EFFECT OF MATERNAL EDUCATION ON INFANT AND CHILD MORTALITY IN RURAL KENYA

BY

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Declaration

I declare that this is my original work and that to the best of my knowledge, it has not been presented for a degree in any university.

Signature. ^^^^fzTTTf

KIPTUI MARK

This project has been submitted for examination with our approval as University supervisors

Signature............................

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Signature............................

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Dedication

This project is dedicated to my wife Rael Kemboi and my son Joshua Kandie Kemboi who encouraged me and remained patient for the entire two years of my masters' degree course. This is also extended to my sisters and brother David and my parents.

Acknowledgement

I wish to register my gratitude to the Director; population studies and research institute (PSRI) University of Nairobi Prof. A.B.C OCHOLLA-AYAYO for providing us with a conducive learning environment and especially his great efforts in securing for us the computers for our data analysis and providing deeper insights on the research methodology of social sciences.

Special thanks also go to my two supervisors: Dr L. Ikamari and Prof. A.B.C Ocholla Ayayo, without whose support, guidance and constructive comments, this study could not have been a success.

I also acknowledge the support of the entire P.S.R.I staff and Mr Lamba and last but not least my colleagues especially Mr Francis Obare for his support during the data analysis.

Abstract

As was indicated in chapter one, this study not only examines the effects of maternal education on infant and child mortality but also compares the effects of maternal education on infants and child mortality in the high (Nyanza/Western) and low (Central/Rift Valley) mortality regions of rural Kenya This work is divided into six chapters.

Chapter one looks at the introduction to the study, statement of the problem, research questions, objectives, scope and limitation of the study.

Chapter two opens by looking at the literature review, conceptual and operational frameworks on the determinants of infants and child mortality, conceptual and operational hypotheses, definition of key concepts and measurement of the variables.

Chapter three examines the methodology employed in this study; here methods of data collection, source of data, survey design, sampling, data quality, and methods of data analysis are discussed.

Chapter four looks at preliminary data tests in terms of frequencies, and cross-tabulations. This permits proper recoding of variables and simple tests of association, if any between each independent variable and the risk of infant and child mortality.

Chapter five looks at the actual data analysis. Here the results of the bivariate and multivariate logistic regression for both rural Kenya and the high and low mortality regions are presented and discussed.

Finally, chapter six looks at the summary of the findings of the study, conclusion and gives some recommendations for policy makers and for further research together with the references.

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CHAPTER ONE: 1.0 GENERAL INTRODUCTION

This study examines the effects of maternal education on infant and child mortality in rural Kenya using the 1998 Kenya demographic and health Survey data. Rural Kenya here refers to the over sampled districts of Bungoma. Kakamega. Kericho, Kilifi, Kisii. Machakos. Meru. Murang'a, Nakuru, Nandi, Nyeri. Siaya. South Nyanza, Taita-Taveta. and Uasin Gishu.

The study also compares the effects of maternal education on infant and child mortality in the high and low mortality regions of Nyanza/Western and Central/Rift Valley Provinces of Kenya respectively. Both the 1993 and 1998 K.D.H.S data show that the above two regions have the highest and lowest infant and child mortality levels. For instance in 1993 the levels of infant mortality were 128 and 64 per thousand live births for Nyanza and Western and 3 I and 45 for Central and Rift Valley Provinces respectively. During the same period, the levels of child mortality in the two regions were 68 and 49 per thousand live births for Nyanza and Western and II and 17 for Central and Rift Valley Provinces. Such extreme cases provide an ideal demographic profile for the study of the effects of maternal education on infant and child mortality.

Various studies have shown that, of all the socio-economic, environmental, and cultural determinants of infant and child mortality, maternal education exerts the strongest influence on infant and child mortality (Caldwell et al 1979). The mother, unlike other members of the family such as the father and other relations is closer physically and biologically to the infants and the children. This categorically places the mother, unlike anybody else at a better position to influence the infant's and the child's survival status.

The mother also spends considerable amount of time with the infant/ child especially in rural areas and thus her attributes which may be largely a product of education directly influences the development of the infant or child in question. Infant mortality, that is mortality during the first year of life, is an important indicator for describing the overall social and economic well being of a country and hence the living standards of its people. Infant and child mortality has also been a topic of interest to population researchers because of its apparent relationship with fertility and indirectly with the acceptance of modern contraception (Kabir, m et al, 1993).

Besides reflecting a country's social and economic development, infant mortality and to some extent child mortality have far reaching social, economic, and demographic consequences, not only for the concerned individuals and families but also the country at large. This is so because the death of an infant or a child accelerates population growth through increased fertility as people try to replace the death ones (Replacement insurance hypothesis). Similarly, the death of an infant or a child leads to great/intense sorry and grieve, let alone the substantial material and financial resources lost in trying to save such lives.

Thus infant and child mortality represents one of the most costly human experiences and every effort should be made to lower it. Such efforts should include poverty reduction in all its dimensions, expanded schooling particularly for girls who are tomorrow's mothers and efforts to enhance women's abilities to care for their families especially their children, should be enhanced too.

1.1 STATEMENT OF THE PROBLEM

This study examines the effects of maternal education on infant and child mortality in rural Kenya. The study also compares the effects of maternal education on infant and child mortality in the high and low mortality regions of Nyanza/Western and Central/Rift valley provinces of Kenya respectively.

Although studies worldwide, on the determinants of infant and child mortality show that socio-economic. environmental, demographic and cultural factors are important. Caldwell and others have advanced maternal education as a key factor in infant and child mortality (Caldwell et al. 1989).

Caldwell argues that education makes a mother less fatalistic about illness as it promotes belief in modern medicine and hygienic practices such as hand washing before and after meals, and after visiting the toilet. Similarly education encourages maternal use of modern health services and facilities and increases her ability to manipulate the world, especially external conditions, including increased power to play a major role in decision-making especially on her reproductive health and this may limit her family size and even increase her birth interval. The sum effect of all these drives is enhanced infant and child survival and hence reduced infant and child mortality (Caldwell. 1979).

Writing on the effects of maternal education on infant and child mortality, Mcdonald et al (1981) argues that maternal education brings a new system in which children and mothers are given a higher priority in terms of care and consumption than in the traditional society. Linderbaum et al. (1985) asserts that the only difference between educated and uneducated mothers was that educated mothers emphasised on cleanness, an attitude and practice, which they acquired while in school.

Elsewhere Ware (1984) argues that higher female education leads to a woman's better ability to make her own decisions and to understand the importance of hygiene. Ware further asserts that the education of the mother may also be a proxy for the possession and control of resources. Maternal possession and control of the resources simultaneously implies more say in decision-making especially on reproductive health issues and enhanced childcare practices.

Writing on the same issue Das Gupta (1990). observed that education improves a mother's basic child-care skills and her domestic management of illness, and this leads to better preventive care and enhanced and sustained use of medical services, both of which are associated with enhanced infant and child survival. Cleland (1990) argues that maternal education enhances knowledge about effective ways to prevent, recognise, and treat childhood diseases.

Estimates from several studies show that infant and child mortality have been declining in Kenya since 1950's except for the recent upsurge and that both infant and child mortality vary by socio-economic conditions. Infant mortality declined from 184 per 1000 live births in 1984 to about 60 **per** 1000 live births in 1989. (Brass et 1993).

As lkamari,(1996). in his detailed study on the factors affecting child survival in Kenya, puts it. maternal education is a very important determinant of both infant and child mortality in Kenya. Indeed much of the decline in infant and Child mortality in Kenya, has been attributed largely to the increasing levels of maternal education (Kibet. 1982. Mosley, 1989).

Mosley. (1989) argues that improvements in maternal education accounted for 86 per cent of the decline in child mortality between 1962 and 1979 and between the provinces of Kenya, and that the rest of the decline was explained by improvements in household incomes

Other factors associated with infant and child mortality includes maternal age at first birth, and birth interval. K'oyugi (1992) found that young maternal age at birth, first and six plus parities and multiple births are associated with infant and child mortality. Other significant factors in his study were better toilet facilities, house floor material, and less contaminated water.

Elsewhere Ikamari (1996) found that, the use of modern contraception, increased maternal age at birth, household possession of a toilet facility and piped water supply all had statistically beneficial effect on infant and child survival.

Eshetu (1998) found that maternal education, source of drinking water and possession of a toilet facility were all strong predictors of infant and child mortality.

Although the effect of maternal education on infant and child mortality in Kenya has been highlighted in the above studies, it appears that it has not been sufficiently investigated especially in rural Kenya. Thus the aim of this study is to make a contribution by examining the effects of maternal education on infant and child mortality in rural Kenya using 1998 KDHS data set.

1.2 DEMOGRAPHIC AND ECONOMIC PROFILE

Both the socio-economic and demographic conditions of any country have a strong bearing on the mortality experiences of such a country. Similarly the socio-economic and demographic profile influences people's abilities to educate their children especially the girl child. Kenya's demographic profile shows clear improvements in all demographic indicators from 1948 through 1950s. 1960s and 1970. From 1970s the trends seemed to have stagnated and by mid 1980s the demographic situation worsened.

Evidence from various censuses indicates that from mid 1980s both infant and child mortality rates exhibit a slow steady decline dirough the late 1980s after which the rates plateau and then begin to rise. These increases become rather pronounced during the period between the early and mid 1990s and have occurred at all age groups. While neonatal mortality has not changed substantially, post neonatal and child mortality have both risen by more than one third during the period between the mid 1980s and the mid 1990s. I luis the turning point was mid 1980s, that is around 1985.

Both the I 993 and 1998 KDHS data provide evidence of a worsening mortality situation in the 1990s. The results from census volumes and the central bureau of statistics indicate that, the infant mortality rate stood at 184 per thousand live births in 1948. dropping to 174 in 1962. This decline continued so that by 1969 the infant mortality rate was 119 per thousand live births. Thereafter it dropped drastically to 84 per thousand live births. The decline finally reached its lowest level of 66 per thousand live births in 1989 then it rose to74 in 1999.

Economically, Kenya has had mixed performance since 1963. Until 1973. the mean gross domestic product (GDP) growth was 6.5 per cent per annum. There was low inflation, high job creation and a stable balance of payments during this period. Starting from 1973 to 1980, the country's economy was upset by three major shocks namely a sharp rise in oil prices in 1973 which created an internal and external economic imbalances.

Four years later (1977-1978) tea and coffee prices rose and this improved greatly the balance of payments. It also created internal imbalances. In 1979. oil prices rose again. Despite the above set backs Kenya enjoyed a Gross Domestic Product (GDP) of 5.2 per annum. However, the period 1980-1985 was characteris^ed by slow growth in GDP and this period saw a drop in GDP from 5.2 per annum to 2.5 per annum. The drop in GDP was due to the high cost of oil. global recession in 1980-1982 and the severe drought of 1984, which saw massive resources being diverted to meet basic needs such as food purchasing and negotiations with donor agencies and governments for food assistance. By 1990 the GDP had fallen to 4.3 per annum and it dropped further to 2.2 per annum in 1991.This steady declining trend continued so that by 1993 the GDP was as low as 0.4 per annum. The adverse effects of such a trend in economic performance forced the government in 1993 to introduce more and far reaching structural reforms, including removal of all import licensing and removal of foreign exchange controls.

These reforms bore fruit, with the GDP growing at 3.0 percent. However, the upward trend in GDP was not sustained for long and the growth slowed to 4.8 percent in 1996 and declined substantially to 1.2 percent in 1997.

In the field of education, available evidence shows that. Kenya had recorded a steady and increasing enrolment in both primary and secondary education from 1963 onwards. This trend continued until the late I980's when the enrolment stagnated momentarily and began a downward trend. For instance, between 1993 and 1998 the percentage of females aged 15-19 who had completed primary school declined from 56 percent to 40 percent .For males aged 15-19 over the same period, the percentage declined from 52 percent to 38 percent (KDHS, 1993 and 1998). These results reflect clear disinvestments in education in Kenya. This may largely be attributed to poverty brought about by declining economic performance and the alarming high levels of unemployment with its demotivating effects.

Research Questions.

1. Is infant and child mortality still affected by maternal education in rural Kenya in the recent past?

2. Are the effects of maternal education on infant and child mortality in the high mortality regime (Nyanza/Western) and low mortality regime (Central/Rift Valley) provinces similar or not in the recent past?

1.4.0 STUDY OBJECTIVES

1.4.1 GENERAL OBJECTIVES

This study examines not only the effects of maternal education on infant and child mortality in rural Kenya hut also compares the effects of maternal education on infant and child mortality in the high (Nyanza/Western) and low (Central /Rift valley) mortality regions of rural Kenya.

1.4.2 SPECIFIC OBJECTIVES: -

This study:

1 Examines the effects of maternal education on infant and child mortality in rural Kenya.

2 Compares the effects of maternal education on infant and child mortality in the high (Nyanza/Western) and the low (Central/Rift valley) mortality regions.

1.5 Scope and Limitation

This study examines the effects of maternal education on infant and child mortality in rural Kenya. It also compares the effects of maternal education on infant and child mortality in the high and low mortality regions of Nyanza/Western and Central/Rift valley provinces of rural Kenya.

Specifically rural Kenya as used in this study covers the following over-sampled districts; Bungoma. Kakamega. Kericho. Kilifi, Kisii. Machakos. Meru. Murang'a, Nakuru. Nandi. Nyeri. Siaya. South Nyanza. Taita-taveta and Uasin Gishu. Similarly the districts covered in this study under the low mortality region of central/Rift valley province includes. Murang'a. Nyeri.

Kericho, Nakuru, Nandi. and Uasin- Gislui rural whereas those covered under the high mortality region of Nyanza/Western provinces are; South Nyanza, Bungoma, Kakamega. Siaya. and Kisii rural.

Data from women of reproductive age 15-49 years and survival status of children under live years of age, categorised into infants, that is those under one year and children, that is those above one but under or below five years of age was used in this study.

Due to time and financial constraints, this study employed secondary data from the fifteen over-sampled districts in the 1998 KDHS survey. The use of secondary data such as the 1998 KDHS data, having been collected for other purposes other than this study have the limitation of only giving data which at most approximates the study's needs. Thus, not all the variables needed in I his study were captured, for instance the possession of livestock which is a good variable for measuring household wealth in rural areas was not captured and hence a limitation of this study. Similarly in any study based on ^sample, both sampling and non-sampling errors are almost unavoidable so are omissions and misreporting of births and deaths.

Thus for effective study appropriate manipulation and measurement on .the data was done where it was found necessary so as to answer the research questions. For example to capture the effect of environmental conditions, house floor material was used as a proxy. Similarly, source of drinking water was used as a proxy to capture the level of infant's children's exposure to pathogens. Thus an appropriate proxy was constructed where necessary for each variable and according to available data.

1.6 STUDY JUSTIFICATION

The knowledge of the determinants of infant and child mortality is a pre-condition for the formulation and implementation of appropriate population policies to lower infant and child mortality. Infant and child mortality besides it's adverse effects on a country's socio-economic development has an indirect bearing or effect on fertility.

In Kenya it's the government policy to lower infant and child mortality in particular and mortality in general. Thus all efforts geared to the understanding and the ultimate reduction of mortality in general and especially infant and child mortality is a welcome not only because mortality is undesirable but because it is in line with government policies.

As Mott (1979) puts it "the death of an infant or a child represents one of the most costly human experiences". This is because the death of an infant relative to that of an adult is a source of great sorry and grieve. Demographically the death of an infant or a child represents the loss of not only one person but of the many descendants who could be. traced to him/her had he/she lived (Bogue. 1969). Similarly the death of an infant or a child accelerates /promotes the desire for another child (replacement insurance hypothesis) which increases the risk of infant, child, and maternal mortality as closer birth intervals are detrimental to the child and the mother.

High levels of infant and child mortality are simultaneously a reflection and a product of poverty. That is, a poor population can not only fail to afford medical services and better nutrition but are also unable to afford better shelter and such necessities as clean water and better waste disposal systems such as toilets and sewages. Still the huge financial and other material resources used in the treatment of infants and children imply serious drain of people's resources and where infant and child mortality levels are high such medical expenses drive people to poverty. Since infants and children form the base of any population high levels of infant and child mortality poses a serious threat to future survival as both tomorrow's productive and reproductive segment of the population is threatened. That is tomorrow's labour force and parents are today's infants and children. Similarly infant and child mortality is associated with high fertility. This is because high infant and child mortality rates activates people's desire to have more children to replace the dead ones. Thus increased infant and child mortality is related to increased fertility, which in turn constrains socio-economic development.

