm	19.3	2.0	8.4	21.3
Other farm	10.7	6.2	10.5	11.1
Own Business	8.2	15.1	16.0	7.2
Other Business	30.6	70.9	50.0	26.3
Not working	31.0	5.8	15.2	34.0
Not stated	0.1	0.0	0.0	0.1

SOURCE: Kenya 1984.p35.

From the KCPS almost one in every three husbands was not working and the percentage of those working was highest in urban areas. Table 2.1.8 above shows the distribution of women by work status of husband and place of resideence. Table 2.1.8 shows that most husbands work in other peoples businesses and they reside in urban areas. Even those who indulge in their own businesses are mostly urban residents than rural - whereas farm workers mainly reside in rural places.

The results in table 2.1.9 illustrate that the infant mortality rate is lowest for those whose fathers are working in their own business. The life expectancy at birth is 55.65 years. The rate then increases slightly for those whose fathers work in other peoples business, whereby the life expectancy at birth is 55.38 years. It should be noted that the difference in infant mortality levels between those who work in own business and other business is very small and insignificant.

The infant mortality rate rises considerably for those whose fathers work in farms. It is 88 per 1000 and 90 per 1000

Table 2.1.9. Childhood Mortality Estimates by Work Status of Father 1984

Category	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
Own farm	91.41	61.37	99.56	172.76	116.04	52.99
Other farm	88.16	59.18	84.37	122.42	180.99	53.49
Own Business	78.64	50.21	72.32	134.19	130.85	55.65
Other Business	79.75	51.23	96.28	114.83	124.73	55.38
Not working	104.66	75.93	110.116	178.11	172.27	49.92

* expressed per 1000

for those whose fathers work in other peoples farms and own farms respectively. Mortality is highest for those whose fathers are not working the IMR is 104 per 1000 and the life expectancy at birth is 49.9 years. The same trend is also shown in the case of child mortality rate in column 3. It is important to note that the results of q(2), q(3) and q(5) show a rather different pattern.

One clear pattern we have got is that infant and child mortality rates are low for those children whose fathers work in businesses. It is moderate for those whose fathers work on the farms and highest for those whose fathers are not working at all. One possible reason to support our results is that most people who indulge in business are residing in urban areas (ref table 2.1.8) whereas those who work on farms are largely rural occupants. It could also imply that farm jobs earn less income as compared to other jobs. This can indirectly affect the mortality experience of a particular category.

2.9 MORTALITY ESTIMATION BY PLACE OF RESIDENCE.

This variable describes maternal place of residence at the time of the survey. Table 2.1.10 below provides the infant and child mortality estimates by place of residence. Of all women, 835 were in metropolitan, 445 in other urban and 5,301 in rural areas.

From table 2.1.10 below, there emerges a clear picture of mortality differential by type of residence. The infant and child mortality rates shown in columns 2 and 3 are lowest in other urban, low in metropolitan and higher in rural areas. The life expectancy at birth for metropolitan areas is 54.98 years, whereas for the other urban areas is 57.29 years, which shows an increas of approximately 2.3 years. The life expectancy at birth for rural areas is 51.70 years which is 5.6 years less than that of urban areas.

Table 2.1.10 Mortality Estimates by Place of Residence 1984.

Place of Residence	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
Metropolitan	81.52	52.86	94.98	109.12	143.11	54.98
Other urban	71.49	43.77	100.24	79.34	117.59	57.29
Rural	96.34	67.29	118.98	155.60	139.10	51.7

* expressed per 1000

The excess of rural over urban mortality in our case is partly attributed to the differential distribution of socio-economic characteristics in the urban and rural areas. Better educated and higher income people live in greater proportion in metropolitan areas of Nairobi and Mombasa. The concentration of health manpower and facilities in major urban areas, the fact that urban population is better provided with basic community ammenities such as clean water, sewerage disposal systems seems also conducive to low mortality. In the case of Kenya, it is estimated that in 1976-77, 90 percent of all physicians

were located in urban areas leaving only 100 physicians to care for more than 10 million people in rural areas (UN, 1982).

Many infants in Kenya die from preventable diseases or curable conditions because they and their mothers get little or no medical care before, during or after birth. Neonatal tetanus which is a major killer of infants in some parts of Kenya is commonly the result of unclean hands or instruments used during childbirth. This case is very common in the rural areas where there are less health facilities or trained health manpower. In the rural ares also people are therefore trapped in poverty. They are hence more susceptible and less resistanct to diseases in part owing to malnutrition, less access to immunization and poor environmental sanitation. Malnutrition has been found to claim alot of life in rural areas because it lowers resistance to infectious and parasitic diseases that could not be threatening to a well nourished child. Just as under-nutrition prepares the was for infection, diseases undermine the nutritional status of a child. A sick baby often loses appetite so that its food intake is reduced just when it needs more nutrients than usual to fight illness, (Newland, 1981 p.20).

A very interesting finding of our estimates is that infant and child mortality in other urban areas is lower compared to metropolitan areas have an infant mortality rate of 81 per 1000. a child mortality rate of 53 per 1000 whereas the other urban areas have infant and child mortality rates of 71

per 1000 and 44 per 1000 respectively. This finding does not confirm that of Hobcraft et al (1984) who after using the WFS data concluded that chidhood mortality is generally lowest in all metropolitan areas.

A number of possible reasons can be raised for such variation. Firstly, Mombasa and Nairobi are Kenya's leading commercial, industrial and adminstrative centres. It is therefore assumed that they are the regions which receive a greater proportion of in-migrants from the rural areas. The migrants have been found to have higher mortality levels than non migrants, (Wakajumah, 1986). This is due to unfavourable social and economic conditions which urban settlers face upon arrival due to conditions at the the previous place of residence. Secondly, in-migration to the metropolitan areas of Nairobi and Mombasa has produced a higher rate of growth in supply than in demand for manpower. A greater proportion of their population now live in slums or squatter settlements. These have been growing at a rate which far exceeds the capacity of the government to keep pace with public heath and medical needs of the population concerned. The consequence is that during recent years conditions in metropolitan areas have either not improved or have deteroriated.

2.10 MORTALITY ESTIMATION BY CONTRACEPTIVE USE

In our study we chose to use two categories of contraceptive users i.e ever users and non users. The ever users are defined as those women who at one time have applied either

modern or traditional contraception. The non users are defined as those who have never applied any contraceptive method. From the KCPS 29 percent of all women have used some method, almost half of ever users have applied a modern method. The modern method include; pill, condom, vaginal methods, injection, IUD and sterilization. The traditional methods include rhythm, douche, withdrawal, abstinence and other behavioural ones. Table 2.1.11 below presents the estimates for childhood mortality by mothers contraceptive use.

Table 2.1.11 Mortality Estimates by Mothers Contraceptive Use 1984

Category	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
Ever users	69.06	41.65	85.81	110.88	87.12	57.87
Non users	103.43	74.61	122.81	165.45	161.68	50.18

* expressed per 1000

Children of the mothers who have ever used a contraceptive method have a low mortality experience than those who never applied a contraceptive method. The infant mortality rate for ever users is 69 per 1000 and life expectancy at birth is 57.87 years. On the other hand the infant mortality rate for non users is 103 per 1000 and the life expectancy at birth is 50.18 years. This shows that there is a net gain of approximately 7 years when mothers apply contraceptives.

The differential mortality experience by contraceptive use can be due to several reasons. Firstly, it has been found that most women in Kenya apply contraceptives inorder to terminate births rather than control intervals (Mungai, 1986).