Thus the death of an infant unlike that of an adult has far-reaching social, economic and demographic consequences or implications not only for the concerned families but also the nation at large. Had it lived it would very probably have survived to go to school, enter the labour force, marry and bear children not to mention the huge financial resources lost in trying to save such lives. Thus this study examines the effect of maternal education on infant and child mortality in rural Kenya, on the assumption that knowledge of the determinants of infant and child mortality is a pre-requisite for the formulation and implementation of policies aimed at reducing infant and child mortality.

2.0 CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The long, and worldwide sustained interest in infant and child mortality in general and infant mortality in particular, stems from the fact that it is not only an important indicator for describing the overall social and economic well-being of a country but also because of its apparent relationship with fertility and indirectly with the acceptance of modern contraception.

Although infant and child mortality is associated with the level of socio-economic development globally. Caldwell and others have pointed to one specific aspect of socio-economic development: the education of the mother or women, as a key factor in explaining decline in child mortality. Caldwell and others suggested, awareness of danger, quickness of identification of illness and consequent action, the readiness to change ineffective actions, and the persistence of efforts until success against mortality has been achieved as important in explaining the low rate of mortality in Srilanka inspite of low income and low per capita expenditure on health care (Caldwell et al 1989). Since fluctuations in the infant mortality index reflects differences in the level of living, (Zopfe. 1984). the trends and differentials iiynfant mortality is a function of a country's or region's level of social and economic development. However, the socio-economic determinants of infant and child mortality may directly or operate through proximate determinants to influence the levels of infant and child mortality in any given region at a given time or period.

As Ominde puts it, "Sub-Saharan African countries are rightly concentrating on reduction of mortality through improvements of health conditions, nutrition, housing, increasing educational opportunities, especially for women, development of skills and raising productivity. Whereas the above factors may largely explains infant and child mortality decline in the Sub-Saharan African countries, maternal education has been shown to be a powerful leading factor in the infant and child mortality reduction. Mott, (1979) argues that better educated women, everything else being equal are more likely to have their children survive. When improvement in overall health services are factored in. substantial reduction in infant and child mortality can be realised. Linderbaum et al (1985) observed that the only feature explaining maternal education - infant and child mortality link was a greater emphasis by educated mothers on cleanliness unlike uneducated mothers. Educated mother's dwellings were cleaner, their children are spotless and they prefer to wash with private tank water or tube at home rather than using public canals and rivers.

This divergence was derived from primary school experience, which introduced children to new ideas of cleanliness. Such ideas persisted into adult lite, without a conscious understanding of their health implications. Indeed it has been established that the incidence of infection can be reduced, substantially by simple hygienic practices such as hand washing before and after meals and after visiting the toilets (Khan 1982. Stanton and Shenmnes, 1987). The health benefits of maternal education on infant and child mortality derive mainly from increased ability of educated women to manipulate their environments to favour child survival. This is supported by the finding that the incidence of deaths from endogenous causes, such as pre-maturity and congenital defects, varies little by the education of the mother, whereas mortality from infectious diseases, accidents and other exogenous causes vaiy widely. (Nam et al. 1987. 1989). As a matter of fact, social medicine is based on the premise that, examination of individual subjects should not be separated from the examination of the environments in which they exist, that the social, economic, and cultural factors which make up the environment, play an important, perhaps a paramount role, in determining disease incidence, and ultimately infant and child mortality in particular and mortality in general (Helmut and Dolhain, 1982).

Community values, customs and practices, which can be altered by education in general and maternal education in particularly, impacts positively or negatively on the implementation of health programmes, hence culture plays a crucial role in influencing infant and child mortality risks. Health practices and health ideas penetrate deeply into the domain of politics, philosophy, religion, etiquette, cosmology and kinship (Helmut and Dohain. 1982).

Maternal education cuts across and penetrates through all the external forces or influences, which affects infant and child mortality and indirectly facilitates maturation of the mother through its influence on age at first birth and hence birth. Indeed, il has been argued that maternal education is a thread running throughout the whole web/pattern of external factors. Education is purchasable and by securing more income, it improves the communication of knowledge and ideology required for rational judgement founded upon an understanding of cause and effect relationship. Similarly education affects the mode of personal behaviour. This is the whole basis of health education programmes (Helmut and Dolhain. 1982).

Boss and Shapiro (1982). in their research on the effects of maternal education on infant and child mortality in the United States in the mid 1970s, found that maternal education is significantly related to post-neonatal mortality, net of race. age. birth order, and prior foetal death, but not to neonatal mortality. A detailed study in the Philippines by Cebu group (1988) show that the beneficial effect of better hygiene practiced by educated mothers on diarrhoeal morbidity is partly offset by earlier weaning. They estimated that an increase of one year in maternal schooling is associated with a nine per cent improvement in excreta disposal, which in turn reduces diarrhoeal morbidity among six-month-old infants by 3.8 percent.

I lowever. the one year increase in schooling is also associated with a five per cent decrease in the probability of breast-feeding, which is estimated to raise the incidence of diarrhoea by two per cent. Thus the existence of such counter railing influences might well account for the variety of results concerning maternal education and morbidity and by extension childhood mortality. Despite the mixed results, the inverse relationship/association between maternal education and child mortality has been found in all the major regions of the world.

I lobe raft (1985), writing on the demographic determinants of infant and early child mortality observes that, closer birth intervals increases the risk of infant and child mortality whereas, widely spaced infants and children reduces the probability of infant and child mortality. Whereas there was an excess neonatal mortality for first births. Hobcraft. against expectation, found no clear evidence of excess mortality for children of birth orders 4-6, nor even for those of order seven or higher, once other factors in the regression model had been controlled. This suggests that the mortality associated with births of higher orders may be predominantly caused by other factors such as spacing patterns and education of the mother.

Hobcraft found that infant and child mortality was higher for teenage mothers but saw no evidence ot increased risks for children born to older mothers, even mothers aged 35 years and over. Maternal education has been seen as a factor in infant and child mortality worldwide. Analysis of world fertility survey (W.F.S) indicate/show that children of mothers with no formal education faced up to twice the risk of death than children of mothers with 7+ years of education. Evidence from comparative analysis of eleven countries using DHS (Dicego and Boerma, 1991) also shows large educational differentials in infant and child mortality. These differentials are greater in post-neonatal than in neonatal period. This may indicate that social and environmental factors play an important role in influencing child mortality whereas demographic or biological factors dominate infant mortality.

Whereas maternal education may capture income or household wealth, maternal education has been shown to have an independent effect on child mortality, working through behavioural factors in form of improved child-care practices (Caldwell. 1979). Caldwell argues that educated mothers are less fatalistic, break away from adverse traditional practices such as female genital mutilation and early forced marriages and adopt new child care behaviour and that there is a change in the traditional balance of family relations in a family in which the mother is educated. This change leads to child-centred families.

Shutz (1984) argues that, education increases the productivity of health inputs that is, educated mothers may know how to boil water in order to kill water borne pathogens. Education may also reduce costs of information about optimal use of health inputs and may increase family income.

Several studies in Kenya have highlighted the effects of maternal education on infant and child mortality. (Ankar and Knowles, 1983. Kichamu. 1986, Ondimu. 1987. Mosley. 1989, Jada. 1992. K'Oyugi. 1992 and Ikamari. 1996). The results of these studies show that whereas infant and child mortality decline may be attributed to socio-economic development, maternal education has been largely responsible for the observable decline in infant and child mortality. Given that education equips women with knowledge and skills necessary for raising healthy children. (Caldwell. 1989. Rosenwieg and Shutz. 1982). maternal education may be a cheap suitable substitute for services lhat provide knowledge, skills and a health environment for raising healthy children.

Mosley (1983) showed that the level of maternal education and household income in the rural areas of Kenya are strongly associated with declining child mortality. Indeed, as Ikamari puts it. "maternal education is a very important determinant of both infant and child mortality in Kenya (Ikamari, 1996). The study found that infants and children of educated mothers have lower risks of death than those of uneducated mothers.

The observed infant and child mortality decline in Kenya, except for the recent upsurge, has been attributed to the increasing level of education, especially maternal education. (Kibet. 1982. Mosley. I(>89). For instance. Mosley (1989) advanced the theory that improvements in maternal education accounted for 86 per cent of the decline in child mortality between i 962 and 1979 and between the provinces of Kenya and that the rest of the decline was explained by improvements in household incomes.

K'Ovugi (1992). writing on the impact of household and community level environmental factors on infant and child mortality in rural Kenya, found that, maternal age at birth, first and six plus parities, multiple births, better toilet facilities, house-tloor material and less contaminated water were statistically and significantly associated with infant and child mortality.

Elsewhere, Eshetu. (1998) found maternal education, source of drinking water and possession of a toiiet as strong predictors of infant and child mortality. One can argue therefore, that maternal education promotes adoption of healthful behaviours and greater efficacy of these behaviours (Mosley and Chen 1984). Better-educated mothers also tend to adopt healthier reproductive patterns such as few and well spaced children. This simultaneously promotes increased resources and mother's body maturation before the next birth. Thus, education simultaneously changes a mother's worldview and attitudes hence behaviour in favour of modern health care practices and through increased chances of employment provides financial and hence material resources to effect the drives of that changed behaviour.

Therefore maternal education affects infant and child mortality independently and through other proximate determinants.

2.1 SUMMARY OF LITERATURE REVIEW

The high and sustained interest in e^rly childhood mortality globally, stems mainly from the relationship between early childhood mortality and the level of socio-economic development. As Caldwell puts it. although the level of infant and child mortality is a function of socio-economic development, maternal education, which is a sub-set of the socio-economic development index, plays a leading role.

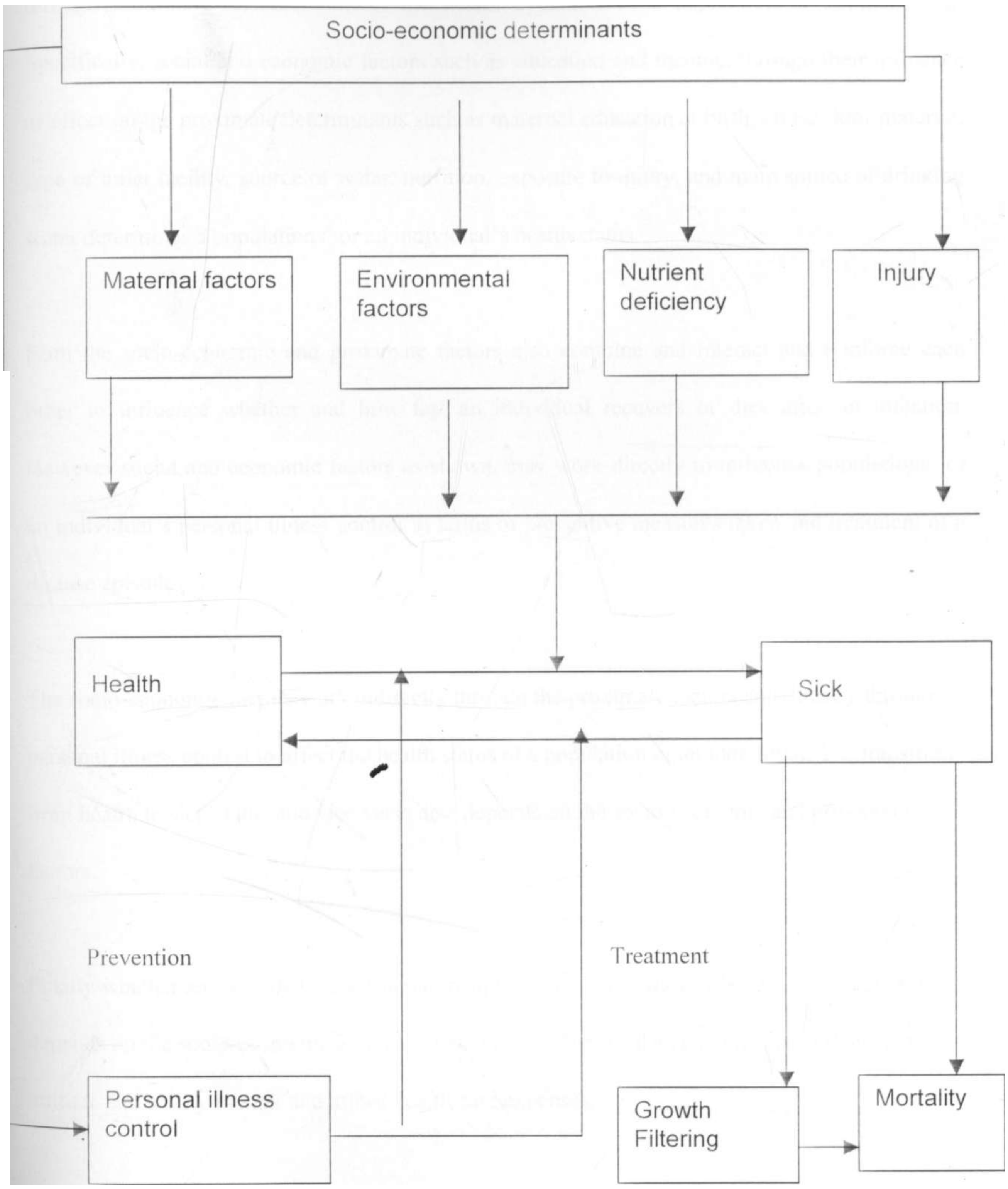
Thus for a country or region to lower infant and child mortality levels, emphases should be put on improved and increased housing conditions, more clean water, increased income, sanitary and sewage disposal systems in general and increased education especially of the women in particular.

A point to note however is that whereas infant mortality is largely related to endogenous causes such pre-maturity and congenital defects, child mortality is largely related to exogenous causes such as infectious and parasitic diseases. Maternal education simultaneously influences these two causal factors namely (endogenous and exogenous) determinants through its influence on increased maturity and better knowledge, skill and attitude in manipulating the external conditions.

However, the existence of counter railing influences may account for the variety of results on maternal education-infant and child mortality link. For example whereas increased maternal education implies more knowledge, skills, income, and desired attitudes and behaviour, it also implies reduced probability of breastfeeding both of which imply beneficial and adverse effects on early childhood mortality respectively.

Despite the few and scattered mixed results however, the inverse relationship between maternal education and infant/child mortality is evident in numerous studies worldwide. In a nutshell therefore, one can argue that maternal education affects infant and child mortality independently and through other proximate determinants.

2.1 OPERATION OF THE FIVE GROUPS OF PROXIMATE DETERMINANTS ON THE HEALTH DYNAMICS OF A POPULATION



Source: Mosley and Chen (1984). P.24.

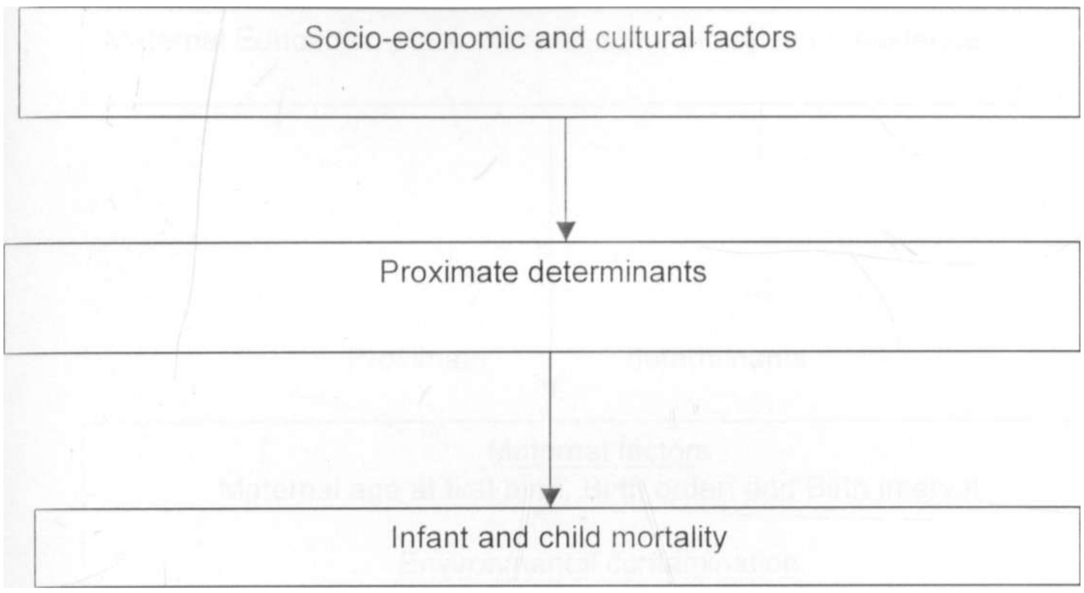
The framework shown above depicts how socio-economic factors work independently and through proximate factors to affect the health dynamics of a population or an individual. Specifically, social and economic factors such as education and income, through their influence or effect on the proximate determinants such as maternal education at birth, house floor material, type of toilet facility, source of water, nutrition, exposure to injury, and main source of drinking water determines a populations' or an individual's health status.

Roth the socio-economic and proximate factors also combine and interact and reinforce each other to influence whether and how fast an individual recovers or dies after an infection. However social and economic factors as shown, may work directly to influence populations' or an individual's personal illness control in terms of preventive measures taken and treatment of a disease episode.

The socio-economic factors work indirectly through the proximate factors and directly through personal illness control to affect the health status of a population or an individual. The transition from health to sick status and vice versa also depends on the socio-economic and proximate factors.

finally whether an individual or a group of people recover once they or he/she is/are sick or not depends on the socio-economic and proximate factors. That is. the above factors influence one's attitude and ability to seek and afford health care expenses.

2.2 CONCEPTUAL FRAMEWORK ON THE DETERMINANTS OF INFANT AND CHILD MORTALITY



Source: Adopted and modified from Mosley and Chen (1984).

From the conceptual framework above, it can be seen that the socio-economic and cultural factors work through the proximate factors to influence/affect the risk of infant and child mortality. Thus, whether an infant or child becomes sick and whether such a child recovers or not depends on interaction between the socio-economic factors and the proximate determinants. Thus the transition to and recovery from sickness depends on a complex web of socio-economic, demographic, environmental, and cultural factors.

2.3 OPERATIONAL FRAMEWORK ON THE DETERMINANTS OF INFANT AND CHILD MORTALITY

Socio-economic and cultural factors\determinants

Maternal Education, place of residence and region of residence

Proximate determinants

Maternal factors
Maternal age at first birth, Birth order, and Birth interval

Environmental contamination
House floor material, source of drinking water,
Types of toilet facility if any

Personal illness control
Place of delivery
No of antenatal visits and its timing

The risk of infant and child death. That is sickness and death

I he operational framework above indicate that, the socio-economic and cultural factors influence or effect maternal education, which in turn works through the proximate determinants to determine the i'isk of infant and child death. Specifically, a mothers education, which is largely depended on her parents or relations material resources and support, affects a mothers' number of children and their spacing, their main house tloor material, source of drinking water, type of toilet facility, place of delivery, the person assisting at birth, and the number of antenatal visits and its timing which in turn affects the risk of infant and child death.

2.4 GENERAL CONCEPTUAL HYPOTHESES

2.4.1 Theoretical Hypothesis

Although variations in infant and child mortality is primarily a function of the prevailing socio-economic, cultural, demographic, behavioural and environmental conditions/factors, such conditions/factors are themselves affected, modified and even promoted positively or negatively by corresponding variation in education in general and maternal education in particular.

2.4.2 Specific conceptual hypotheses

1. Increased maternal education reduces/lowers infant and child mortality through its effects on social factors.

2. Increased maternal education lowers infant and child mortality through its effects on economic factors.

3. Increased maternal education reduces infant and child mortality through its effects on demographic factors.

4. Increased maternal education lowers infant and child mortality through its effects on environmental factors.

5. Increased maternal education reduces infant and child mortality through its effect on cultural factors.

6. Increased maternal education reduces infant and child mortality through its effects on behavioural factors.

2.4.3 Operational hypotheses

Increased maternal education increases maternal age at first birth and this lowers infant and child mortality due to enhanced maturity.

Increased maternal education increases the chances/probability of having a better house-floor material and this reduces infant and child mortality since such environments are less contaminated.

Increased maternal education increases the changes of having clean and treated water and this lowers infant and child mortality as the water is less contaminated.

Increased maternal education increases the probability of having a better toilet facility and this lowers infant and child mortality as such toilets are cleaner and less contaminated. Increased maternal education, increases the desire for fewer and healthier children and wider birth intervals, achieved through contraceptive use and this lowers infant and child mortality as fewer and widely spaced children get enough resources, attention and the mother's body gets enough rest before the next birth.

Increased maternal education increases the probability of maternal use of antenatal and post-natal health care services and this lowers infant and child mortality due to its protective effect on both the mother and the child.

Increased maternal education increases the probability of delivering in a health facility and by a trained person such as a doctor or a nurse or a trained birth attendant and this lowers infant and child mortality as birth complications are quickly identified and addressed and attended to in a health facility and in a clean environment.

2.5 DEFINITION OF KEY CONCEPTS

Infant mortality: This refers to death(s) during the first year of life.

Child mortality: - This refers to deaths of children above one year but below five years of age.

Proxy/index: Refers to a crude measure of an item or variable whose true representation cannot be found in the data set or whose true representation is too abstract or hidden to measure using a single item such variables are called constructs.

Rural Kenya:- This refers to the fifteen over-sampled districts in the 1998 KDHS data set. namely Bungoma. Kakamega. Kericho, Kilifi, Kisii, Machakos. Meru. Murang'a, Nakuru. Nandi. Nyeri. Siaya. South Nyanza. Taita-taveta and Uasin Gishu.

Low and high mortality regions: - This refers lo Central/Rift Valley and Nyanza/Western provinces of Kenya respectively.

2.6 VARIABLES AND THEIR MEASUREMENT

	Variable	**Measurement**	**Factors it captures**
1	Assistance at delivery	No assistance* Doctor/nurse/tba Relative/other friends	Health seeking behaviour
2	House floor material	Non-earth* Earth	Environmental and Economic conditions
J	Source of drinking water	Piped water* Non-piped water	Exposure to pathogens
4	Type of toilet facility	With toilet* No toilet	Environmental conditions
5	Place of delivery	In health facility* Out of health facility	Health seeking behaviour
6	Birth order	1 2-3* 4 - 5 6+	Socio-cultural factors
7	Birth Interval	<24 24 -35* 36+	Demographic and socio-cultural
8	Maternal highest education	No education* Primary education Secondary education+	Child health care skills and positive attitudes and economic status
9	No of antenatal visits	No visit* 1-3 4-7 8+	Health seeking behaviour
10	Timing of first antenatal visits	0-3* 4-6 7+	Health seeking behaviour
1 1	Maternal age at first birth	15-19 20-34 * 35+	Demographic factors
12	Region	Central * Coast Eastern Nyanza Rift valley Western	Environmental factors

Legend: * denotes reference category.

The choice of the reference category is based on either theory where the variable with the lowest i isk of infant or child mortality is taken as the reference category or where a theory does not exist, the category with the highest frequency or weight or magnitude is taken as the reference category.

CHAPTER Til REE: METHODOLOGY

3.1. METHODS OF DATA COLLECTION

3.1.1 Source of data

This study used data from the 1998 Kenya Demographic and Health Survey (KDHS). Specifically, data drawn from the fifteen selected and over-sampled districts representing rural Kenya was used. This, being secondary data collected for other purposes, other than this research, appropriate manipulation of the data was done/carried out so as to answer the research questions.

3.1.2 Survey design

The 1998 KDHS was drawn from a national master sampling frame, which is maintained by the Central Bureau of Statistics (CBS). From this master plan. NASSEP-111. 536 sample points were drawn. 444 of which were rural and 92 were urban.

A two-stage stratified approach was used. The first step involved selecting sample points or clusters. The second stage involved selecting households within the sample points or clusters from a list compiled during a special central bureau of statistics household listing exercise.

In order to produce reliable estimates for certain variables at the district level, fifteen selected districts were over-sampled in the 1998 KDHS. In each of the fifteen over- sampled districts, about four hundred households were selected. In all other rural areas combined, about 1400 households were selected, and 200 households were selected in urban areas.

3.1.3 Sampling

3.1.4 Its rationale

Sampling refers to the process of picking a portion of a population to represent the universe population. The portion thus picked is termed a sample.

In social science research, the need for a representative sample emanates from time and financial constraints, which hinders complete study of the whole/universe population. A sample is said to be representative of the universe population if it contains/has all the average characteristics of the population. The characteristics of such a sample can be studied and generalised to apply to the whole population.

For a sample to be representative of the universe population each and every member of it should/must be selected randomly such that each and eveiy member has an equal and known chance/probability of being selected. For example, if the population has 51 percent women and 49 per cent men, then the sample derived from it, must have 51 per cent women and 49 per cent men. However, actual samples vary within narrow limits of the expected hypothetical or theoretical values.

Thus, sampling enables one to pick a representative and manageable portion of a population for study/research. The limit of the sample size being dictated by one's or an organisation's financial incl time constraints. Thus, representative samples permits generalisations from the sample to the universe population.

3.2 The 1998 KDHS sampling

As far as the selection of households and individuals is concerned, the Central Bureau of Statistics (CBS) began a complete listing of households in all points or clusters starting from November 1997 and finished the exercise in February 1998. In the end. listing in 6 of 536 sample points/clusters could not be completed due to problems of inaccessibility (and were thus not included in the survey). Of the size selected sample points/clusters eventually not included, five are rural and one is urban. Thus, the following districts were not included due to inaccessibility; Garissa, Mandera and Wajir in Northeastern province. Turkana and Samburu in Rift Valley and Isiolo in Eastern province.

I rom the five hundred and thirty (530) sample points/clusters, a systematic sample of households was drawn, with a "take" of 22 households in the urban clusters and 17 households in the rural clusters for a total of 9465 households. All women aged 15-49 (that is. women of reproductive age) were targeted for interview in the selected households.

A point of caution, however is that whereas sampling enables one to generate a manageable and representative portion of a population (the sample) from a universe population and from which some generalisations can be made for the universe population, estimate from a sample are affected by two types of errors; non-sampling and sampling errors. Thus to improve the quality of the data, such errors should be minimized as much as possible.

3.3 Data Quality

As stated above, both non-sampling and sampling errors are found to exist in any data generated from a sample. In the 1998, KDHS such errors were unavoidable since sampling was carried out to generate both the clusters and the households. Non sampling (measurement) errors are the results of shortcomings in the implementation of data collection and data processing, such as failure to locate and interview the correct-household, misunderstanding of the questions on the part of either the interviewer or the respondent, and data entry errors. Although numerous efforts were made during the implementation of the 1998 KDHS to minimize non-sampling errors, non-sampling errors are impossible to entirely avoid and difficult to evaluate statistically

Sampling errors on the other hand, can be evaluated statistically. The sample of the respondents selected in the 1998 KDHS is only one of the many samples that could have been selected from the same population, using the same design and expected size. Assuming similar and repeated scientific procedures of sampling was undertaken in generating each sample, each of these samples would yield results that differ somewhat within narrow limits from the results of the actual sample selected. Thus sampling errors are a measure of the variability between all possible samples.

Although it is not exactly known, the degree of variability can be estimated from the survey results. A sampling error is usually measured in terms of the standard error for a particular statistic, which is the square root of the variance. The standard error can be used to calculate the confidence interval within which the true value for the population can reasonably be assumed to fall. For example for any given statistic calculated from a sample survey, the value of that statistic will fall within average of plus or minus two times the standard error of that statistic in 95 per cent of all possible samples of identical size and design.

Sampling errors for the 1998 KDHS are calculated for selected variables considered to be of primary interest. In general, the relative standard errors for most estimates for the country as a whole are small, except for estimates of very small proportions (that is rare occurrences).

To produce reliable estimates at the district level, over-sampling was done in fifteen rural districts. As a result of such over-sampling, the 1998 KDHS is not self-weighting; that is. sample weights are needed to produce national estimates. Similarly, such sample weights may be used to compensate for the unequal selection between geographically defined strata. This could also affect the quality of the data.

It is also important to note that the 1998 KDHS data excluded North-Eastern province and some districts in Rift Valley and Eastern province due to inaccessibility and related problems. Specifically Garissa. Mandera and Wajir. in North-fasten province. Turkana and Samburu in Rift Valley and Isiolo in Eastern province are the districts that were left out. This constituted five and one rural and urban clusters/sample points respectively. However, the total population residing in the above districts is less than four per cent of the total population of Kenya and thus its effect on the national estimates may be negligible.

3.4 METHODS OF DATA ANALYSIS

Preliminary tests of the data involved running of frequencies of the predictive variables such as maternal education, birth interval and birth order to mention but only a few. This was considered necessary as it allows appropriate recoding of the variables for further analysis.

Then, all the independent variables were recoded appropriately as per their distribution above, fhus all the variables were now in categorical form. The next step involved running the frequency distribution of the recoded variables. This transformed and condensed the data and hence generation of frequency distribution tables. The actual data test methods used involved first cross-tabulation / chi-square and latter logistic regression analysis. That is each of the independent explanatory variable was cross tabulated with the risk of infant and child mortality.

Cross tabulation method here is used to screen each of the independent explanatory variables in the full model and the sub-model. That is, cross-tabulation is done/undertaken between the background (maternal factors) and the dependent variables (the risk of infant and child death). Then the proximate determinants are cross-tabulated with the dependent variable (the risk of infant and child death). In both cases above (background and proximate factors) the explanatory variables, which are significantly associated with the risk of infant and child mortality, are taken for inclusion in the sub-model analysis whereas those not significantly related to the risk of infant and child mortality may be dropped.

A variable having significant t-value of less than 0.05 at 90 per cent confidence level and above is taken as significant and is thus put in the sub-model for further analysis whereas available having a significant t-value greater than 0.05 at 90 per cent confidence level and above will be taken as insignificant and may be dropped.

I lowever. values less that 5 in the cells in cross-tabulation / chi-square tests distorts the results and hence a disadvantage of cross-tabulation/chi-square tests.

The use of logistic regression analysis method is appropriate when the dependent variable, in this case the risk of experiencing an infant and child death is dichotomous. that is death or alive and when the independent explanatory variables are in categorical form fro instance/example maternal education being no education, primary education, and secondary plus. Here the alpha value is set at 0.05. that is oc = 0.05. A point to note however is that logistic regression has the limitation of variables becoming significant as the sample size tends to infinity that is. as the sample size becomes large.

I or infant and child mortality the agg intervals are 0-1 I and 12-59 completed months respectively. The dependent variable takes the value of unity if the child fails to survive and zero if the child survived through the age brackets. This is so because the study is concerned with the effects of maternal education on infant and child mortality in rural Kenya, hence the study's focus on mortality or death.

I he risk of infant and child death which form the dependent variable(s) in this study were created by subtracting sixty months from the date of interview and dividing the resulting time period into 0-

I I and 12-59 completed months respectively and applying the rule that dependent variables takes the values of unity and zero respectively for death and survival.

To increase the number of cases, a ten-year observation period was done by subtracting one hundred and twenty months from the date of interview. Finally, using significant t-value results from the computer output of the logistic regression analysis, each of the independent explanatory variables is assessed. Any independent variable with as significant t-value of less than 0.05 at 95 per cent confidence level and above is taken to be statistically and significantly associated with the risk of infant and child mortality or that the variable has an independent effect on infant and child mortality. Thus it is concluded that maternal education operates through such a variable to influence infant and child mortality. Beta values are used to infer the strength of the effects of independent explanatory variables. Beta values of 0.5 mean a fairly strong effect of a variable on the risk of infant and child deaths; and a beta value below and above 0.5 means a weak and a strong effect respectively. For example a value of 0.8 and above means a strong effect on infant and child mortality and a value of -0.8 and above means a stronti negative effect on infant and child mortality. That is. it increases and decreases the probability of experiencing an infant and child death respectively.