It is therefore possible that users of contraceptives reduce births that occur at high parities and this reduces infant mortality. Another possible reason is mainly due to the size of the sample. The urban dwellers are more users compared to the rural counterparts. It has also been noted that urban dwellers are major users of modern methods than rural dwellers (Kenya, 1984). The influence of place of residence therefore plays a major role here. Most ever users are also educated and this makes them to have an advantage over non users who are not educated.

2.11 MORTALITY ESTIMATION BY TYPE OF UNION

The KCPS revealed that 25 percent of the currently married women were in polygamous unions. Polygamy is slightly more common in rural areas than in urban areas. The date also showed that polygamy is negatively related to educational attainment of the wife both in urban and rural areas (Kenya, 1985). Table 2.1.12 below presents a summary of childhood mortality estimates by type of marital union.

Table 2.1.12 Childhood Mortality Estimates by Type of Unions 1984.

Types of Union	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
Polygamous	117.8	90.32	128.14	201.48	194.88	47.21
Monogamous	81.6	52.93	92.00	124.86	129.39	54.96

* expressed per 1000

The infant mortality rate is very low (81 per 1000) for monogamous unions compared to that of polygamous unions (118 per 1000). The life expectancy at birth for polygamous unions is approximately 47 years whereas that of monogamous unions is 55 years. This implies that a net gain of approximately 8 years for the children born in monogamous unions. The same pattern occurs in child mortality whereby its low for monogamous unions (i.e 53 per 1000) as compared to that of polygamous unions (i.e 90 per 1000).

This differential mortality experience by type of marital union could be due to the fact that children in polygamous unions receive on the average less attention from both parents than children in monogamous unions. It is also possible that the general level of well being, income levels in polygamous unions is relatively low and this reduces the potential for child survival. The KCPS data also revealed that most women in polygamous unions are less educated and reside in the rural areas. This also could influence child survival.

2.12 MORTALITY ESTIMATION BY MARITAL STATUS

Of all the respondents in KCPS 68 percent were married, 2.4 percent separated and 2 percent divorced. The mortality estimates by marital status differential is hereby given below in table 2.1.13.

Table 2.1.13 Childhood Mortality Estimates by Marital Status 1984.

Status	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
Single	73.02	45.13	65.92	139.77	104.82	56.9
Married	89.30	60.29	97.58	141.86	144.58	53.24
Separated	75.9	47.73	26.90	95.92	254.96	56.27
Divorced	108.38	80.02	183.13	174.94	107.93	49.14
Widowed	80.71	52.05	55.77	184.74	117.30	55.15

* expressed per 1000

The infant and child mortality rates in columns 2 and 3 respectively, show that the single have the lowest mortality experience. These are then followed by separated, widowed, married and divorced in that order. The life expectancy at birth for the single is 56.9 years whereas that for the divorced is 49.14 years. This shows as difference of approximately 8 years. The q(2), q(3) and q(5) values show a slightly different pattern but then we rely on the 1q0, 4q1 and e(0) because they are obtained from the life table which we derived by using the q(2), q(3) and q(5) values plus the // regional model life table.

The single mothers have low infant and child mortality because most of them are educated and hence work outside homes. This enables them to have more income and a better understanding of society and health requirements. The single also have an advantage of having low fertility. This is because, they mostly have only one child or two and thus can easily take care of their children.

Data on separated, divorced and married is really doubtful and could be subject to alot of errors in classification. Most mothers who are separated or divorced do not like to state their actual status. They prefer to state that they are married. This is evident from the actual percentage of respondents, i.e. only 2 percent divorced, 2 percent separated. This implies that some women who are either divorced or separated are entered falsely in married category thus inflating mortality rates for the later. On the other hand, the widowed have a relativel low mortality experience because the majority of the women (widowed) are past the age 35 years. This implies that they probably become widows after child-bearing. Most african traditions also allow re-marriage and thus makes widows still have husbands who can take care of the children.

2.13. MORTALITY ESTIMATION BY RELIGIOUS IDENTIFICATION.

In this section estimates are made by religious identification of the respondents. Of all the respondents, 37 percent were catholics, 53 percent were protestants, 4 percent were muslims, 5 percent had no religion and 3 percent belonged to other sects. Table 2.1.14. below presents the mortality estimates for the different categories of religion.

The mortality estimates do not portray a very. significant difference between the categories. The q(2), q(3) and q(5) values show differing patterns and this could be due error in

age and birth reporting . The infant mortality in column 2 show that the protestants have the lowest mortality experience of 90 per a 1000. These are followed by other non sects, catholics and muslims in that order.

Table 2.1.14. Childhood Mortality Estimates by Maternal Religious Identification 1984.

Religion	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
Catholic	102.03	73.16	118.40	136.77	193.9	50.48
Protestant	90.14	61.10	112.62	140.12	130.99	53.0
Muslim	109.0	80.7	105.62	171.75	212.51	49.0
Others	96.17	67.12	56.74	121.08	287.97	51.7
No religion	110.16	81.97	92.33	241.92	164.41	48.77

* expressed per 1000

The life expectancy at birth for the protestants is 53 years, whereas that for no religion is 49 years. This shows a difference of 4 years between them. The fact that protestants experience low mortality implies that they have achieved high levels of socio-cultural development. It is also possible that protestant religion first gained root in areas where enviromental conditions favour low mortality.

The muslims have been found to have high mortality experience because of the distinctive position of women operating partly through their access to education and many other ways (Caldwell, 1986). The muslim women have low levels of family planning and with limited access to employment outside the household. All these are based on the teachings of the Quran which considers education for girls to be both wrong and

unnecessary. The autonomy of women in muslim world is absent and this affects child survival. In Kenya,the muslim religion is also concetrated in the coastal belt which coincidentally is a malaria zone and reduces chances for child survival. Mortality is also high for those with no religious identification. The majority of these people still value traditional customs of childcare. These customs prevent them from attending chid health clinics, from eating some nutritious foods and from applying modern contraceptives. All these can lead to high childhood mortality.

2.14. MORTALITY ESTIMATION BY ETHNICITY.

All the respondents were grouped into major ethnic groups namely; Kikuyu, Luhya, Luo, Kamba, Meru-Embu, Kisii, Mijikenda, Kalenjin and others. Table 2.1.15 below show that the Kikuyu were the majority followed by the Luhya and the Luo. In the metropolitan and other urban areas, the biggest single group in the KCPS is the Kikuyu followed very closely by the Luo and Luhya.

The mortality estimates in table 2.1.16. show that there exists marked mortality differences along ethnic groups. Children born of Kikuyu parents experience lowest infant and child mortality rates with a life expectancy at birth of 63 years. These are followed by the Meru-Embu, Kamba, Kalenjin, Kisii, Other tribes, Luhya, Mijikenda and Luos in that order.

Table 2.1.15 Percent Distribution of all Women 15-49 by Ethnic Group and Place of Residence 1984.

Ethnic Group	Total	Nairobi & Mombasa	Other	Rural
	100.0	100.0	100.0	100.0
Unweighted No.	6581	835	445	5301
1. Kikuyu	25.7	22.2	27.3	25.8
2. Luo	14.4	24.4	20.5	13.1
3. Luhya	14.6	15.5	23.5	13.8
4. Kamba	10.6	9.1	2.9	11.4
5. Kisii	5.2	1.1	3.0	5.7
6. Meru-Embu	7.2	2.0	2.4	8.0
7. Mijikenda	5.9	7.0	6.0	5.8
8. Kalenjin	8.8	1.3	3.2	9.8
9. Others	7.7	17.3	11.1	6.6

SOURCE: Kenya (1984, p32 table 3.10)

Whether these results are exerggerated or not, there is evidence that there exists mortality differentials along ethnic lines in Kenya. This could reflect differences in cultural and eating habits . Most ethnic groups also reside in separate geographical locations and this affects mortality mortality experience.

Table 2.1.16 Children Mortality Estimates by Ethnicity, 1984.

Ethnic Group	1q0*	4q1*	q(2)*	q(3)*	q(5)*	e(0)
Kikuyu	49.0	24.8	55.7	66.6	71.7	62.8
Luo	144.5	116.5	175.1	241.1	225.2	42.3
Luhya	107.9	74.5	146.2	151.8	170.3	49.2
Kamba	83.4	54.6	140.1	111.9	94.6	54.6
Kisii	91.2	62.1	76.6	127.8	206.2	52.8
Meru-Embu	74.9	46.8	61.9	128.8	132.4	56.49
Mijikenda	114.8	87.2	125.6	193.6	194.7	47.8
Kalenjin	87.2	58.3	93.7	165.5	114.0	53.7
Other tribes	94.0	64.9	87.3	137.8	191.5	52.2

* express per 1000

2.15. Chapter Summary.

This chapter has clearly shown that there exists a marked difference in mortality levels for various differentials considered here. Children whose mothers have attained 9 or more years of formal schooling have high chances of survival as compared to those with low or no education. The children whose mothers are currently working have high chances of survival as compared to those whose mothers are not currently working. It is also clear that the children whose fathers work in business have high life expectancy at birth compared to those whose fathers work in the farm or are not working at all.

Infant and child mortality is also low for urban residents compared to rural residents. Mortality differential by marital status is not significant but then it is evident that separated and single mothers have low mortality experience as compared to divorced and married mothers. Another major variable is religion; protestants and catholics are shown to have lower mortality experience as compared to muslims and those with no religion. On the side of ethnic composition it is very evident that tribes from Central and Eastern provinces have low mortality experience as compared to tribes from Nyanza, Coast and Western provinces. The Kikuyu, Embu and Meru have the lowest mortality experience whereas the Luo, Mijikenda and the Luhya have higher mortality rates. The children born of mothers who have used at least a contraceptive method have a high life expectancy at birth compared to those whose mothers

have never used any contraceptive method. The same thing is evident in union status where children born in monogamous unions have high life expectancy at birth compared to those born in polygamous unions.

CHAPTER 3

REGIONAL MORTALITY VARIATIONS.

3.0 Introduction.

Kenya is a large country and diverse in its ethnic composition . It is divided into seven major adminstrative regions known as provinces, which are also further subdivided into smaller regions known as districts. The mortality levels and patterns provided in chapter two may not necessarily be the actual experience in all the adminstrative regions. In this chapter therefore we examine the regional variations in infant and child mortality levels. The infant mortality rates, child mortality rates and life expectancy at birth are presented for all the districts and provinces covered by the KCPS of 1984.

3.1 Mortality Estimation For Coast Province.

Coast province covers the coastal belt of Kenya. In the KCPS four districts namely Kilifi, Kwale, Mombasa and Taita Taveta were covered. A total of 1313 women were interviewed in this province. The characteristics of the women interviewed showed that education level, labour participation, and age at f marriage were all low.Polygamy was very prevalent whereas contraceptive usage was comparatively low (Kenya 1986).

The childhood mortality estimates obtained for Coast province are shown in table 3.1.1. below. It is evident that Coast province and its districts show a very high mortality experience .It is only Mombasa district which has mortality

levels which are slightly below the national average. Mombasa district has an infant mortality rate of 89 per 1000, a child mortality rate of 60 per 1000 and a life expectancy at birth of 53 years. Taita-taveta, Kilifi and Kwale follow one another in that order in terms of mortality levels. Kwale district has the highest infant mortality rate of 127 per 1000, a child mortality rate of 100 per 1000 and a life expectancy at birth of only 45 years. This implies that a child born in Mombasa district is likely to live approximately eight more years than that born in Kilifi and Kwale districts.

Some of the issues that can be raised as possible reasons for high mortality in the Coast province are; it is nea in the tropical zone and hence malaria is endemic due to mosquito prevarence. Another reason is that the muslim religion is very prevalent here. Mortality has been found by other scholars to be high among muslim due to low female autonomy, low education level and low age at first marriage (Caldwell, 1986).

Table 3.1.1. Mortality Estimates for Districts in Coast Province 1984.

Region	1q0*	4q1*	q(2)*	e(0)
Coast province	115.24	87.61	130.93	47.70
Kilifi	124.26	97.26	139.38	45.07
Kwale	127.25	100.51	101.89	45.40
Mombasa	89.23	60.22	122.29	53.26
Taita-taveta	104.78	76.07	230.80	49.89

* expressed per 1000.

3.2. Mortality Estimation For Central Province.

Central province covers an area of 13173 square kilometres. It is comprised of five districts namely, Kiambu, Kirinyaga, Muranga, Nyeri and Nyandarua. A total of 917 women were interviewed form Central province.

The respondents showed high education levels, low labour participation, very high contraceptive prevalence and very few women in polygamous unions (Kenya, 1986).

The mortality estimates provided in table 3.1.2 show that Central province has the lowest infant and child mortality levels in the country. The infant mortality of 43 per 1000 and a child mortality rate of 20 per 1000 are not only the lowest in all the provinces of Kenya but also more similar to the low mortality countries. There exists some minor variations in mortality by districts in Central province; Nyeri district has

Table 3.1.2 childhood mortality estimates for districts in central province 1984.

Region	1q0*	4q1*	q(2)*	e(0)
central province	43.27	20.17	38.69	64.29
kiambu	53.04	28.09	51.31	61.77
kirinyaga	64.39	37.57	28.94	58.96
muranga	37.94	15.92	54.83	65.65
nyeri	35.26	13.75	31.01	66.29

* expressed per 1000.

the lowest levels and then it is followed by Muranga, Kiambu and Kirinyaga in that order.

Our results confirm those of earlier works (Anker and Knowles, 1979; Kibet 1982; Mott 1980; Muganzi 1984 and Kichamu 1986). Among the reasons which have been given for the low mortality in Central province are; well developed medical facilities, good agricultural land which supports a wide variety of crops and a generally well developed physical and social infrastructure. For example by 1983 there were 43 hospitals, 45 health centres and 207 dispensaries in Central province. This gave a total of 4512 beds and a bed ratio of 160 beds per 100000 people (Kenya, 1984).

3.3. Mortality Estimation For Nyanza Province.

Nyanza province has a total area of 12525 square kilometres and by 1979 it had a population density of 211 people per square kilometre. The province comprises of four districts namely Kisii, Kisumu, Siaya and South Nyanza. The luo form the major ethnic group occupying three districts of Siaya, Kisumu and South Nyanza, whereas the Kisii occupy Kisii district.

A total of 970 women were interviewed in Nyanza province. The surveyed sample indicate low levels of education for respondents low level participation in active labour, low age at first marriage high prevalence of polygamy and low level of contraceptive use (Kenya, 1986).

The mortality estimates presented in table 3.1.3 show that Nyanza province has the highest mortality rates in Kenya. The average infant mortality rate of 125 per 1000, and child

mortality of 97 per 1000 are far above the national average. The life expectancy at birth is only 46 years which is about 6 years below the national average and 18 years below that of Central province.

Table 3.1.3 Childhood Mortality Estimates For The Districts in Nyanza Province, 1984.