Similarly, the above procedure is used to **assess** each of the explanatory variables for Nvanza/Western and Central/Rift Valley provinces, hence addressing the second specific objective, namely to compare the effects of maternal education on infant and child mortality in the high and low mortality regions respectively

CHAPTER FOUR: THE DISTRIBUTION OF THE STUDY POPULATION

This chapter opens by describing the distribution of the study population. Then differentials of infant and child survival status by selected background characteristics will follow. Cross tabulation/chi-square is used to test the strength of association if any between each of the independent variables and the risk of infant and child mortality. The chi-square test, given by *y~* is used to test the strength and significance of the association between each of the independent variables and the dependent variable; the risk of infant and child death. Chi-square test is given by x = I $(o-e)^2/e$ where $\%^{2=}$ chi-square. o=the observed and e=the expected. This is done mainly when one has a contingency table. While the observed in the above equation is given the expected has to be calculated. For the expected to be calculated one assumption has to be made namely that: the overall totals applies to the sub-categories, that is, there is no significant differences among the categories. The expected is equal to the summation of the row totals over the grant totals multiplied by the column totals.

r

Table 4.1

Distribution of births by selected background characteristics.

Predictive variable	No.	Valid percent
Maternal highest educ.		
No education	1200	15.6
Primary education	5042	65.4
Secondarv+	1463	19.0
Total	7794	100.0
Assistance at Birth		
No assistance	5664	72.7
Doctor/nurse/tba	1390	17.8
Relative/other	740	9.5
Total	7794	100.0
Birth interval		
<24	1688	27.2
24-35	2314	37.3
36+	2195	35.4
Total	6197	100.0
Birth order		
1	1 580	20.3
2-3	2395	30.7
4-5	1747	22.4
6+	1072	26.6
Total	7794	100.0
Place of delivery		
In a health facility	817	10.5
Out of a health facility	r 6977	89.5
Total	7794	100.0
House floor material		
Non earth	1543	19.8
Earth	6251	80.2
Total	7794	100.0
Source of drinking water		
With piped water	1383	17.8
Without piped water	6408	82.2
Total	7794	100.0
Type of toilet facility		
_No toilet facility	1415	18.2

With toilet facility	6379	81.8
Total	6379	100.0
No of antenatal visits		
No visits	129	5.4
1-3	788	32.9
4-7	1236	51.6
8+	244	10.2
Total	2397	100.0
Timing of first antenatal visits		
0-3	287	12.7
4-6	1576	69.5
7+	405	17.9
Total	2268	100.0
Maternal age at first birth		
15-19	1045	14.7
20-34	5159	72.7
35+	890	12.5
Total	7094	100.0
Region		
Central	627	8.0
Coast	953	12.2
Eastern	1073	13.8
Nyanza	1477	19.0
Rift valley	2398	30.8
Western	1266	16.2
Total	7794	100.0

Table 4.1. above shows the distribution of births by selected background characteristics. The distribution indicates that, 15.6. 65.4, and 19.0. per cent of births were born to female respondents who had no education, and secondary plus levels of education respectively. As far as birth interval is concerned. 27.3, 37.3, and 35.4. per cent of births were born to female respondents whose birth intervals distributed were; below 24 months, between 24-35. and 36 + respectively.

For birth order, 20.3. 30.7. 22.4. and 26.6 per cent of children belonged to birth orders; I. between 2-3. 4-5, and 6+ respectively. The distribution of births by place of delivery indicates that 10.5 per cent were born in a health facility while 89.5 per cent were born outside a health facility. The distribution also indicates that 19.8 per cent of births were born in households whose house floor material were non earth while SO.2 per cent were born in households whose lloor material was earth. The distribution of births by source of drinking water indicates that 82.2 per cent births were born in households with no piped water while 17.8 per cent were born in households with piped water.

The results also indicates that 5.4. 32.9, 51.6. and 10.2 percent of births were born to mothers who had made no antenatal visits. 1-3. 4-7, and 8 plus antenatal visits respectively. Similarly. 12.7, 69.5, and 17.9 percent of births were born to women whose timing of the first antenatal visits was 0-3, 4-6, and 7 plus respectively.

Similarly 18.2 per cent of births were born in households without a toilet facility while 81.2 per cent were born in households with at least a toilet facility. Likewise, 72.7, 17.8, and 9.5 per cent of births were born to mothers who received no assistance at birth, were assisted by a doctor/nurse/tba and relative/other friends respectively. The results also that 14.7. 72.7. and 12.5 per cent of births were born to women, whose ages at first birth were 15-19, 20-34, and 35+ years.

Finally the results show that **8.0. 12**.2. **13.8.** 19.0. 30.8. and 16.2 per cent of births were born to women whose region of residence were central, coast, eastern. Nyanza. rift valley, and western provinces respectively.

Table 4.2: Distribution of infants and children by selected background characteristics. (Differentials). Infants

Va liable	**No. A live**	**No. Death**	**Total**
Maternal highest iduc. (Infants)			
No. Education	1053 (14.3%)	98 (1.3%)	1 151 (15.4%)
Primary education	4507 (60.4%)	369 (4.9%)	4876 (65.3%)
Secondary+	1350 (18.1%)	85 (1.1%)	1435 (19.2%)
Total	6910 (92.6%)	552 (7.4%)	7462 (100.0%)
X^2=6.854	**D.f=2**	**Sig. =0.032**	
Birth interval			
<24	1448 (24.1%)	164 (2.7%)	1612 (26.9%)
24-35	2083 (34.7%)	167 (2.8%)	2250 (37.5%)
36+	2040 01.0%)	97 (1.6%)	2137 (35.6%)
Total	5571 (92.9%)	428 (7.1%)	5999 (100.0%)
/; =44.48	**D.f=2**	**Sig. =0.000**	
IJirtli order			
1	1416 (18.8%)	1 19 (1.6%)	1535 (20.3%)
2-3	2195 (29.1%)	146 (1.9%)	2341 (31.0%)
4-5	1567 (20.8%)	109 (1.4%)	1676 (22.6%)
6+	1820 (24.1%)	179 (2.4%)	1999 (26.5%)

Total	6998 (92.7%)	553 (7.3%)	7551 (100.0%)
X3 = 13.98	D.f =J		Sig. =0.003
Toilet facility			
No toilet	1 189 (15.7%)	151 (2.0%)	1340 (17.7%)
With toilet	5809 (76.9%)	402 (5.3%)	6211 (82.3%)
Total	6998 (92.7%)	553 (7.3%)	7551 (100.0%)
-/; =37.358	**D.f=1**	**Si«.—0.000**	
Source of drinking water			
With piped water	1299 (17.2%)	63 (0.8%)	1362 (18.0%)
Without piped water	5699 (75.5%)	490 (6.5%)	6189 (82.0%)
Total	6998 (92.7%)	553 (7.3%)	7551 (100.0%)
/: =17.8	**D.f=1**	**Si». =0.000**	
Type of house floor material	No. Alive	No. Death	Total
Non earth	1429 (18.9%)	82 (1.1%)	151 1 (20.0%)
Earth	5569 (73.^o)	471 (6.2%)	6040 (80.0%)
Total	6998 (92.7%)	553	7551 (100.0%)
X" = 10.0	D.f=1	Sig.=0.002	
Assistance at birth	No. Alive	No. Death	Total
No assistance	5013 (66.4%)	425 (5.6%)	5438 (72.0%)
1)octor/nurse/tba	1301 (17.2%)	78 (1.0%)	1379 (18.3%)
Relative/other	684 (9.1%)	50 (0.7%)	734 (9.7%)

Total	6998 (92.7%)	553 (7.3%)	7551 (100.0%)
k =786,,	**D.f=2**	**Sig. =0.020**	
I'lace of delivery			
In health facility	766 (10.1%)	47 (0.6%)	813 (10.8%)
Out of health facility	6232 (82.5%)	506 (6.7%)	6738 (89.2%)
Total	6998 (92.7%)	553 (7.3%)	7551 (100.0%)
X2 =3.19	**D.f=1**	**Si«. =0.074**	
No of antenatal visits			
No visits	1 18(5.0%)	10(0.4%)	128(5.4%)
1-3	739(31.1%)	41(1.7%)	780(32.9%)
4-7	1 158(48.8%)	67(2.8%)	1225(51.6%)
8+	209(8.8%)	32(1.3%)	241(10.2%)
Total	2224(93.7%)	150(6.3%)	2374(100.0%)
/2=23.181	d.f=3	Sig =0.000	
Timing of first antenatal visits			
0-3	262(1 1.7%)	20(0.9%)	282(12.6%)
4-6	1466(65.3%)	95(4.2%)	1561(69.5%)
	378(16.8%)	25(1.1%)	403(17.9%)
Total	2106(93.8%)	140(6.2%)	2246(100.0%)
7.2=0.415	<T.I=2	Sig.=0.813	
Maternal age at first birth			
15-19	901(13.1%)	105(1.5%)	1006(14.6%)
20-34	4691(68.2%)	3 17(4.6%)	5008(72.8%)
35+	788(11.5%)	73(1.1%)	861(12.5%)
Total	6380(92.8%)	495(7.2%)	6875(100.0%)
^2=23.56	D.f=2	Sig.=0.000	
Region			
Central	606(8.0%)	1 8(0.2%)	624(8.3%)
Coast	878(1 1.6%)	53(0.7%)	931(12.3%)
Eastern	1016(13.5%)	39(0.5%)	1055(14.0%)
Nyanza	1 140(15.1%)	232(3.1%)	1372(18.2%))
Rift valley	2227(29.5%)	129(1.7%)	2356(31.2%)
Western	1 131(15.0%)	82(1.1%)	1213(16.1%)

Total	6998(92.7%)	553(7.3%)	7551(100.0%)
^2=2403	D.f=5	Sig.=0.000	
Maternal Education (children)			
No education	1053 (14.8%)	41 (0.6%)	1094 (15.4%)
Primary education	4507 (63.4%)	138 (1.9%)	4645 (65.3%)
Secondary +	1350 (19.0%)	25 (0.4%)	1375 (19.3%)
Total	6910 (97.1%)	204 (2.9%)	7114 100.0%0
x^2 =s,,57	**D.f=2**	**Sig. =0.013**	
Preceding birth interval			
<24	1448 (25.5%)	62 (1.1%)	1510 (26.3%)
24-35	2083 (36.3%)	57 (1.0%)	2140 (37.3%)
36+	2040 (35.6%)	48 (0.8%)	2088 (36.4%)
Total	5571 (97.1%)	167 (2.8%)	5738 (100.0%)
r =10.86	**D.f=2**	**Sig.=0.004**	
liirtli order			
1	**T416** (19.7%)	37 (0.5%)	1453 (20.2%)
2-3	2195 (30.5%)	47 (0.7%)	2242 (31.1%)
4-5	1567 (21.8%)	60 (0.8%)	1627 (22.6%)
6+	1820 (26.1%)	60 (0.8%)	1880 (26.1%)
Total	6998 (97.2%)	204 (2.8%)	7202 (100.0%)
	D.f=3	**Sig. =0.(11 8**	
Place of delivery			
In a health facility	766 (10.6%)	4 (0.1%)	770 (10.7%)
Out of a health	6232	200	6432

facility	(85.5%)	(2.8%)	(89.3%)
Total	6998 (97.2%)	204 (2.8%)	7202 (100.0%)
/: = 16.7	**D.f =1**	**Si« =0.00(1**	
House floor material			
Non earth	1429 (19.8%)	26 (0.4%)	1455 (20.2%)
Earth	5569 (77.3%)	178 (2.5%)	5777 (79.8%)
Total	6998 (97.2%)	204 (2.8%)	7202 (100.0%)
/;	**D.f =1**	**Si«. =0.007**	
Source of drinking water			
Piped water	1299 (18.0%)	20 (0.3%)	1319 (18.3%)
No piped water	5699 (79.1%)	184 (2.6%)	5883 (81.7%)
Total	6998 (97.2%)	204 (2.8%)	7202 (100.0%)
i: =10.16	**D.f =1**		**Sig. =0.001**
Type of toilet facility			
No facility	1 189 #6.5%)	62 (0.9%)	1251 (17.4%)
With toilet facility	5809 (80.7%)	142 (2.0%)	5951 (82.6%)
Total	6998 (97.2%)	204 (2.8%)	7202 (100.0%)
i: =2-1.H	**D.f =1**	**Sig. =0.000**	
Maternal age at first 1 birth			
15-19	901(13.7%)	33(0.5%)	934(14.2%)
20-34	4691(71.5%)	122(1.9%)	4813(73.3%)
35+	788(12.0%)	28(0.4%)	816(12.4%)
Total	6380(97.2%)	183(2.8%)	6563(100%)
	4.29	DF = 2	SIGN = 0.1 17
J^egion			
Central	606(8.4%)	3(0.00%)	609(8.5%)

Coast	878(12.2%)	17(0.2%)	895(12.4%)
Eastern	1016(14.1%)	13(0.2%)	1029(14.3%)
Nyanza	1 140(15.8%)	93(1.3%)	1233(17.1%)
Rift valley	2227(30.9%)	31(0.4%)	2258(31.4%)
Western	1 131(15.7%)	47(0.7%)	1 178(16.4%)
Total	6998(97.2)	204(2.8%)	7202(100%)
X^2= 147.75	Df= 5	Sign = 0.000	

Table 4.2 above shows the association between each of the independent variables and the risk of infant and child death. First each of the predictive variables is cross tabulated with the risk of infant death, then each of the independent variable is also cross tabulated with the risk of child death. The chi-square is thus used to show the association if any between the dependent variable (the risk of infant and child death) and each of the independent variables.

The results given in table 4.1.1 above thus indicates that 1.3 per cent of infants death occurred among female respondents with no education, while 4.9. and 1.1 per cent occurred among female respondents with primary education, and secondary plus level of education respectively. Overall this is consistent with the view that infant mortality in general declines as maternal education increases.

The results also indicates that 2.7 per cent of infants death were of birth intervals less than 24 months, while 2.8, and 1.6 per cent^ere of birth intervals between 24-35 and 36 plus months respectively.

In terms of risk of death by birth order. 1.6 per cent of infants death were of birth order 1, while 1.9. 1.4, and 2.4 per cent were of birth order, 2-3, 4-5. and 6 plus respectively. Similarly, 2.0 per cent of infants' death occurred in households having no toilet facility while 5.3 per cent occurred in households having at least a toilet facility.

On the other hand. 0.8 per cent of infant death occurred in households with piped water. This is consistent the view that piped water, unlike other contaminated sources such as pond, river and lake water is associated with lower risks of infant death.

Iii terms of risk of infant death by house floor material, the results indicates that. I. I per cent of infants death occurred in households whose floor material was non earth while 6.2 per cent, occurred in households whose floors were earth. This is consistent with the view that; better house floor material is associated with reduced risk of infant death.

Likewise 0.6 percent of infant deaths occurred to infants born in a health facility while 6.7 percent occurred among infants born outside a health facility.

Similarly. 5.6 per cent of infants death occurred among women who had received no assistance at birth while 1.0. and 0.7 per cent of infants death occurred among women who had received assistance from a doctor/nurse/trained and untrained traditional birth attendant and relative/other friends respectively.

On the number of infants death classified by the number of antenatal visits, their mothers had made, the results indicates that 0.4 per cent of infants death, occurred to women who had made no antenatal visit, whereas 1.7. 2.8. and 1.3 per cent occurred to women whose timing of first antenatal visit was 0-3. whereas 4.2. and 1.1 per cent occurred to mothers whose timing of first antenatal visits were 4-6 and 7 plus.

*

The results also show that 1.5, 4.6. and 1.1 per cent of infant deaths occurred among women whose ages at first birth were 15-19. 20-34. and 35+ years respectively, similarly, the results indicate that 0.2, 0.7. 0.5. 3.1. 1.7. and 1.1 per cent of infants deaths occurred among women whose regions of residence were central, coast, eastern. Nyanza. rift valley, and western province respectively.

Each of the background factors also showed some association with the risk of child death. As shown above, 0.6 percent of the children death occurred among female respondents with no education whereas 1.9. 0.4 per cent occurred among female respondents with primary education, and secondary plus level of education respectively. This is consistent with the view that maternal education is related to the risk of child death.