Region	1q0*	4q1*	q(2)*	e(0)
Nyanza province	124.57	97.60	145.14	45.91
Kisii	77.83	49.48	67.63	55.83
kisumu	135.25	107.92	205.56	43.95
Siaya	132.01	104.92	150.20	44.53
South Nyanza	135.26	107.93	135.52	43.95

*expressed per 1000.

Kisii district experiences a much lower mortality level as compared to other districts in the province. It has an infant mortality rate of 78 per 1000, a child mortality rate of 49 per 1000 and a life expectancy at birth of 56 years. This implies that a child born in Kisii district is expected to live twelve more years than a child born in other parts of the province. Our finding is similar to that by Kibet (1982) and Kichamu (1986). Some of the reasons that have been given for this variation in mortality levels for Nyanza province are, differences in both socio-cultural and ecological setting and differences in ethnic composition of the districts. Kisii district is located in a relatively high potential agro-ecological zone which supports the growing of a wide variety of food and cash crops and this improves the nutritional and the economic status of its inhabitants. Kisii district is also

located in a relatively high area hence mosquitoes are not very common. This reduces the endemicity of malaria which is common in other areas of Nyanza.

Nyanza province has been found to experience highest mortality levels because it is within the most tropical region and hence malaria is found to be very endemic. Apart from this, alot other tropical diseases such as neonatal tetanus are very prevalent in Nyanza and this reduces chances of child survival. The province is also poorly served with medical facilities, there is an acute shortage of piped water for domestic use and poor network of transportation. All these factors have thwarted the level of socio-economic development and thus determining mortality levels in the province.

3.4. Mortality Estimation for Western Province.

Western province has a total area of 8196 square kilometres. It is divided into three districts namely; Kakamega, Busia and Bungoma. Ethnically the province is virtually covered by the luhya. Ecologically the province varies from a high potential land in Kakamega district to a low potential land in some parts of Busia district. Agriculture is however well developed in the province with a variety of crops thus giving the province a sound economic base.

A total of 1001 women were interviewed in Western province. Educational levels of the respondents was moderate,

polygamous unions were very common whereas very few women were involved in gainful work outside home (Kenya, 1986).

The mortality estimates provided in table 3.1.4 show that Western province is also having an alarmingly high mortality level. It has an infant mortality rate of 116 per 1000, a child mortality rate of 89 per 1000 and a life expectancy at birth of 47 years. This figures are below national averages and make Western province to be the third after Nyanza and Coast with high mortality experience in Kenya. There also exists variations in mortality rates by the districts. Busia district experiences lowest mortality rates followed by Kakamega and Bungoma.

Some of the reasons that have been advanced for the high level of mortality in Western province are; it is in the Lake Victoria region hence malaria is very prevalent, there is an acute shortage of health facilities manpower and lack of clean piped water for domestic use.

Table 3.1.4 childhood mortality estimates for the districts in western province 1984.

Region	1q0*	4q1*	q(2)*	e(0)
Western province	116.60	89.04	167.35	47.44
Busia	86.99	58.06	189.49	53.75
Bungoma	106.90	78.38	183.80	49.45
Kakamega	92.11	63.01	59.65	52.62

* expressed per 1000.

3.5. Mortality Estimation For Rift Valley Province.

Rift Valley province is the largest province in Kenya covering a total area of 163883 square kilometres. Because of

its large area, the province has a wide diversity of climate, soils, agricultural activities and ethnic composition. The province is divided into thirteen adminstrative districts.

In the KCPS only eight districts were covered namely; Baringo, West Pokot, Nakuru and Narok-Kajiado from the dry zone; Kericho, Nandi, Trans-Nzoia and Uasin-Gishu from high-land zones. A total of 864 women were interviewed in this province.

The mortality estimates presented in table 3.1.5 potrays Rift-Valley province to be an area of medium mortality level. The infant mortality rate of 83 per 1000 and a child mortality of 54 per 1000 are all below the average national levels. The life expectancy at birth is approximately 55 years and this is about 3 years above the national average.

Whereas the province has a moderate mortality level, there exists marked inter district variations in mortality levels in the province. Kericho, Nandi and West Pokot districts have relatively high mortality levels as compared to Nakuru, Baringo, Trans-Nzoia and Uasin Gishu districts. Kericho district has the highest mortality experience with a life expectancy at birth of 50 years. Trans-Nzoia district has the best survival chances with a life expectancy at birth of 62 years.

The inter district mortality variations for the Rift-Valley province can be attributed to many factors. West Pokot has a low life expectancy because of the marginal ecological conditions that makes only 3 per cent of the total area to be

Table 3.1.5 childhood mortality estimates for the districts in Rift Valley Province 1984.

Region	1q0*	4q1*	q(2)*	e(0)*
Rift Valley	83.32	54.54	94.29	54.57
Kericho	103.13	74.30	126.93	50.24
West Pokot	97.30	68.28	18.15	51.49
Nakuru	60.29	34.12	72.06	59.97
Baringo	70.02	42.48	168.23	57.64
Trans-Nzoia	50.13	25.72	45.58	62.52
Uasin-Gishu	61.70	35.30	79.84	59.63
Nandi	92.96	63.84	92.78	52.43

*expressed per 1000.

high agro-ecological potential (Kenya, 1984b). This has made nomadism to be the way of life for the district and famine a common phenomenon. Kericho and Nandi districts show high mortality levels despite the fact that they are in a high potential agricultural land. This is probably because of high number of people who migrate to this districts to offer cheap labour in the tea plantations established here.

The remaining districts of Nakuru, Uasin Gishu and Trans-Nzoia have low mortality levels because of high levels of socio-economic development achieved during and after the colonial rule. These areas used to be white settlement areas and hence grew up with many urban centres and infrastructural facilities.

3.6. Mortality Estimation For Eastern Province.

A total of four districts were surveyed in the KCPS from Eastern province. These were; Kitui, Machakos, Embu and Meru. The total number of women interviewed was 891. There was

low level of education for the respondents.Very few respondents participated in paid jobs outside their homes. Polygamy was less prevalent whereas contraceptive use was relatively high (Kenya, 1986).

The mortality estimates presented in table 3.1.6 show that Eastern province has relatively medium mortality levels as compared to other provinces of Kenya. The province has an infant mortality rate of 80 per 1000, a child mortality rate of 51 per 1000 and a life expectancy at birth of 55 years. This therefore makes the province to lie third after only Central and Nairobi. There however exists some inter district

Table 3.1.6 Childhood Mortality Estimates For Districts in Eastern Province,1984.

Region	1q0*	4q1*	q(2)*	e(0)
Eastern Province	79.78	51.26	97.53	55.38
Embu	63.64	36.96	27.33	59.16
Meru	76.05	47.86	65.04	56.23
Machakos	84.13	55.32	151.01	54.39
Kitui	101.69	72.81	122.23	50.58

* expressed per 1000.

variations in mortality experience within Eastern province. Embu enjoys the lowest infant mortality rate of 63 per 1000, a child mortality rate of 37 per 1000 and a life expectancy at birth of 59 years. This is then closely followed by Meru, Machakos and Kitui districts in that order. The life expectancy at birth for Kitui district is approximately 51 years and

this implies that a child born in Embu district is likely to live 8 more years than that born in Kitui district.