The results also indicate that I.I, 1.0 and 0.8 percent of children death were of birth interval less than 24 months, between 24-35 and 36 plus months respectively. Thus short birth intervals as expected are associated with higher risks of child death and the risk of death decreases with increasing birth interval. Similarly, 0.5 percent of children deaths were of birth order 1 while 0.7 percent. 0.8 percent and 0.8 percent were of birth order 2-3. 4-5 and 6 plus respectively.

The results also show that 0.1 per cent of child death were born in a health facility while 2.8 percent were born outside a health facility. This is consistent with the view that children born outside a health facility such as at home have higher risk of death than children born in a health facility. In deed, children born outside a health facility are less likely to have received enough vaccination if any, so are their mothers compared to those born in a health facility.

The results also indicate that 0.4 percent of child death occurred in households having better house floor material (non-earth) while 2.5 percent occurred in households whose house floor material was earth. This is consistent with the view that better house floor material is associated with reduced infection rates and hence reduced risk of child death.

r

The data in the table above also indicates that 0.3 per cent of children death were in households having piped water while 2.6 percent were in households with piped water while 2.6 percent were in households having no piped water (without piped water). This is consistent with the view that piped water is safer than water from other sources such as pond, lakes and rivers.

Similarly, the data indicates that 0.9 percent of children death were in households with no toilet facility while 2.0 percent were in households with at least a toilet facility. The results also indicates that. 0.5, 1.9. and 0.4 per cent of children death were of women whose ages at first birth were 15-19. 20-34. and 35+ years respectively.

The results also indicates that 0.0. 0.2. 0.2. 1.3. 0.4. and 0.7 per cent of children death occurred among women whose region of residence were central, coast, eastern. Nyanza, rift valley, and western province respectively.

In conclusion, the results indicate that except for the place of delivery, maternal education, preceding birth interval, birth order, the type of toilet facility, source of drinking water, and house floor material, are all significantly associated with the risk of infant death.

Similarly, maternal education, preceding birth interval, birth order, toilet facility, source of drinking water, house floor material, and the place of delivery are all associated with the risk of child death.

I (able 4.1.2 below shows the distribution of births by selected background characteristics in the high and low mortality regions of Nyanza/Western and Central/Rift valley provinces respectively.

Table 4.3 High mortality region: Nyanza/Western.
Distribution of births by selected background characteristics

Predictive variable	No.	Valid per cent
Maternal highest educ.		
No education	312	11.5
Primary education	1821	67.0
Secondary+	584	21.5
Total	2717	100.0
House tloor material		
Non earth	303	11.0
Earth	2440	89.0
Total	2743	100.0
Place of delivery		
In a health facility	224	8.2
Out of a health facility	2519	91.8
Total	2743	100.0
Birth order		
1	513	18.7
2-3	772	28.1
4-5	630	23.0
6+	823	30.2
Total	2743	100.0
Type of toilet facility		
No facility	558	20.4
With facility	2179	79.6
Total	2737	100.0
Source of drinking water		
Piped water	217	7.9
Non piped water	2526	92.1
Total	2743	100.0
Preceding birth interval		
<24	636	28.6
24-25	890	40.0
36+	700	31.4
Total	2226	100.0
Assistance at birth		
No assistance	2045	74.6
Doctor/nurse/tba	490	17.9
Relative/other	208	7.6

Total	2743	100.0
Timing of antenatal visits		
0-3	**122**	15.2
4-6	546	68.2
7+	133	16.6
Total	801	100.0
No of antenatal visits		
No visits	52	6.1
1-3	305	35.8
4-7	41 1	48.2
8+	85	10.0
Total	853	100.0

I able 4.3 above shows the distribution of births by selected background characteristics. The distribution indicates that I 1.5, 67.0. and 21.5 per cent of births were born to female respondents with no education, primary education, and secondary plus level of education respectively.

That data also indicates that; 11.0. and 89.0 per cent of births were born in house holds whose lloor materials were non-earth and earth respectively. Similarly 8.2 and 91.8 per cent of births were born in a health facility and out of a health facility respectively.

As for birth order. 18.7. 28.1. 23.0. and 30.2 per cent of births were of birth order I. 2-3, 4-5. and 6 plus respectively. In the same way, 20.4 and 79.6 per cent of births were born in house holds with and without toilet facility respectively.

Likewise, 7.9, and 92.1 per cent births were born in house holds with and without piped water respectively. The distribution of births by birth interval indicates that 28.6. 40.0, and 31.4 per cent of births were of birth interval, below or less than 24 months, between 24-35. and 36+ plus months respectively.

Finally 15.2, 67.7. 15.2. and 1.9 per cent of births were born to female respondents whose ages at first birth were below 16 years, between 16-20. 21-25 and above 26 years respectively. The results also show that 74.6 per cent of births were born by women who received no assistance at birth while 17.9 and 7.6 per cent were born to women who were assisted by a doctor/nurse/tba and relative/other friends respectively.

Similarly. 6.1 per cent of births were born to women who had made no antenatal visits, while 35.8, 48.2, and 10.0 per cent were born to mothers who had made; 1-3, 4-7 and 8+ antenatal visits respectively. Finally, 15.2, 68.2. and 16.6 per cent of births were born to women whose timing of first antenatal visits were 0-3. 4-6 and 7+ respectively.

Table 4.4: Distribution of infants and children death by selected background characteristics (differentials). Infants. (Nyanza/Western)

Vii **liable**	**No. A live**	**No death**	**Total**
Maternal highest educ.			
No education	p 248 {9.1%)	39 (1.5%)	287 (11.2%)
Primary education	1479 (57.8%)	229 (8.9%)	1708 (66.7%)
Secondary+	518 (20.2%)	46 (1.8%)	564 (22.0%)
Total	2245 (87.7%)	314 (12.3%)	2559 (100.0%)
..-19.501	**D.f =3**	Si«. =0.000	
Birth interval			
<24	495 (23.6%)	93 (4.4%)	588 (28.0%)
24-35	744 (35.5%)	103 (4.9%)	847 (40.4%)
36+	613 (29.2%)	50 (2.4%)	663 (31.6%)

Total	1852 (88.3%)	246 (11.7%)	2098 (100.0%)
X^1=20.875	**1).f=2**	**Sig. =0.000**	
IJirtli order			
1	417 (16.1%)	66 (2.6%)	483 (18.7%)
2-3	652 (25.2%)	86 (3.3%)	738 (28.5%)
4-5	520 (20.1%)	65 (2.5%)	585 (22.6%)
6+	682 (26.4%)	97 (3.8%)	779 (30.1%)
Total	2271 (87.9%)	314 (12.1%)	2585 (100.0%)
X^2=1.867	**l).f=3**		**Sig. =0.600**
Type of toilet facility			
No facility	415 (16.1%)	99 (3.8%)	514 (19.9%)
With facility	1852 (71.8%)	213 (8.3%)	2065 (80.1%)
Total	2267 (87.9%)	312 (12.1%)	2579 (100.0%)
X^2=**30.973**	**l).f=l**		**Sig. =0.000**
Source of drinking water			
Piped water	198 (7.7%)	12 (0.5%)	210 (8.1%)
Non piped water	*20T** (80.2%)	302 (1 1.7%)	2375 (91.9%)
Total	2271 (87.9%)	314 (12.**1%)**	2585 (100.0%)
X^2=**8.863**	**D.f=1**		**Sig. =0.003**
Type of house lloor material			
Non earth	256 (9.9%)	J J (1.3%)	289 (1 1.2%)
Earth	2015 (77.9%)	281 (10.9%)	2296 (88.8%)
Total	2271 (87.9%)	314 (12.1%)	2585 (100.0%0
X^2 **=0.162**	**I).f=l**	**Sig. =0.688**	

Assistance at birth			
No assistance	1653 (63.9%)	245 (9.5%)	1898 (73.3%)
Doctor/nurse/tba	438 (16.9%)	44 (1.7%)	482 (18.6%)
Relative/other	180 (7.0%)	25 (1.0%)	205 (7.9%)
Total	2271 (87.9%)	314 (12.1%)	2585 (100.0)
/' =5.1-46	**l).f =2**	**Sig. =0.076**	
Place of delivery			
In a health facility	199 (7.7%)	22 (0.9%)	221 (8.5%)
Out of a health facility	2072 (80.2%)	292 (11.3%)	2364 (91.5%)
Total	2271 (87.9%)	314 (12.1%)	2585 (100.0%)
X =1.088	**D.f=1**	**Si«. =0.297**	
No of antenatal visits			
No visits	46(5.5%)	5(0.5%)	5 1 (6.1 %)
1-3	274(32.7%)	26(3.1%)	300(35.8%)
4-7	366(43.7%)	37(4.4%)	403(48.1%)
8+	69(8.2%)	15(1.8%)	84(10.0%)
Total	755(90.1%)	83(9.9%)	838(100.0%)
=6.705	D.f=3	Sig.=0.082	
Timing of antenatal visits	y		
0-3	102(13.0%)	16(2.0%)	1 18(15.0%)
4-6	483(61.4%)	54(6.9%)	537(68.2%)
7+	124(15.8%)	8(1.0%)	132(16.8%)
Total	709(90.1%)	78(9.9%)	787(100.0%)
y. =3H>3	D.f=2	Sig.=0.138	
Maternal education (Children)			
No education	248 (10.4%)	23 (1.0%)	271 (1 1.2%)
Primary education	1479 (62.0%)	99 (4.2%)	1578 (66.2%)
Secondary plus	518 (21.7%)	18 (0.8%)	536 (22.5%)
Total	2245	140	2385

	(94.1%)	(5.9%)	(100.0%)
9.945	**D.f=2**	**Si«. =0.007**	
Preceding birth interval			
<24	495 (25.2%)	40 (2.0%))	535 (27.2%)
24-35	744 (37.8%)	40 (2.0%)	784 (39.9%)
36+	613 (31.2%)	35 (1.8%)	648 (32.9%)
Total	1852 (94.2%)	1 15 (5.8%)	1967 (100.0%)
X-3.605	**D.f=2**	**Sig. =0.165**	
Birth order			
I	417 (17.3%)	25 (1.0%)	442 (18.3%)
2-3	652 (27.0%)	30 (1.2%)	682 (28.3%)
4-5	520 (21.6%)	41 (1.7%)	561 (23.3%)
6+	682 (28.3%)	44 (1.8%)	726 (30.1%)
Total	2271 (94.2%)	140 (5.8%)	241 1 (100.0%)
y^2 **=4.888**	**D.f=3**	**Sig. =0.180**	
Place of delivery			
In a health facility	199	j (0.1%)	202 (8.4%)
Out of a health facility	2072 (85.9%)	137 (5.7%)	2209 (91.6%)
Total	2271 (94.2%)	140 (5.8%)	2411 (100.0%)
=7.528	**D.f=1**	Sig. **=0.006**	
House floor material			
Non earth	256 (10.6%)	12 (0.5%)	268 (11.1%)
Earth	2015 (83.6%)	128 (5.3%)	2143 (88.9%)

Total	2271 (94.2%)	140 (5.8%)	2411 (100.0%)
=0_974 **D.f=1** **Sig. =0.324**			
Source of drinking water			
Piped water	198 (8.2%)	6 (0.2%)	204 (8.5%)
Non piped water	2073 (86.0%)	134 (5.6%)	1954 (91.5%)
Total	2271 (94.2%)	140 (5.8%)	241 1 (100.0%)
T =3.346 **D.f=1** **Sig. =0.067**			
Type of toilet facility			
No facility	415 (17.2%)	38 (1.6%)	453 (18.8%)
With facility	1852 (76.9%)	102 (4.2%)	1954 (81.2%)
Total	2267 (94.2%)	140 (5.8%)	2407 (100.0%)
X^2=6.739	**D.f =1**	Sig =0.009	

Table 4.5. Low mortality region: Central/Rift valley
Distribution of births by selected background characteristics

Predictive variable	No.	Valid per cent
Maternal highest educ.		
No education	369	12.2
Primary education	843	27.0
Secondary +	572	18.0
Total	3025	100.0
House floor material		
Non earth	710	23.5
Earth	2315	76.5
Total	3025	100.0
Place of delivery		
In a health facility	364	12.0
Out side a health facility	2661	88.0
Total	3025	100.0
Birth order		
1	651	21.5
2-3	980	32.4

4-5	672	22.2
6+	722	23.9
Total	3025	100.0
Type of toilet facility		
Without a facility	359	12.0
With a facility	2627	88.0
Total	2986	100.0
Source of drinking water		
Piped water	596	19.7
No piped water	2429	80.3
Total	3025	100.0
liirtli interval		
<24	663	28.0
24-35	864	36.5
36+	841	35.5
Total	1711	100.0
No of antenatal visits		
No visits	41	4.4
1-3	299	32.4
4-7	477	51.6
8+	107	1 1.6
Total	924	100.0
Timing of first antenatal visits		
(1-3	89	10.1
4-6	623	70.6
7+	171	19.4
Total	883	100.0

Table 4.5 above indicates that 15.6. 65.4. and I 9.0 per cent of children/ births were born to female respondents with no education, primary education and secondary plus level of education respectively. Similarly 23.5 and 76.5 per cent of births occurred in house holds whose main lloor material were non earth and earth respectively.

On the other hand. 12.0 and 88.0 per cent of births occurred in a health facility and out side a health facility respectively. Likewise 21.5, 32.4. 22.2, and 23.9 per cent of births were of birth intervals I, 2-3, 4-5, and 6+ respectively. As far as toilet facilities are concerned. 12.0 and 88.0 per cent of births occurred in households with and without a toilet facility respectively. Similarly, 19.7 and 80.3 per cent of births occurred in house holds having piped and non-piped drinking water respectively.

As far as birth interval is concerned. 28.0. 36.5 and 35.5 per cent of births were of birth interval; less than 24 months, between 24-35 and 36 plus months respectively. The results also indicates that 4.4 per cent of births were born to mothers who had had no antenatal visits while 32.4. 51.6. and 1 1.6 per cent were born to women who had I -3. 4-7. and 8+ antenatal visits respectively.