The inter district mortality variations within Eastern province is due to among other reasons, ecological conditions. Embu and Meru are essentially agricultural districts with farmers growing a variety of crops such as coffee, tea, tobacco, pyrethrum, wheat, maize millet, bananas and potatoes. Livestock is also kept there. One can therefore say that most families in these two districts have sufficient foods to enable them prepare a balanced diet. In such areas therefore, malnutrition can occur mainly due to ignorance rather than poverty and lack of food supplies.

On the other hand the climate of Kitui and Machakos districts has set severe limitation on the use and development of land. The climate of this area is dry and the rainfall is always un-reliable. Incidences of crop failures and droughts are very common in Machakos and Kitui districts. It is therefore to no surprise to find that most of the infants in this area die of gastro-entritis, measles and respiratory diseases all which have a direct or indirect link with malnutrition.

3.7. Mortality Estimation For Nairobi Province.

Nairobi is considered one of the provinces of Kenya due to its large population. It has a total area of 684 square kilometres and by 1979 it had an average population density of 1210 people per square kilometre. The population of Nairobi

is strictly urban and since it is the capital city of Kenya, most of the adminstrative, commercial and industrial headquarters are located here.

A total of 625 women were interviewed in Nairobi during the KCPS. The educational levels, labour force participation rates and the contraception prevalence rates for Nairobi residents was considerably higher than all other provinces (Kenya, 1986).

The mortality estimates obtained show that Nairobi province comes second to Central province in terms of low mortality experience. It has an infant mortality rate of 75 per 1000, a child mortality rate of 46 per 1000 and a life expectancy at birth of 57 years. Our findings are quite consistent with the past ones which have also given low mortality estimates for Nairobi. Some of the reasons that have been put forward for this low mortality are; it is by far ahead in terms of provision of health, water, sanitary and other social infrastructure. The education and income levels for most residents is relatively high. It should not however be taken as gospel truth that the risk of death for a child living in Nairobi is lower and substantially lower than the rest of the country. Studies by Nyamwange (1984) and Kichamu (1986) show that mortality in Nairobi is so hetergenous. There are some sub-populations within Nairobi who actually experience very high mortality mainly due social stratification and the place of residence within the city.

3.8. Chapter Summary

We have shown that there exists regional variations of infant and child mortality in Kenya. The life expectancy ranges from 61.77 years for Central province to 45.91 years for Nyanza province. The same experience is also evident in the case of districts. Nyeri district (in Central province) has the lowest mortality with a life expectancy at birth of 66.29 years, whereas South Nyanza and Kisumu districts (all in Nyanza province) have the highest mortality level.

Both socio-economic and environmental factors play an equally important role in determining regional mortality differentials. Nyanza, Coast and Western provinces have extremely poor survival probabilities because they are the most tropical parts of Kenya hence malaria and other tropical diseases are very endemic here. Incidentally these areas are lagging behind in terms of supply of medical facilities and communication network. Some parts of Rift-Valley and Eastern provinces (i.e Kitui, Machakos, Narok-Kajiado and West Pokot) have poor child survival chances because they are in semi arid areas hence agricultural production is low leading to famine and malnutrition. Meanwhile most parts of Central, Rift-Valley and Eastern province experience low mortality due to; average educational attainment, above average nutritional status and relatively good access to medical care (Mott; 1982). One can therefore conclude that the regional mortality differentials in Kenya potray the disparities in socio-economic development that exist.

CHAPTER FOUR

THE SOCIO-ECONOMIC DETERMINANTS OF MORTALITY: A MULTIVARIATE ANALYSIS.

4.0. Introduction.

There are several factors that are assumed to play a major role in determining the level of mortality in Kenya. Among these factors are; maternal education, polygamy status, place of residence, working status of parents, contraceptive use, marital status and utilization of maternity clinics during pregnancy and after child birth. In this chapter, we shall use a multivariate analysis to these variables inorder to assess their separate and total effect on childhood mortality. The multivariate analysis was supposed to be applied to the statistics on both distict and household level. Cross sectional analysis of household level statistics at the district level was to constitute the macro study whereas the analysis at the household level constitutes the micro study. In this study we have only done a micro-level analysis .

4.1 Macro-Level Study.

There are anumber of reasons that made the macro-level regression analysis not possible. First, the KCPS data is rich on data which can only be used for a micro-level analysis. Most of the variables were at family or household level. Variables like maternal education, contraceptive use, age, work status, attendance of maternal clinics and marital status are suitable for a micro study. Past studies have relied on more general or

broad variables like climate, endemicity of malaria and urban-rural residence for macro analysis (Anker and Knowles 1980). All these details are not included in the KCPS. Other reasons that makes macro-level studies not suitable are that; the number of observations is relatively small, there is high level of collinearity among the explanatory variables yet some possibly important variables are missing.

4.2 Micro-Level Analysis.

In this approach,a cross-sectional regression analysis is done to all households covered by the KCPS. Survival up to age 3 years is used as a measure of infant and child mortality. The results obtained should be taken with caution due the fact that most characteristics refer to the survey. This does not neccesarily imply that the same conditions prevailed in the past when deaths occured.

4.3. Methodology used.

We shall rely on the results obtained from a multiple-linear regression analysis of a dichotomous response variable i.e child died or survived in the first three years of life. The ordinary least squares estimation is employed and the results can be interpreted as providing an estimate of the effect socio-economic variables have on the probability of a child dying before completing age 3 years.

4.4. The Ordinary Least Squares Approach.

This method chooses the best-fitting model to be that model which minimizes the sum of of squares of the distances between the observed responses and and those predicted by the fitted model.The idea is that, the better the fit the smaller will be the deviations of the observed from the predicted values. Thus if we let:

$$Y = B_0 + B_{X1} + B_2 X_2 + B_k X_k \quad \text{_____} 4(a)$$

denote the fitted regression model ,the sum of squares of deviations of observed Y values from corresponding predicted values using the fitted regression model is given by;

$$\sum_i (y_i - y_i)^2 = \sum_i (y_i - B_0 - B_1 X_1 \ldots\ldots B_k X_k)^2 \ldots\ldots 4(b)$$

The least squares solution therefore consists those values for which the sum in equation 2 above is minimum, generally called the residual sum of squares or SSE.

4.5. Problems With The Least Square Method.

There are problems associated with applying linear regression to a dichotomous response variable. The "mean response" of a dependent variable taking values 0 and 1 is equivalent to the proportions of cases with value 1 and hence in this case is interprated as the proportion dying before they reach age 3 years. One would hope that such proportions that are predicted by the model lie between zero and one, but in practice there is no guarantee that values from a linear

regression model lie within these bounds. Also a linear scale of comparisons is often not appropriate when the proportions lie near the extreme values of zero and one.

However for the data considered here we apply linear models with some degree of confidence because the overal mean of the response variable is more than one half and the means across the background variables rarely deviate outside the range of 0.2 and 0.8. In this case the logit scale is nearly linear and in practise logit regression will not greatly differ with linear regressions.

The second major problem is that of multicollinearity assumption. In our case, multicollinearity could arise where the dummy variables each representing the presence or abscence of a characteristic are all included in the regression and the dummy variables include all possibilities. For example, suppose the regression includes the dummy variables representing the education of mother i.e where d is 1 when mother has no education and 0 if otherwise; so that No Education = 1, 1-4 years =0, 5-8 years = 0, and 9+ years = 0. If all the four dummy variables of education are included in the regression there will be perfect multi-collinearity. In such a case any one of the dummy variables must be dropped to avoid this problem of linaer dependence (Intriligator, 1978). In our study, we have left out one reference category in each variable so as to avoid this problem of linear dependence. We believe that our sample has no multi-collinearity because the standard

errors of the estimate are very small implying high precision in the estimators.

Other assumptions include; That the variance of the error term is true, that the error term is normally distributed and that the sample is selected by simple random sampling. Even though these asumptions may not be fully met, we are confident with our results because of the range of the means of the variables which is close to one half. The normality assumption is not critical for the size of the sample we considered here is large enough.

4.6. Test For Significance.

We can test the general null hypothesis that all K independent variables considered together do not explain a significant ammount of variation in the dependent variable Y.

$$H_0 : B_1 = B_2 = \cdots = B_k = 0$$

by calculating the F statistic

$$F = \frac{\text{mean - square regression}}{\text{mean - square residual}} \qquad 4(c)$$

and comparing it with the critical point from the F tables;

$$F_k , n - k - 1, 1 - \alpha$$

Where ;

k is the number of the independent variables
n is the sample size
α is the preselected significance level.

We then reject the null hyhpothesis if the computed F value exceeds the F value from the table.

Another important measure used in our analysis is the R square. This provides a quantitative measure of how well the combination of the independent variables predicts the dependent variable. R square is therefore the percentage of variation in the dependent variable that can be explained by all the independent variables in the equation. Since all the R square values are given by the computer, there is no need to go into details on how it is obtained.

4.7. Partial F -Test

We have also made use of partial F - test in this chapter. This helps us to answer many questions. These include

(a) does the variable x_1 alone significantly aid in predicting Y.

(b) does the addition of other extra variables contribute to the prediction of Y.

The test therefore allows for the elimination of variables which are of no help in predicting Y and this enables one to reduce the set of possible independent variables to a set of important predictors.

4.8. Dummy Variable Technique.

The explanatory or backgruond variables consist of a mixture of scaled continuos variables (age), dichotomous variables with some ordering between categories (education)and with no ordering between categories(eg work status and place of residence).

The categorical variables are introduced in the regression by means of dummy variables. A dummy variable is any variable in an equation that takes on finite number of values for the purpose of identifying different categories of a nominal variable (Kleinbaum and Kupper 1978). The use of dummy variables allows one to produce the same information as that obtained by distinct analytical procedures as analysis of variance and discriminant analysis. Also the use of dummy variables permits one to compare several regression equations by use of a single mutiple regression model.

4.9. Description Of The Variables Used.

We limited ourselves to exploring the connections between a child dying before reaching age 3 years and many socio-economic variables that were covered by the KCPS. A description of all the variables included in our regression is given below:

SURVE: binary dependent variable indicating whether a child survived to age 3 years(1 if died, 0 if survived).

PEDUC1: binary variable indicating period of formal education of mother(1 if completed 1-4 years, 0 if other).

PEDUC2: binary variable indicating period of formal education for mother (1 if completed 5-8years, 0 if others).

URBN: binary variable indicating urban residence for mother (1 if urban, 0 if other)

WRKW1: binary variable indicating current work status of mother(1 if currently working, 0 if other).

WRKW2: binary variable indicating work status of mother(1 if worked in the past, 0 if other).

POLYG: binary variable indicating polygamy status of mother, (1 if mother is in polygamous union, 0 if other).

EVUSE: binary variable indicating ever use of contracptives (1 if ever used at least a method, 0 if other).

MARRD: variable indicating marital status of mother (1 if married, 0 if other).

OTHERS: variable indicating marital status of mother (1 if divorced,separated or widowed, 0 if other).

MCH1: binary variable indicating whether mother visited a maternity clinic (1 if no, 0 if yes).

WRKHF: variable indicating work status of father (1 if working in farms, 0 if other).

WRKHB: variable indicating work status of father(1 if working in business, 0 if other).

V219 AGE:continous variable indicating the age of the mother.

The following categories were left out of their respective variables so as to act as reference categories:mothers who have no education, currently reside in the rural area, who have never worked, who are single, and those who have never used a contraceptive method. We also left out those whose husbands are currently not working and those who are in monogamous unions.

4.10. Discussion Of The Results.

The household level analysis is reported in tables 4.1.2 and 4.1.3. The means and standard deviations for all the variables in the regression are in table 4.1.1.

Stepwise regression was carried out in which every variable was put into the equation in a given sequence. The order of inclusion of the independent variables in the multiple linear regression was determined by the computer. Each of the additional variable was brought into the equation at a separate stage on the merits of the amount of unexplained variation on childhood mortality it accounted for. For each of the steps in the regression, the SPSS package printed an analysis of variance table giving the regression cooefficients, residual sum of squares together with associated degrees of freedom, mean squares and the F-statistics.

Table 4.1.2 presents the basic results of the multivariate analysis. There are five major equations; in the first equation, only one variable was included i.e whether a mother attended a maternity clinic or not. Equation 2 contained the variable in equation 1 and some additional variables on work status of father and marital status of mother. Equation 3 contained all the variables in equation 2 and some additional variables on maternal age and educational level. Equation 4 included additional variables on place of current residence contraceptive usage and polygamy status. Equation 5 finally included all the variables in the regression and it can be written as follows;

SURVE = 0.193 + 0.820(MCH1) + 0.129(MARRD) - 0.039(WRKHB)+ 0.083(OTHERS) - 0.004(AGE) - 0.072(HEDUC) - 0.072 (PEDUC2) - 0.057(PEDUC1) - 0.029(URBN) - 0.020(WRKW2) -0.013(EVUSE) - 0.015(POLYG) - 0.009(WRKHF) + 0.007 (WRKW1).

These results provides a fairly strong evidence that socio-economic and demographic factors have a significant effect on childhood mortality and the observed relationship are by no means small. The mothers attendence at a maternity clinic seems to be the principal variable that determines childhood mortality up to age 3 years. The factor accounts for 72 % of the variation in the dependent variable. It is important to note that when all the variables are inluded in the equation their combined effect is statistically very significant but when we consider the individual contribution, only two variables are not significant (i.e WRKHF and WRKW1).

The variables which have a positive effect on childhood mortality are; MCH1, MARRD,and OTHERS . This implies that a child born of a mother who never visited a maternity clinic has high chances of dying before reaching age three years as compared to that whose mothers visited a maternity clinic while pregnant. The results also show that children born of married mothers experience high mortality compared to those born of single mothers. This finding could be due to the fact that the majority of the respondents were married and also very few children are born outside wedlock. The children born of mothers who are either divorced, separated or widowed suffer high mortality compared to those born of single mothers.

This finding reflects the burden left to one spouse after the break-up of a family which is caused by death, separation or divorce. One can therefore conclude that once a lady is married anything that breaks the family greatly affects the survival chances of children.

Table 4.1.1 Means and Standard Deviations for Household Level Variables, 1984 (N = 6581).

VARIABLE	MEAN	SD
NEDUC*	0.3600	0.4800
PEDUC1	0.1641	0.3704
PEDUC2	0.3095	0.4623
HEDUC	0.1641	0.3704
URBN	0.1422	0.3492
RRUR*	0.8572	0.3492
WRKW1	0.1896	0.3920
WRKW2	0.1202	0.3252
WRKW3*	0.6902	0.4625
WRKHF	0.2094	0.4069
WRKHB	0.2742	0.4461
WRKHN*	0.2162	0.4117
POLYG	0.1715	0.3769
MONOG*	0.5290	0.4992
EVUSE	0.2977	0.4573
EVNON*	0.7023	0.4573
v219AGE	28.07	9.1059
SINGE*	0.2388	0.4264
MARRD	0.6915	0.4619
OTHERS	0.0697	0.2547
MCH1	0.4732	0.4993
MCH2*	0.0572	0.2323
SURVE	0.5083	0.5000

* refers to the variables not included in the regression.