Table 4.0: Distribution of infants and children death by selected background characteristics. (Differentials). Infants. (Central/Rift valley)

Variable	**No alive**	**No death**	**Total**
Maternal education			
No education	329	J J	362
Primary incomplete	1 154	64	1218
Primary complete	807	26	833
Secondary plus	^ 543	24	567
Total	2833	147	2980
X^2=20.199	**D.f=3**	**Si«. =0.**	**)00**
Birth interval			
<24	600 (25.7%)	48 (2.1%)	648 (27.8%)
24-35	809 (34.7%)	42 (1.8%)	851 (36.5%)
36+	803 (34.4%0	29 (1.2%)	832 (35.7%)
Total	2212 (94.9%)	1 19 (5.1%)	2331 (100.0%)
X^2=I 1.645	**D.f=2**	**Sig. =(**	**1.003**
Birth order			
1	617 (20.7%)	26 (0.9%)	643 (21.6%)

2-3	928 (31.1%)	40 (1.3%)	968 (32.5%)
4-5	636 (21.3%)	26 (0.9%)	662 (22.2%)
6+	652 (21.9%)	55 (1.8%)	707 (23.7%)
Total	2833 (95.1%)	147 (4.9%)	2980 (100.0%)
X^2=16.05	**D.f =3**	**Sig. =0.001**	
Type of toilet facility			
No toilet facility	326 (11.1%)	21 (0.7%)	347 (1 1.8%)
With toilet facility	2472 (83.9%)	126 (4.3%)	2598 (88.2%)
Total	2798 (95.0%)	147 (5.0%)	2945 (100.0%)
/>0.933	**D.f=1**	**Sig. =0.334**	
Source of drinking water			
Piped water	560 (18.8%)	29 (1.0%)	589 (19.8%)
No piped water	2273 (76.3%)	1 18 (4.0%)	2381 (80.2%)
Total	2833 (95.1%)	147 (4.9%)	2980 (100.0%)
JC-0.000	**D.f=1 r**	**Sig. =0.991**	
Households floor material			
Non earth	664 (22.3%)	34 (1.1%)	698 (23.4%)
Earth	2169 (72.8%)	[illegible] (3.8%)	2282 (76.6%)
Total	2833 (95.1%)	147 (4.9%)	2980 (100.0%)
y>0.()07	**D.f=1**	**Sig. =0.931**	
No of antenatal visits			
No visits	39(4.2%)	2(0.2%)	41(4.5%)
1-3	285(30.9%)	11(1.2%)	296(32.1%)
4-7	460(49.9%)	179(1.8%)	477(51.8%)
8+	94(10.2%)	13(1.4%)	107(1 1.6%)

Total	878(95.3%)	43(4.7%)	921(100.0%))
X'=15.369	**D.f=3**	**Sig. =0.002**	
Place of delivery			
In a health facility	348 (11.750	16 (0.5%>)	364 (12.2%)
(kit of a health facility	2485 (83.4%)	131 (4.4%)	261 (87.8%o)
Total	2833 (95.1%)	147 (4.9%)	2980 (100.0%>)
X:=0.255	**D.f=l**	**Sig. =0.613**	
Maternal education (children)			
No education	329 (11.2%)	JJ (1.1%)	362 (12.3%)
Primary education	1961 (66.8%)	90 (3.1%)	2051 (69.9%)
Secondary plus	499 (17.0%)	24 (0.8%)	523 (17.8%))
Total	2789 (95.0%)	147 (5.0%)	2936 (1 ()0.0%>)
X^2= 14.695	**D.f=2**	**Sig.=0.001**	
Birth interval			
<24	600 (26.8%)	(0.5%)	611 (27.3%)
24-35	809 (36.1%)	**11** (0.5%)	820 (36.6%>)
36+	803 [illegible]	*(0.2%)*	808 (36.1%))
Total	2212 (98.8%)	27 (1.2%)	2239 (100.0%>)
X^2=4.276	*D.f =2*	**Sig.=0.118**	
Birth order			
1	617 (21.5%)	7 (0.2%)	624 (21.8%)
2-3	928 (32.4%)	9 (0.3%)	937 (32.7%)
4-5	636 (22.2%)	8 (0.3%)	644 (22.5%)
6+	652 (22.7%)	10 (0.3%)	662 (23.1%)
Total	2833 (98.8%>)	34 (1.2%)	2867 (100.0%o)
X-1.041	**I).1=3**	**Sig.=0.791**	

Type of toilet facility			
No facility	326 (11.5%)	8 (0.3%)	334 (**11**.8%)
With facility	2472 (87.4%)	22 (0.8%)	2494 (88.2%)
Total	2798 (98.9%)	30 (1.**1%)**	2828 (100.0%)
y> 6.425	**D.f=l**	**Sig.=0.011**	
Source of drinking water			
With piped water	560 (19.5%)	7 (0.2%)	567 (19.8%)
Without piped water	2273 (79.3%)	27 (0.9%)	2300 (80.2%)
Total	2833 (98.8%)	34 (1.2%)	2867 (100.0%)
X^2**=0.014**	**I).f=l**	**Sig.=0.905**	
House floor material			
Non earth	664 (23.2%)	10 (0.3%)	674 (23.5%)
Earth	2169 (75.7%)	24 (0.8%)	2193 (76.5%)
Total	2833 (98.8%)	34 (1.2%)	2867 (100.0%)
7/=<>.667	**l).f=l**	**Sig.=0.414**	
Place of delivery			
In a health facility	* 348 (12.1%)		348 (12.1%)
Out of a health facility	2485 (86.7%)	34 (1.2%)	2519 (87.9%)
Total	2833 (98.8%)	34 (1.2%)	2867 (100.0%)
/;=4.753	**D.f=l**	**Sig.=0.029**	
Timing of first antenatal visits			
(1-3	86(9.8%)	3(0.3%)	89(10.1%)
4-6	597(67.8%)	24(2.7%)	621(70.6%)
7+	156(17.7%)	14(1.6%)	170(19.3%)
Total	839(95.3%)	41(4.7%)	880(100.0%)
X-6.109	**l).f=2**	**Sig.=0.047**	

A comparative study of the association of each of the independent variables and the risk of infant death in the low and high mortality regions of Central/Rift valley and Nyanza/Western respectively indicates that: maternal education is significantly associated with the risk of infant death in both regions.

Similarly birth interval is significantly associated with the risk of infant death in the two regions. The type of the house floor material is not significantly associated with the risk of infant death in both the low and high mortality regions.

On the other hand however, while the source of drinking water is significantly associated with the risk of infant death in the high mortality region, it is not significantly associated with risk of infant death in the low mortality region. Similarly, whereas birth order is significantly associated with the risk of infant death in the low mortality region, it is not so associated in the high mortality region.

The place of delivery is not significantly associated with the risk of infant death in both the low and high mortality regions. Finally whereas the type of toilet facility is significantly associated with the risk of infant death in the high mortality region, it is not so associated in the low mortality region.

Turning to the association between each of the predictive variables and the risk of child death in ihe two regions, the results, indicates that; whereas maternal highest education level is significantly associated with the risk of child death in the high mortality region, it is not so associated in the low mortality region. Similarly birth interval is not significantly associated with the risk of child death in both the low and the high mortality regions.

However the type of toilet facility is significantly associated with the risk of child dearth in the low and high mortality regions. Against expectation, the type of house floor material is not significantly associated with the risk of child death in both the low and the high mortality regions. Similarly the source of drinking water is not significantly associated with the risk of child death in both the low and the high mortality regions. The chi-square test also shows that birth order is not significantly associated with the risk of child death in the low and high mortality regions.

Finally the place of delivery is significantly associated with the risk of child death in the low and high mortality regions of rural Kenya.

CHAPTER FIVE

5.0 RESULTS AND DISCUSSIONS OF THE BIVARIATE AND MULTIVARIATE LOGISTIC REGRESSION ANALYSIS

INTRODUCTION

This chapter briefly discusses the use of regression analysis in general and logistic regression analysis in particular as used in this study.

Regression as a term, means tending to or approaching the mean of any measure, for example people's children tend to regress towards the mean, say height of their parents.

As stated earlier in this study, logistic regression is mainly used when the outcome or dependent variable is dichotomous, that is binary; either yes or no. alive or death, contraception or not contraception and a boy or a girl just to/nention a few example. Since this study looks at the risk of infant and child death, its binary nature manifests itself as death or alive and the independent variables are categorical.

Thus, since the dependent and independent variables in this study are dichotomous and categorical respectively, the use of logistic regression analysis as a method of data analysis was found to be the most appropriate method, and hence its use.

In interpreting the output results of a logistic regression, Beta (B), standard error (S.E), significance (Sig.), and exponentiated [3(Exp[3), otherwise known as the odds ratios are used.

A negative and positive sign of Beta indicates a reducing and increasing effect of the variable in question on the dependent/outcome variable in this case the risk of infant and child death.

Standard errors should not be too large, that they should be around 0.4. Thus standard errors in ihe range of 0.4 can be taken to be reasonably good. Large standard errors are due to fewer cases. To reduce standard errors; variables may be recorded to few categories. The significant values indicate, whether the observed effect was significant or not. The level of significance can be taken at ninety per cent confidence level, ninety-five per confidence level and ninety nine per cent confidence level, symbolised as *, **, and *** respectively. A confidence level below ninety per cent is not worthy talking about. Exponentiated values/odds ratios are used to assess/judge the likelihood or probability of observing one's event of interest, in this case, the probability of infant and child death.

A point to note, however, is that the effects of each variable are interpreted relative to the reference category. As stated earlier, the choice of the reference category is a function of either theory or a category's numerical size. Here the category with the lowest risk of experiencing the event of interest, in this case, Infant and child death is taken as the reference category. Whenever a theory does not exist to enable one choose the reference category, one can use the category with the large size/numerical strength as the reference category.

The logistic co-efficient (|3I) is interpreted as the difference in the predicted log odds of the outcome between those in the higher risk category and those in the reference category. The logistic co-efficient (Bi) is exponentiated to obtain an estimate of the odds ratio associated with each category of the explanatory variable. The odds ratio of the reference category is unity. If the odds ratio of a given category is greater than 1.00. then, it indicates an increased likelihood of experiencing the even of interest in this case the risk of infant and child death, and when the odds ratio is less than 1.00. il indicates a reduced risk of experiencing the event, in this case, the risk of infant and child death rejative to the reference category.

The need for a bivariate logistic regression analysis steins from the problem of multicolinearity inherent in multivariate logistic regression. Multicolinearity as a problem is defined as the Interco relation of the independent variables. That is. one variable may capture the effect of another variable(s) and hence the need for a bivariate logistic regression, where the effect of each explanatory variable is assessed independently.

BIVARIATE LOGISTIC REGRESSION RESULTS

Introd uction

This section presents the results of bivariate regression. This permits the assessment of the effects of each independent variable on the dependent variable; the risk of infant and child death, first, the effects of each independent variable on the risk of infant death are assessed. Then the effect of each independent variable on the risk of child death is also assessed.

Table 5.1.0 shows the results of the bivariate logistic regression. Here the effect of each independent variable on the risk of infant mortality in rural Kenya is shown. The results in the table above, indicates that, except the place of delivery, all the other variables are significantly associated with the risk of infant death.

As the exponentiated p, Exp. ((3) values otherwise known as the odds ratio show, birth intervals less than 24 months increases the likelihood or the risk of infant death while birth intervals of 36 and above months reduces the likelihood of infant death relative to or compared to the reference category; 24-35 months.

Table 5.1.0a Results of bivariate logistic regression showing the effect of independent variables on the risk of infant death (Rural Kenya)

VAR	P	S.E	D.f	Sig.	Exp. ((3)
Birth interval					
24-35*			2		
<24	.3455	.1151	1	.0027***	1.427
36+	-.5224	.1314	1	.0001***	.5931
Maternal highest level of education					
No education. *			2		
Primary education	-.1281	.1 187	1	.2804	.8798
Secondary+	-.3902	.1538	1	.0112**	.6769
Toilet facility					
With a toilet*					
Without toilet	.6329	.1012	1	.0000***	1.8831
Birth order					
2-3*			J		
1	.2335	.1281	1	.0683*	1.2631
4-5	.0447	.13.8	1	.7328	1.0457
6+	.3907	.1159	1	.0007**	1.4781
Source of drinking water					
Piped water*					
IJnpiped water	.5726	.1373	1	.0000***	1.7728
House floor material					
None earth*					
Earth	. 3 ^ 0	.1232	1	.0017***	1.4726
Source of assistance at delivery					
No assistance*			2		
Doctor/Nurse/TBA	-.3458	.1270	1	.0065***	.7077
Relative/other	-.1481	.1550	1	.3392	.8624
No of antenatal visits					
No visit*			J	.0001	
1-3	-.4236	.3664	1	.2476	.6547
4-7	-.3817	.3525	1	.2789	.6827
8+	-.5915	.3801	1	.1 197	1.8067
Maternal age at birth					
20-34*			2		
15-19	.5446	. 1 183	1	.000	1.724
35+	.3151	.1354	1	.0199	1.370
Region					

Central*			5		
Coast	.7090	.2779	1	.0107	2.003
Eastern	.2563	.2895	1	.3760	1.292
Nyanza	1.934	.2498	1	.0000	6.850
Rift valley	.6678	.2557	1	.0090	1.949
Western	.8922	.2651	1	.0008	2.441

Note: * = Reference category

P<0. Is * = 90% confidence level
Significant at P < 0.05 = ** = 95% confidence level
P < 0.01 = ** * = 99% confidence level

This may be because short birth intervals exhaust the maternal body resources and her ability to care for the closely spaced infants. Such closely spaced infants also compete for the scarce resources.

On the other hand, widely spaced birth intervals, that is 36 and above months benefit from sufficient material resources and better care. Similarly wider birth intervals allow the mother's body enough time to recovery and rest before the next conception. Thus wider birth intervals unlike shorter birth intervals ensure ample time for mother's body recovery and accumulation of material resources, both of which have beneficial effects on infant survival.

The results also indicates that, primary and secondary plus highest level of maternal education, have a reducing effect on the risk of infant death compared with the reference category. Thus primary and secondary plus highest level of maternal education reduces the likelihood of infant death relative to the reference category: that is no education. The results indicate that the risk of infant death progressively reduces as maternal education increases. Such an inverse relationship between maternal highest level of education and the risk of infant death may be due to the fact that, a mother's education increases her skills of child care and her physical and emotional maturity to cope with both pregnancy and increased responsibilities of adult life. Education is .! Iso a proxy for increased material resources and knowledge, let alone the change of attitudes in favour of modern health seeking behaviour.

Similarly, infants born in households having no toilet facility have increased risk of death compared to infants born in households having a toilet facility. Thus lack of a toilet facility increases the likelihood of infant death relative to the reference category. Whereas infants do not use toilet facilities, their parents or the maids use such facilities and where there is no toilet facility, the hands of those who take care of infants may have faecal contamination and this is passed on to the infant during feeding or normal body contact. Likewise insects such as houseflies may transport dirt from the nearby bushes to the infants' foods.

The findings also indicated that, birth orders I, 4-3, and 6 plus increase the risk of infant death compared to birth order 2-3. This may be because first-born children infants are normally born when most families have fewer resources and the parents especially the mother may have no practical experience in child-car practices. The mother may also be emotionally immature especially in rural areas where the age at marriage may be low. Similarly, birth orders 4-5 and 6 plus increases the risk of infant death possibly because at such high birth orders, there is steep or cutthroat competition among the children for the scare resources and the mother's body resources to sustain a conception may also be low. Likewise, a mother's attention to an individual infant in terms of material and emotional support may decline with increased number of children and age.

The results also indicate that infants born in households, using non-piped drinking water have a higher risk of death compared to infants born in households that use piped drinking water. Thus non-piped sources of drinking water such as ponds, lakes and rivers increases the likelihood or risk of infant death compared to piped sources of drinking water. This may be because other sources of water other than piped water are more likely to be more contaminated.

Similarly, infants, born in households whose floor material is earth, have a higher risk of death compared to infants born in households whose floor material is non-earth.

This may be because earth as the house floor material may be moist and thus cold. This exposes infants to bad weather as moist households having earth as the main floor material also have poorhouse walls and even roofs. Such poor structures expose infants to both harsh weather and more pathogens in the dust.

The result also indicates that, assistance at delivery by a doctor/nurse/trained or untrained traditional birth attendant or by a relative/ other friends reduces the risk of infant death compared to no assistance at all during delivery. A point to note is that assistance by a doctor/nurse/trained and untrained traditional birth attendant have a higher reducing effect on the risk of infant death than assistance by a relative or other friends. This may be because a doctor/nurse/tba may be able to handle serious birth complications such as obstructed births and even perform an operation than a relative or a friend.

The results also indicate that. 1-3 and 4-7 number of antenatal visits both reduces the likelihood of experiencing infant death relative or compared to the reference category: that is no antenatal visits at all. However. 8 plus antenatal visits increase the risk of infant deaths and whereas this is against expectation, it may be a reflection of excess doses and hence it's adverse effects. The reducing effect of 1-3 and 4-7 antenatal visits is quiet in order as. the more the visits, the more is the protective effect on both the unborn baby and the mother hence its reducing effect on the risk of infant death relative to the reference category. No visits means absence of protection of both the unborn infant and the mother and hence increased chances of infection and hence death.

The results above show that 15-19 and 36 plus years of maternal age at first birth have a reducing effect on the risk of infant death compared to the reference category; 20-35 years. Similarly all the regions in this study of rural Kenya have an increasing risk of infant mortality compared to central province. However, the place of delivery and the timing of the first antenatal visits have no significant effect on the risk of infant death.

Table 5.1.1: Results of bivariate logistic regression showing the effect of Independent variables on the risk of child death

	VAR	P	S.E	D.f	Sig	Exp.(P)
Birth interval	24-35*			2	.1)050	1.5644
	<24	.4475	. 1867	1	.0165*	. 8602
	36+	-.1506	. 1983	1	.4475	
maternal highest education level	No educat*			2	,0149	
	Primary Educat.	-.2402	.1811	1	.1848	.7865
	Secondary Educat.	-.7411	.2569	1	.0039***	.4766
Toilets facility	With toilet*					
	Without toilet	.7299	.1591	1	.0000***	2.0749
Birth order	2-3*			3	.0199	
	1	.1984	.2223	1	.3721	1.2195
	4-5	.5803	. 1975	1	.0033***	1.7865
	6+	.4306	. 1973	1	.0291**	1.5382
Source of drinking water	Piped water*					
	Unpiped water	.7405	.2374	1	.0018***	2.0970
House floor material	Non earth*					
	Earth	.5613	.2118	1	.0081***	1.7529
Place of delivery	In a health facility*					
	Out of a health facility	1.8090	.5048	1	.00003***	6.1042
Assistance at delivery	No assistance*			2		
	Doctor/Nurse/TBA	-1.4836	.3117	1	**0.0000*** **	.2268
	Relative/other	-1.4469	.4166	1	.00005***	.2353
Region	Central *			5		
	Coast	1.355	.6262	1	.£304	3.878
	Eastern	.9413	.6404	1	.1416	2.563
	Nyanza	2.794	.5864	1	.0000	16.34
	Rift valley	1.025	.6041	1	.0896	2.788
	Western	2.119	.5953	1	.0004	8.324

Note* Reference category

P<0.1 = * = 90% confidence level

Significant at P < 0.05 s ** = 95% confidence level

P < 0.01 s ** * = 99% confidence level

Turning to the risk of child death, the results of bivariate regression analysis presented in table 5.1.1 indicates that birth intervals of less than 24 months and 36 and above months increases and reduces the risk of child death respectively compared to the reference category; 24-35 months. Increased risk associated with shorter birth intervals may be due to competition among closely spaced children for the limited resources available. Similarly closely spaced children not only exhausts the mothers body resources as the recovery period is short but also reduces her ability to give individual attention to the children; that is a mother's ability to care for her children is reduced.

The results also indicates that maternal primary and secondary plus highest level of education have a reducing effect on the risk of child death compared to no education. This may be because maternal education is a proxy for increased childcare skills, modern health seeking behaviour and increased material resources. Indeed the results shows that as maternal level of education increases, the risk of child death reduces, hence an inverse relationship between maternal highest level of education and the risk of child mortality.

Further, lack of a toilet facility increases the risk or likelihood of death among children compared to possession of a toilet facility. This may be because absence of a toilet may mean that people use nearby bushes or thickets around t. eir homes and this increases the rate of contamination and through insects such as houseflies even the food stuffs and utensils may be contaminated, hence increased risk of child death.

As expected, the results indicate that delivery out of a health facility increases the risk of child death compared to delivery in a heath facility. This is because deliveries out of a health facility unlike in a health facility get no qualified personnel to attend to pregnancy related complications. Similarly mothers who deliver at home are also less likely to have received enough, if any prenatal health care.

Birth orders 1. 4-5 and 6 plus all increases the risk of child death compared to birth order 2-3. The higher risk of death for birth order I may be due to immaturity, scarce resources and a mother's lack of experience in child-care practices whereas the risk associated with birth orders 4-5 and 6 plus may be clue to increased competition for limited resources and deteriorating ability of a mother's body to sustain a conception due to advanced age and hence reduced strength.

On the source of drinking water, the results indicates that unpiped source of drinking water increases the risk of child death compared to piped sources of drinking water. This may be because unpiped sources of drinking^vater such as ponds, wells, lakes and rivers may contain more pathogens than piped sources of drinking water. Finally having the earth as the main house Floor material increases the risk of child death compared to having non-earth such as cement, polished wood or planks as the main house floor material. This may be because earth as the house floor material may be more contaminated than non-earth floor such as polished wood or cement. Non-earth house floor materials are also cleaner. This variable captures the effect of the environment where the child lives.

The results in the table above indicates that whereas maternal age at first birth has no significant effect on the risk of child death in rural Kenya, the region of residence has a significant effect on the risk of child death. Specifically, all the regions of rural Kenya have an increasing effect on the risk of child death compared to central province. This may be due to the high level of socio-economic development in central province compared to other regions.

Table 5.1.2 Results of multivariate logistic regression showing the effect of independent variables 011 the risk of infant death (Rural Kenya)

VAR	P	S.E	l).f	Sig.	Exp. (|3)
Birth interval 24-35*					
<24	-.1499	.2663	1	.0174	.8608
36+	-.7024	.2500	1	.57351	.4954
Birth order 2-3*				.0293	
4-5	.2400	2843	1	.3986	1.2712
6+	.6549	.2529	1	.0096	1.9249
Source of drinking water, piped *					
Non piped Water	1.0237	.4339	1	.0183	2.7835
No of clinic visits, no visits *				.0000	
1-3	-.0007	,,.2481	1	.9978	.9993
4-6	1.2994	.2905	1	.0000	3.6671

Tabic 5.1.3 Results of multivariate logistic regression showing the effect of independent variables on the risk of child death (Rural Kenya)

VAR	P	S.E	D.f	Sig.	Exp.((3)
Birth interval 24-35*			2	.0045	
<24	.4744	.1883	1	.0118	1.6071
36+	-. 1332	.2027	1	.51 13	.8753
Type of toilet facility. With * without	.4921	.1801	1	.0063	1.6358
Place of delivery In health facility* Out of health facility	1.7705	.7094	1	.0126	5.8735
Birth order 2-3*					
4-5	.5537	.2004	1	.0057	1.7396
6+	.3441	.2009	1	.0867	1.4107
Type of house floor Non earth * Earth	.6104	.2784	1	.0283	1.8413

As the logistic regression results in Table 5.1.2. Indicates, preceding birth intervals of less than 24 months and 36 plus months have a reducing effect on the risk of infant death relative to the reference category; 24-35 months. This is consistent with theory and may be due to the fact short birth intervals do not only deplete the mother's body but also puts stress on the available material and non material resources. Short birth intervals affect adversely the production and supply of maternal milk. The sum effect of all this is to increase the risk of infant death.

Similarly, birth orders of 4-5 and 6 plus, have an increasing effect on the risk of infant death compared to birth order 2-3. Higher birth orders may lead to competition for the already scarce resources and higher birth orders also affects adversely maternal attention and care to their infants. This may lead to depletion of the family resources and hence reduced ability to say afford health care services and other basic needs and hence increased risk of death

The source of drinking water also has a significant effect on the risk of infant death. Specifically, non-piped drinking water such as from ponds, lakes and wells and rivers increases the likelihood of experiencing an infant death compared to piped water. This is consistent with theory and may he due to increased contamination; that is there may be more bacterial and viral load in non-piped water relative to piped water. Such contaminated water has more pathogens and hence increases the incidence of disease episodes and hence increased probability of death.

Finally, clinic attendances, in terms of the number of antenatal visits by a mother have an effect on the risk of infants' death. This is consistent with theory. More specifically, whereas 1-3, and 4-7 visits have a reducing effect on the risks of infant death. 8 and above visits has an increasing effect on the risk of infant death. The first, 1-3 and 4-7 visits offer a protective influence to both the mother and the unborn child while 8 and above visits may become an overdose and hence its adverse effects on infant death, thus its increasing effect on the risk of infant death.

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The remits however, indicates that, maternal highest education, type of toilet facility, place of delivery, type of house floor material, assistance at birth and the timing of first antenatal visits have no significant effect on the risk of infant death. The fact that most biological related variables such as birth interval and birth order have significant effect on the risk of infant death whereas environmental related variables such as type of house floor material have a significant effect on the risk of child death is consistent with theory. This is so because infant deaths are more genetically caused than child deaths, which are more environmentally induced. Indeed, since infants are not as mobile as children, their interaction with the surrounding environment such as house floors is minimal. Thus infant deaths unlike child deaths are more genetically induced and are more related to such factors as birth interval, birth order, and the number of antenatal care their mothers receive, as a protective measure against infection.

The logistic regression results in table 5.1.3 on the effects of each independent variable on the risk of child death in rural Kenya indicate that: preceding birth interval, type of toilet facility, place of delivery birth order, and type of house floor material have a significant effect on the risk of child death, whereas maternal highest education level, and source of drinking water have no significant effect on the risk of child death.

More specifically, birth intervals less than 24 months increase the risk of child death compared to birth intervals of between 24-35 months. On the other hand, birth intervals of 36 and above months reduce the risk of child death compared to birth interval of between 24-35 months. This is consistent with the theory that shorter birth intervals (less than 24 months) are a risk factor whereas longer birth intervals have beneficial effects on child survival. Shorter birth intervals deplete maternal body resources whereas longer birth intervals allows for maternal body recovery before the next birth and allows the for the accumulation of material resources for such children.

Similarly, the type of toilet facility has an effect on the risk of child death. Children born in households having no toilet facility have a higher risk of death compared to children born in households having at least a toilet facility. This may be because children born in household having no toilet facility may dispose their faecal material in the nearby bushes and such faeces may reach the children's food through, their hands or with the aid of housetlies and hence the risk of contracting diseases such as cholera.

The results also indicate that, children born out ot a health facility have a higher risk of death compared to children born in a health facility. This is consistent with theory and may be because children born outside a health facility may die in case of complications during delivery such as obstructed births and inability to deliver normally compared to children born in a health facility where an operation may be done by a doctor in cases of complications and prolonged labour pains. Children born out of a health facility are also less likely to have received adequate vaccinations if any and their mothers are less likely to have received antenatal care if any.

The data also indicates that children of birth orders. 4-5 and 6 plus have or face a higher risk of death compared to children of birth order 2-3. This may be because higher birth orders not only depletes maternal body resources but also depletes the scarce resources due to their number and hence increased competition for the scarce resources.

Finally, the type of house floor material has an effect on the risk of child death. Specifically, the results indicates that earth as the main house floor material increases the risk of child death compared to non-earth as the main house floor material. Thus children born in households whose main floor material is earth have higher risks of death compared to children whose house floor material is non-earth. The house floor material is a proxy for the environment in which children who are now mobile live. Earth as the main house floor material is likely to be moist and more contaminated relative to cemented house floor material, it thus presents more risks than non-earth house floors. The data however, indicates that maternal highest education level and source of drinking water are not significantly associated with the risk of child death.

A point to note, however is that even though the results indicates that maternal highest education level is not significantly associated with the risk of child death, the effect of maternal highest education level, on the risk of child death may have been captured by such variables as the type of toilet facilities and the house floor material and hence its actual effects on the risk of child death may have been lost.

Indeed during the bivariate logistic regression, maternal highest education level of primary and secondary plus had a significant effect on the risk of child death. Similarly, and especially in the rural parts of Kenya, there are many people, both young and old for example the large scale farmers and their children, who may not have any education, yet they and their children may be very rich and can afford good houses and medical care. In the same way. the more educated a mother is, the more even educated may be her husband. Thus the effect of maternal education may have been captured by such variables as the type of toilet facility and type of house floor material.

Table 5.1.4: Results of Bivariate logistic regression showing effects of independent variables on the risk of infant death in the high (Nyanza/Western) mortality regions.

Introduction

This section compares the effects of each independent variable on the dependent variables; namely the risk of infant death, in the high and low mortality regions of rural Kenya. The aim here being to find out if there is any difference on the effects of independent variables on the dependent variables in the high and low mortality regions of rural Kenya.

Table 5.1.4.a (high mortality region) infant

Variable	P	S.E	D.f	Sig.	Exp.fi
Birth interval					
24-35*					
<24	.3054	.1544	1	.0079	1.3571
36+	-.5289	.1808	1	.0034	.5892
Maternal educ. No educ*					
Pry. Educ.	-.0155	.1863	1	.9336	.9846
Second.+	-.5714	.2310	1	.0134	.5647
Toilet facility.					
With toilet*					
Without toilet	.7296	.1332	1	.0000	2.0742
Source of water					
Piped water*					
Non-piped .	.8763	.3035	1	.0039	2.4020

Table 5.1.4.1) (low mortality region)

Variable	P	S.E	D.f	Sig.	Exp.fi
Birth interval					
24-35*	.4324	.2180	1	.0474	1.5410
<24	-.3629	.2465	1	.1410	.6957
36+					
Maternal educ.					
No educ.*					
Pry. Educ.	-.7818	.2120	1	.9336	.4576
Secondary+	-7350	.2775	1	.0134	.4795
Birth order					
2-3*					
1	-.0226	.2572	1	.9299	.9776
4-5	-.0529	.2571	1	.8369	.9484
6+	-.6714	.2140	1	.0017	1.9570
No of antenatal visits					
No visits*					
1-3	-.2842	.7874	1	.7182	.7526
4-6	-.3276	.7659	1	.6689	.7207
7+	.9921	.7831	1	.2052	2.6968
Timing of first antenatal visits					
0-3*	.1418	.623^	1	.8199	1.1524
4-6	.9449	.6502	1	.1462	2.5725
7+					

Table 5.1.5 (Child) Results of bivariate logistic regression showing the effects of independent variable on the risk of child death in the high (Nyanza/Western) and low (Central/Rift valley) mortality regions.

Table 5.1.5 Low mortality region

Variable	P	S.E	D.f	Sig.	Exp (3
Toilet facility With toilet* with out	1.0138	.4170	1	0.0151	2.7559

Table 5.1.5 High mortality region

Variable	P	S.E	D.I"	Sig.	Exp [3
Maternal educ., No educ.*					
Pry educ.	-.3261	.2414	1	.1768	.7218
Secondary +	-.9816	.3240	1	.0025	.3747
Toilet facility With toilet*					
Without toil.	.5084	.1977	1	.0101	1.6626
Place of delivery In health facility *					
Out of health facility	1.4732	.5869	1	.0121	4.3532

The results in table 5.1.4 indicates that, birth interval of less than 24 months increases the risk of infant death in the high and low mdftality regions relative to the reference category; that is birth interval between 24-35 months. The results also show that birth interval of 36 and above months reduces the risk of infant death in the high (Nyanza/Western) and low (Central/Rift valley) mortality regions compared to the reference category. I his is consistent with the theory that short birth intervals depletes both the maternal and material resources while long birth intervals allows the mothers body enough time to rest and allows for accumulation of material resources; and hence their adverse and beneficial influences respectively.

The results also indicates that in both the high and low mortality regions, primary education and secondary plus highest level of maternal education have a reducing effect on the risk of infant death compared to no education. This is consistent with the theory that maternal education; through its effect on increased child care skills and increased resources all reinforce each other to lower the risk of infant death.

Maternal education by taking more of a woman's time before marriage gives time for body and mental maturation both of which are beneficial to infant survival. Whereas, the lack of a toilet facility in the high mortality region of Nyanza/Western increases the risk of death compared to the reference category, lack of a toilet facility in the low mortality region; Central/Rift valley region relative to the reference category has no significant effect on the risk of infant death.

However, the place of delivery in both regions has no significant effect on the risk of infant death. This may be because most births in rural areas are born at home rather than in a health facility; possibly clue to distance barrier, lack of financial resources and traditional attitudes encouraging delivery at home.

Similarly, whereas birth order has no significant effect on the risk of infant death in the high mortality region of Nyanza/Western, birth orders I, and 4-5 increases the risk of infant death compared to the reference category; that is birth order 2-3. The results however indicates that birth orders of 6 plus increases the risk of infant death compared to birth order 2-3. The reduced risk of death among infants of birth order 1, and 4-5 may be due to enough material and psychological resources to the infant. The increased risk of death associated with birth orders 6 plus may be due to depletion of material and maternal mental/psychological resources in the household.

The results, too. indicates that non-piped sources of drinking water in the high mortality regions of Nyanza/Western increases the risk of death among infants compared to piped sources of water. This is consistent with the theory that non-piped drinking water may have more pathogens than piped water. However, source of drinking water in the low mortality region has no significant effect on the risk of infant death.

The results also indicate that both the type of house floor material and assistance at birth in both regions have no significant effect on the risk of infant death. However, whereas clinic attendance, in terms of the number of antenatal visits have no significant effect 0l1 the risk of infant death in the high mortality region, the clinic attendance in terms of the number of antenatal visits has a significant effect on the risk of infant death in the low mortality region (Central/Rift valley). More specifically, 1-3. 4-7_and 8+ numbers of antenatal visits have a reducing effect on the risk of infant death compared to no antenatal visits. Antenatal visits' reducing effect on the risk of infant death may be due to its protective effect on both the mother and the unborn baby. Finally, whereas the timing of the first antenatal visits has no significant effect on the risk of infant death in the high mortality region; (Nyanza/Western), the timing of the first antenatal visits; 4-6. and 7+ increases the risk of infant death compared to 0-3 visits. This may be due to the adverse effects of late antenatal visits. The antenatal visits should be made in good time for its protective effects to be fully harnessed, or else too late visits may be of no use.