Table 4.1.2 Regression of child mortality on socio-economic variables, Kenya 1984 (unstandardised coefficients).

Variable	Regression Equations 1	2	3	4	5
MCH1	0.852*	0.828*	0.0823*	0.821*	0.820*
MARRD		0.114*	0.123*	0.135*	0.129*
WRKHB		-0.049*	-0.038*	-0.035*	-0.039*
OTHERS		0.062*	0.082*	0.083*	0.083*
V219AGE			-0.004*	-0.004*	-0.004*
HEDUC			-0.073*	-0.072*	-0.072*
PEDUC2			-0.069*	-0.072*	-0.072*
PEDUC1			-0.034*	-0.036*	-0.037*
URBN				-0.028*	-0.029*
WRKW2				-0.021**	-0.020**
EVUSE				-0.013***	-0.013***
POLYG				-0.014***	-0.015***
WRKHF					-0.009
WRKW1					0.007
constant	0.105	0.466	0.184	0.193	0.193
R^2	0.724	0.732	0.736	0.737	0.737
N	6581	6581	6581	6581	6581

*** significant at 0.10 level
** significant at 0.05 level
* significant at 0.01 level

Note;
at 0.10 critical value = 2.71
at 0.05 critical value = 3.84
at 0.01 critical value = 6.64

The variables which have a negative effect on mortality are ; WRKHB,AGE,HEDUC, PEDUC1, PEDUC2, URBAN, WRKW2, EVUSE and POLYG. Several conclusions can be drawn from this findings. A child whose father is working in his or other peoples business (WRKHB) has high chance of survival as compared to that whose father is not working.The variable "business" was defined in the KCPS as any work other than working in the farm. These

results imply that father who works can afford to maintain his family with basic necessities like; a balanced diet, good shelter, sanitation and clothing.Most fathers who work in business also reside in the urban areas and therefore can afford good medical care for their children as compared to their rural counterparts. Ceteris paribus a father who works earns more income and hence can maintain his family better.

The age of the mother is also an important determinant of mortality. The results show that the lower the age of the mother, the higher the mortality.This could be so because young mothers experience high risks of infant mortality because most of the births are of first order and hence mothers are not physiologically ready.

Mortality is also seen to be low as the mother attains some level of formal education as compared to those who have no education. Table 4.1.2 shows that the probability of a child surviving up to age 3 years increases as the maternal years of schooling also increases. This finding is in line with what other scholars have found in Kenya (Anker and Knowles 1979, Mott 1979, Muganzi 1981, 1984) and other developing countries (eg Caldwell 1984).

Children whose mothers reside in urban areas have a high chance of surviving up to age 3 years as compared to those whose mothers reside in the rural areas.This finding is also consistent with other studies and it supports the theory that urban dwellers enjoy alot of socio-infrastructural ammenities

which are commonly missing in the rural areas.

The children whose mothers have at least used a contraceptive method (EVUSE)have high chances of survival as compared to those whose mother have never used any method. This could be due to the fact that contraceptors are able to regulate their child spacing. The KCPS data also has revealed that contaceptors have low total fertilty and this can reduce mortality.

An interesting finding concerns the variable, work status of mother. The results of the regression show that the children whose mothers worked in the past (WRKW2) have high chances of survival as compared to those whose mothers have never worked. It is also suprising that the variable currently working (WRKW1) for mothers is not significant at all levels. This could be due to some errors in data collection, it is possible that the respondents never clearly understood the concept of "work". It could also be due to type of work-mostly agricultural which does not bring in worthy income.

Table 4.1.3 presents the basic results for the second regression analysis. In this regression, the variable MCH1 was deliberatly left out so as to see the effect of other variables on child survival when MCH1 is not included. We also changed the reference categories for various variables so as to see whether there is any difference in their net effect on the dependent variable. The variables that were now left out of the regression as reference categories are;EVUSE, URBN, POLYG, PEDUC1, WRKHF, and WRKW2.

Four equations were used to describe our findings; equation 1 included women who were married (MARRD), their age (AGE) and whether they were divorced, separated or widowed (OTHERS). Equation 2 included additional variables on rural residence, contraceptive use, monogamy education and work status of father. Equation 3 included additional variables on work status of mother. Finally the last equation contained all the variables that were in the regression. The last equation can be written as follows;

SURVE = 0.574 + 0.492(MARRD) - 0.015(AGE) + 0.441(OTHERS) +0.109(EVNON) + 0.079(RRUR) + 0.078(MONOG) - 0.071 (HEDUC) - 0.015(WRKHB) - 0.010(WRKW3) +0.025(NEDUC) -0.020(PEDUC2) + 0.014(WRKHN) + 0.007(WRKW1)

From table 4.1.3 it is evident that the exclusion of MCH1 from the regression affects the results . All the variables in the regression now accounts for only 19.3 per cent of the variation of the dependent variableas compared to the 72 percent in the first regression. In the second place, very many variables which were statistically significant in the first regression are now no longer significant when MCH1 is left out. This includes; work status of father, work status of mother, and some level of formal education for mother. These results in table 4.1.3 are however consistent with those in table 4.1.2 as far as the direction of the effect of the predictor variables on dependent variable is concerned. Age of the mother and the high level of formal education are the variables which have a significant negative effect on mortality whereas non-use of of contraceptives, married, rural residence and monogamy are positively significant.

Table 4.1.3: Regression of child mortality on socio-economic variables, Kenya 1984 (unstandardised coefficients).

Variable	Regression Equations 1	2	3	4
MARRD	0.575*	0.499*	0.502*	0.492*
V219AGE	-0.015*	-0.016*	-0.015*	-0.015*
OTHERS	0.474*	0.444*	0.444*	0.441*
EVNON		0.112*	0.107*	0.109*
RRUR		0.077*	0.079*	0.079*
MONOG		0.078*	0.078*	0.078*
HEDUC		-0.052*	-0.057*	-0.071*
WRKHB		-0.021	-0.013	-0.015
WRKW3			0.014	-0.010
NEDUC				0.025
PEDUC2				-0.020
WRKHN				0.014
WRKW1				0.007
constant	0.493	0.554	0.557	0.574
R^2	0.134	0.191	0.193	0.193
N	6851	6851	6851	6851

*** significant at 0.10 level
** significant at 0.05 level
* significant at 0.01 level

Note;
at 0.10 critical value = 2.71
at 0.05 critical value = 3.84
at 0.01 critical value = 6.64

4.11. Chapter Summary.

The results in this chapter have proved to be very consistent with our priori expectations and many of the observed relationships are statistically significant. The probability of a child dying before attaining age 3 years is significantly influenced by a number of socio-economic variables. 75 percent of the variation in childhood mortality can be explained by the joint effect of all the socio-economic factors

considered in this study. The direction of the effect is however different. Mothers who either, have higher education, reside in the urban areas, who have used contraceptives or who attended maternity clinics experience lower child mortality risks. Attendance at maternity clinics is however the most important variable that determines child survival.

CHAPTER FIVE.

SUMMARY AND POLICY IMPLICATIONS.

5.0 Introduction.

The purpose of the study was threefold. First, we have applied the Coale-Trussell technique and estimated the infant and child mortality levels for all the differentials that were covered by the Kenya contraceptive prevalence survey. This includes the construction of the life tables by differentials and hence obtaining the probability of dying between age 0 and 1, the probability of dying between age 1 and 5 years and finally the life expectancy at birth. Second, we have estimated mortality levels for the adminstrative regions that regions that were covered by the KCPS sample. Lastly we have relied on the linear multiple regression analysis to test the separate effect of each of the independent socio-economic variables on childhood mortality in Kenya.

Even though data on mortality is far from complete, th following variables seem particularly important and were picked for the study; work status of mother, work status of father to act as a proxy for income, education of mother, marital status, polygamy status ,and mothers use of contraceptives. The study has also considered urban versus rural place of residence and a group of other variables including; age of mother, ethnicity, religion and geograghical location.

However, the study is beset by a number of problems some of which cannot escape mentioning. The major problem is the unreliability of mortality data . This is because the KCPS was originally meant to collect data on contraceptive use. We therefore find ourselves in a situation where some relevant information that we could have preferred to use is missing. . For example we would have liked to use data on birth histories, date of death, cause of death, children ever born by duration of marriage just to mention afew. However, studies elsewhere have shown that the contraceptive prevalence surveys can yield good mortality estimates (Cross and Sullivan 1983). The present study therefore yields results that can be used to make tentative conclusions.

5.1. Major Findings.

Chapter 2 shows that there exists socio-economic differentials in childhood mortality in Kenya. These differentials imply the co-existence of population groups enjoying radically different mortality conditions. These differences are as large as those between the blocks of developed and less developed countries. Quite striking mortality differences are observed for children of mothers with different educational levels, especially when a mother has received no education, when compared to that who has received at least 9 years of formal schooling.It is evident that a child whose mother has 9 or more years of schooling is likely to live 20 more years compared to that whose mother has no formal education.

Another striking difference is by ethnic origin of the respondents. The results here show that there is a marked difference in mortality along ethnic groups, which probably reflects regional imbalances in socio-economic and cultural development. This is due to the fact that every ethnic group occupies a given geographical area that also happens to have different ecological conditions. The kikuyu of central province have a life expectancy at birth of 63 years whereas the Luo of Nyanza province and the Mijikenda from Coastal region have life expectancies of 42 and 48 years respectively. Other variations which are notable include rural versus urban place of residence, religious identification, work status of parents, polygamy status and contraceptive use.

Chapter three also shows that there exists mortality variations along regional place of residence i.e districts and provinces. Central province has the lowest mortality experience whereas Nyanza and Coast provinces have very high mortality experience .These differences emphasize regional variations in epidemiological structure, enviromental conditions, ethnic composition and cultural beliefs. The difference therefore call for different approaches in curbing mortality rates.

So far, chapters 2 and 3 have shown that there exists socio-economic differentials in mortality. Obviously, many factors account for the extremely high mortality of lower social groups ranging from mulnutrition, inadequate preventive measures , inaccessible health facilities, illiteracy and low income just to mention afew. That all these variables are

involved does not imply that all are equally important. Chapter four therefore examines the variables that are most significant determinants of mortality. Basing our concern on the literature review, several hypotheses were formulated in chapter one.
In order to test these hypotheses, household level information collected from 6581 respondents was used. The results showed that the observed relationship between all the socio-economic variables in the regression are statistically significant. This however is so when the variables are combined together. This also shows that the most single determinant of mortality up to age 3 years is attendance of maternity clinics by pregnant mothers. Other variables that also reduce mortality are; urban residence for mother, higher educational level for the mother, contraception for the mother, monogamous unions and having a father who works at least in business other than farming.

5.2. Recommendations For Policy Making.

Planning for mortality reduction requires a very clear understanding of the complex cause effect interactions between on the one hand mortality and on the other hand, broadbased socio-economic development and specific interventions in such areas as health, nutrition, sanitation and education (UN 1984).

The present study has shown that infant and child mortality in Kenya is a result of mutually reinforcing socio-economic and demographic variables such as maternal education, place of residence, work status of father, enviromental conditions, age of the mother and utilization of maternity clinics. It will therefore be illusory to attempt to reduce mortality levels in Kenya through a single intervention. The present study therefore recommends that intervention on all the components of basic needs can lead to the achievement of good health and a low level of mortality required. Special attention should be given the following areas;

(i) Education: Since it has been demonstrated that education (particularly female education) is strongly associated wit low mortality levels, a high priority on compulsory free education up to secondary level i.e 9+ years should be considered. A supplementary effort should also be made to extend adult female education programmes including basic literacy, good hygiene and nutritional practices. It should however be pointed out that improvement in education should not be overemphasized because studies in Costa Rica show that relationship between education and mortality has become partly overshadowed as time has gone by (Rosero-Bixby 1986).

(ii) Health: Improvement of health and reduction of mortality is a central goal of development since a long and healthy life is a single greatest gift an individual can have,(UN 1986). The present study has shown that the lake region

and the coastal belt have high mortality compared to other areas.This is so due to endemicity of malaria which is prevalent in those areas. The rural areas have high levels of mortality compared to urban areas because the rural areas have less health centres, poor sanitary conditions yet the majority of the population lives in rural areas. It is therefore our recommendation that special health interventions be made in the areas of need. This should include vaccination and immunization against the killer diseases. The Lake Victoria region and the coastal belt which have high malaria preference should be well served with many health centres and anti-malarial drugs. The government should also encourage the teaching of primary health care to the rural population.

(iii) Rural-Urban disparities: The study has shown that there exists wide variation on mortality level between the rural and urban occupants. This can be discouraged by promoting equal development in all areas.The development plan should seek to reach the rural areas where the majority of of the people live. Both the housing and transport sector should be improved in the rural areas.

(iv) MCH-FP program: The study has shown that children whose mothers attended maternity clinics stand a high chance of surviving up to age 3 years compared to those whose mother never attended any clinic. It has also been shown that children whose mothers have used a contraceptive method

have high chances of survival compared to those whose mothers have never used any contraception. It is therefore necessary to introduce more MCH-FP clinics in all areas. The introduction of the MCH-FP clinics has proved to be effective in reduction of mortality levels elsewhere(Chen, 1983, Trussell and Pebley 1984).

(v) Employment: The study showed that fathers who work out-the farms reduce the infant mortality rates in their households. The creation of gainful employment policy for the population will help in reducing mortality levels because it will increase family income and hence more food entitlements. More income will also make most families to afford good medical attention .

5.4. Recommendations For Further Research.

In this section we make several recommendations on areas in need of further research. This list is not exhaustive because we are aware of the problems of obtaining data.

(i) As pointed early in literature review, the relationship between work status of mother and child mortality is poorly understood. It seems that some kinds of jobs are negatively related to child mortality whereas others are positively related. Our present study however failed to prove any significant result because of poor definition of the concept "work". A study is therefore necessary to look at the effect of status of women and mortality in Kenya.

(ii) Because female education has a strong empirical relationship to childhood mortality in Kenya, studies that try to clarify why womens education does affect mortality risks would be useful. There are several reasons why schooling influences mortality and studies should indeed help to sort out which of the reasons are important in particular settings.

(iii) Because of wide regional variations in mortality levels in Kenya, researchers should apply different mortality models for some areas rather than rely on the "North" model alone.

(iv) Future studies should also now concentrate on relatively few communities or aggregates that share anumber of factors as culture, religion and ethnic composition. This will make such studies to be intensive and more detailed than the present national studies.

(v) Studies should also be carried in particular areas where the government has initiated some particular policies aimed at reducing mortality. The aim of such studies is to evaluate the success and failure of the policies. For example the Kenyan Government introduced the training and use of traditional birth attendants in some parts of the country. This project should be evaluated to establish whether it has helped in bringing down

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