Thus the only two variables that had a consistent significant effect on the risk of infant death were preceding birth interval and maternal highest education level while place of delivery, source of drinking water and assistance at delivery had no significant effect on the risk of infant death in the two regions. The remaining variables showed/had varied effect on the risk of infant death. Whereas the type of toilet facility has an effect in the high mortality region, it has no effect in the low mortality region. Similarly birth order has no effect in the high mortality region but has some effect in the low mortality region. Finally whereas the timing of the first antenatal visit has no significant effect in the high mortality region, it has a significant effect on infant mortality in the low mortality region.

Turning to the effect of the independent variables on the risk of child death in the low and high mortality regions of rural Kenya, the results in table 5.1.5 indicates that; birth interval has no significant effect on the risk of child death in the two regions. However primary and secondary plus level of maternal education, has a reducing effect on the risk of child death in the high mortality region compared to no education.

The results also indicate that primary and secondary plus level of maternal education has no significant effect on the risk of child death in the low mortality region. It is also evident from the results that lack of a toilet facility in the two regions increased the risk of child death compared to possession of a toilet facility. This is consistent with theory and may be due to the fact that lack of a toilet means that faecal material is disposed in the nearby bushes and this may contaminate the environment in which the children play. Young mobile children may also pick such faeces and even eat them. The houseflies may also deposit pathogens in such faeces into the children's food. The sum effect, being to increase episodes of diseases and eventually death.

The results also indicate that delivery out of a health facility increases the risk of child death in both the high and low mortality regions compared to delivery in a health facility. This may be because women who deliver out of a health facility may face difficulties in cases of complications of pregnancy such as obstructed births. Such cases of complications are handled by qualified doctors through operations in a health facility. Women who prefer to deliver at home are also less likely to have received antenatal healthcare services and hence the risk of child death.

Finally birth order, source of drinking water, and type of house floor material have no significant effect on the risk of child death in both the low and the high mortality regions. In a nutshell therefore, while infant mortality is related to maternal factors such as birth interval, birth order, maternal education, assistance at birtl^and place of delivery, child mortality is more related to environmental factors such as the type of toilet facility, place of delivery.

Indeed maternal education effects have manifested themselves in both infant and child mortality. This is possibly because maternal education plays a leading role in a mothers body maturation by delaying entry in to marriage and through income, u improves the environmental conditions such as house floor material and toilet facilities; both of which reduces the risk of infant and child mortality respectively.

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Table 5.1.6. Results of a multivariate logistic regression showing the effects of independent variables on the risk of infant death in the high (Nyanza/Western) and low (Central/Rift valley) mortality region

Table 5.1.6 a	High mortality region (Nyanza/Western)				
Birth interval 24-35* <24 36+	• .1121 -.9441	S.E .3335 .3989	D.f 1 1	Sig. .7367 .0180	Exp • 1.1187 .3890
Toilet facility With toilet * Without toilet	.8962	.3098	1	.0038	2.4503

Table 5.1.6.b low mortality region (Central/Rift valley^

Variable	•	S.E	D.f	Sig.	Exp •
Maternal educ. No educ.* Pry. Educ. Second.+	 -1.2144 -.9933	 .4980 .6025	 1 1	 .0147 .0992	 .2969 .3703
No of antenatal visits No visits * 1-3 4-6	 -.05951 1.9451	 .5208 .5247	 1 1	 .9090 .0002	 .9422 6.9942
Timing of first antenatal visits 0-3 * 4-6 7+	 .6241 1.7254	 .7942 .8380	 1 1	 .4320 .0395	 1.8665 5.6148

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Table 5.1.6. Results of a multivariate logistic regression showing the effects of independent variables 011 the risk of infant death in the high (Nyanza/Western) and low (Central/Rift valley) mortality region

fable 5.1.6 a High mortality region (Nyanza/Western)

Birth interval	B	S.E	D.f	Sig.	Exp β
24-35*					
<24	.1121	[illegible]	1	.7367	I.I 187
36+	-.9441	.3989	1	.0180	.3890
Toilet facility					
With toilet *					
Without toilet	.8962	.3098	1	.0038	2.4503

Table 5.1.6.1) low mortality region (Central/Rift valley)

Variable	B	S.E	D.f	Sig.	Exp β
Maternal educ.					
No educ.*					
Pry. Educ.	-1.2144	.4980	1	.0147	.2969
Second.+	-.9933	.6025	1	.0992	.3703
No of antenatal visits					
No visits *					
	-.05951	/' 5208	1	.9090	.9422
1-3	1.9451	.5247	1	.0002	6.9942
4-6					
Timing of first antenatal visits					
0-3 *					
4-6	.6241	.7942	1	.4320	1.8665
7+	1.7254	.8380	1	.0395	5.6148

Table 5.1.7. Results of a multivariate logistic regression showing the effects of independent variables on the risk of child death in the low (C entral/Rift valley) and high (Nvanza/Western) mortality regions.

Table 5.1.7.a high mortality region (Nyanza/Western)

Maternal educ.	P	S.E	D.f	Sig.	Exp (3
No educ.*					
Pry. Educ.	-.4231	.2481	1	.0882	.6550
Second.+	-.9760	.3419	1	.0043	.3768

Table 5.1.7 b low mortality region (Central/Rift valley

Birth interval	B	S.E	D.f	Sig.	Exp (J
24-35*					
<24	.2051	.4403	1	.6413	1.2277
36+	-1.639	.7697	1	.0278	.1838

As the multivariate iogistic regression results of both the high and low mortality regions indicate in tables 5.1.5. preceding birth interval has a significant effect on the risk of infant death in the high mortality region whereas it has no significant effect in the low mortality region.

Specifically, birth intervals of less than 24 months increase the likelihood of infant death compared to birth intervals of between 24-35 months. Similarly birth interval of 36 and above months reduces the likelihood of infant death compared to the reference category; 24-35 months. This is consistent with the theory that short birth intervals unlike long birth intervals deplete the mother's body resources and childcare quality let alone the depletion of material resources associated with closely spaced births.

The results also indicate that maternal education level has an effect on the risk of infant death in the low mortality region while it has no effect in the high mortality region. Specifically, primary and secondary plus level of maternal education reduces the risk of infant death compared to no education in the low mortality region. This is consistent with theory as maternal education is a proxy for increased skills and knowledge of infant health care and belief in modern medicine and technology.

Increased education especially of the mother also increases the age of the mother at first birth and hence promotes the maturation of the mother emot ionally and psychologically, both of which are beneficial to infant survival.

The effect of maternal education on infant mortality in the high mortality region may have been insignificant because of widespread poverty and low education attainment especially by women and hence other factors such as birth interval and type of toilet facilities may have captured its effects.

The results in table 5.1.5 also indicate that, the type of toilet facility has a significant effect on the risk of infant mortality in the high mortality region. However toilet facility has no significant effect on the risk of infant death in the low mortality region. The results also show that lack of a toilet facility increases the likelihood of infant death compared to possession of a toilet facility.

This is theoretically sound especially in the high mortality region of Nyanza and Western, as the temperatures are high, and population is also high coupled with high poverty levels especially in

Nyanza. This conditions means many families have no toilet facilities and hence use the thickets and open fields. This may be a risky factor for infant survival as their food may be contaminated. This may not be the case in low mortality region especially central province as most families have at least a toilet compared to Nyanza.

As expected the results indicate that the clinic attendance in terms of the number of antenatal visits has a significant effect on the risk of infant death in the low mortality region while it has no significant effect on the risk of infant death in the high mortality region. Specifically 1-3 visits and 4-7 visits have a reducing and increasing effect on the risk of infant death respectively compared to no antenatal visits. The first 1-3 antenatal visits are critical to infant survival as they affect protection to both the mother and the unborn baby. Excess antenatal visits may have adverse effects on the risk of infant death as it may affect adversely both the infant and the mother.

Finally, the results indicate that thatiming of first antenatal visit has an effect on the risk of infant death. The results also indicate that, 4-6 and 7+ timing of first antenatal visits, both have a reducing effect on the risk of infant death compared to 0-3 visits. This shows that increased timing of first antenatal visits have a beneficial effect on infant survival compared to 0-3 visits.
Thus effective and efficient timing of first antenatal visits reduces the risk of infant death compared to 0-3 visits. This is so because such visits provide protective influence on the infant. The results also indicate that whereas preceding birth interval, maternal highest education level, type of toilet facility, clinic attendance and its timing have significant effect on the risk of infant death in both the low and high mortality regions, place of delivery, birth order, source of

drinking water, type of house floor material, and assistance at birth have no significant effect on the risk of infant death.

The multivariate logistic regression results in table 5.1.7, showing the effect of each independent variable on the risk of child death in both the high and low mortality regions of rural Kenya, indicates that; except birth interval and maternal highest education level, all other independent variables have no significant effect on the risk of child death.

More specifically, the results indicates that birth intervals of less than 24 moths and those of 36 and above months have an increasing and reducing effect on the risk of child death in the low mortality region compared with birth intervals of between 24-35 months respectively. This is consistent with theory and may be because shorter birth intervals unlike longer birth intervals depletes the mothers body resources and leads to competition for the limited resources. Similarly shorter birth intervals unlike longer birth intervals reduce the quality of attention mothers give to their children.

However birth interval has no significant effect on the risk of child death in the high mortality region. On the effect of maternal education on ihe risk of child death, in the high mortality region, the results indicates that, both primary and secondary plus level of maternal education have a reducing effect on the risk of child death compared to no education. This is consistent with the theory that increased maternal education lowers the risk of child death. This may be because maternal education is a proxy for improved childcare skills and maternal resources, both of which improve the survival status of children. However birth interval and maternal highest education level, had no significant effect on the risk of child death in the high and low morality regions respectively.

In conclusion, the hivariate and multivariate logistic regression results on the effect of independent variables on the risk of infant and child death indicate that, in the bivariate logistic regression model for both infants and children in rural Kenya, maternal highest education level has a significant effect on the risk of infant and child death while it had no significant effect in ihe multivariate logistic regression analysis model. This means that whereas maternal education has an effect on the risk of infant and child death, this effect is captured by other variables such as house floor material, source of drinking water, and type of toilet facilities, and that is why its effects disappears when other competing variables are introduced into the model.

At the bivariate logistic regression analysis stage, maternal education has a significant effect on the risk of infant and child death in the high mortality region. However, it has an effect on the risk of infant and not on the risk of diild death in the low mortality region.

When other variables are introduced into the model, during multivariate logistic regression analysis, maternal education loses its effect on the risk of child death in the low mortality region while retaining its effect on the risk of infant death in the same region. Maternal education however loses its predictive power or effect on the risk of infant death while retaining its effect on the risk of child death in the high mortality region.

Thus while maternal education losses its predictive power or effect when other variables are introduced in the multivariate analysis in rural Kenya, it retains its effect on the risk of infant death in the low mortality region while losing its effect on the risk of child death in the same region.

In the high mortality region, maternal education retains its effect on infant and child mortality except for infant mortality at the multivariate analysis stage.

6.(1 CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The summary of the main findings according to the original objectives set out in chapter one. conclusions and important issues for policymaking and further research interest are provided in this final chapter

6.3 Summary

First, frequencies of each independent selected variable were run. This was done to permit proper and effective recording of the variables into different and appropriate categories for further analysis.

On completing the frequencies, cross tabulation/chi-square tests were done to test if any. the association between each independent variable and the dependent variable(s); namely the risk of infant and child death.

Thus the preliminary tests of the data were carried out in chapter four of this study and results discussed in the same chapter. This is shown in chapter four; tables' 4.1.0 through table 4.1.5. Further and detailed data analysis involved both the bivariate and the multivariate logistic regression. This was done and the results are shown in chapter five. The aim or rationale of the bivariate logistic regression analysis as earlier stated was to examine the separate effect of maternal education on infant and child mortality along with other socio-economic, demographic and environmental determinants also believed to affect the risk of infant and child mortality.

Similarly, multivariate logistic regression analysis was carried out so as to examine the effect of each independent variable on infant and child mortality when other explanatory variables known to influence infant and child mortality are introduced

This permits one to know the variables, whose effect are captured by other variables, for example, maternal highest education lost its effect in the multivariate analysis model. This implies that the effect of maternal education on the risk of infant and child mortality was captured by other variables.

The results of the bivariate logistic regression in rural Kenya shown in table 5.1.0: indicating the effect of each independent variable on the risk of infant death, suggests that: whereas preceding birth interval, maternal highest education, type of toilet facility, birth order, source of drinking water, type of house floor material, assistance at delivery, and clinic attendance in terms of the number of antenatal visits, have an effect on the risk of infant death, timing of first antenatal visits and place of delivery have n^significant effect on the risk of infant death. Similarly, the results in table 5.1.1 indicate that all the predictive variables on the risk of child death have a significant effect on the risk of child death.

The multivariate logistic regression results in table 5.1.2 showing the effect of each independent variable on the risk of infant death suggests that whereas birth interval, birth order, source of drinking water, and clinic attendance, in terms of the number of visits have a significant effect on the risk of infant death, maternal highest education level, the type of toilet facility, place of delivery, type of house floor material, assistance at birth and the timing of first antenatal visits have no significant effect on the risk of infant death.

The multivariate logistic regression results showing the effect of each independent variable on the risk of child death in rural Kenya, shown in table 5.1.3 indicates that birth interval, type of toilet facility, place of delivery, birth order, and the type of house floor material have a significant effect on the risk of child death while maternal highest education and source of drinking water have no significant effect.

Turning to the high and low mortality regions, the bivariate logistic regression for the high mortality region (Nyanza/Western) on the risk of infant death, shown in table 5.1.4 a indicates that, besides birth interval, maternal highest education level, the type of toilet facility, and source of drinking water, all the other explanatory variables have no significant effect on the risk of infant death.

The results on the risk of child mortality shown in table 5.1.5 a indicates that apart from maternal highest education level, type of toilet facility, and place of delivery all other predictive variables have no significant effect on the risk of child death.

The multivariate regression results for Nyanza/Western, showing the effect of each independent variable on the risk of infant death in table 5.1.6 a indicate that except birth internal and the type of toilet facility all other explanatory variables have no significant effect on the risk of infant death. Similarly the results in table 5.1.7 a indicates that besides maternal highest education, the type of toilet facility, and the place of delivery, all other explanatory variables have no significant effect on the risk of child death.

The bivariate logistic regression for the low (Central/Rift valley) mortality region in table 5.1.4 b indicates that except for birth interval, maternal highest education level, birth order, clinic attendance in terms of the number of visits and the timing of first antenatal visits all other explanatory variables have no significant effect on the risk of infant death. Similarly the bivariate logistic regression results in table 5.1.5. b indicates that the only independent variable, which has a significant effect on the risk of child death, is the type of toilet facility.

Finally, the multivariate regression results for Central/Rift valley region shown in table 5.1.6.b show that only three explanatory variables namely; maternal highest education level, clinic attendance, and its timing have significant effect on the risk of infant mortality. Similarly the results in table 5.1.7.b indicate that birth interval is the oniy variable which has a significant effect on the risk of child mortality. ^

Thus whereas birth interval, maternal education, type of toilet facility, and source of drinking water affects the risk of infant mortality in the high mortality region, birth interval, maternal education, birth order number of antenatal visit and their timing affects the risk of infant mortality in the low mortality region. Similarly while toilet facility, maternal education and place of delivery affects the risk of child mortality in the high mortality region, the type of toilet facility and birth interval affects the risk of child mortality in the low mortality region.

Thus the effects of maternal education on the risk of infant and child mortality in the low and high mortality regions differ slightly because whereas the main determinant of infant and child mortality in the high mortality region are the source of drinking water and place of delivery, the main determinant in the low mortality region is birth order.

Thus whereas the effect of maternal highest education on the risk of infant and child mortality in rural Kenya is clearly seen in the bivariate logistic regression analysis, maternal education loses its effect when other explanatory variables arc introduced in the multivariate model. This indicates that the effect of maternal education on the risk of infant and child mortality is captured by other variables.

<»4 CONCLUSION

As was stated in chapter one, this study sought to examine, if any, the effect of maternal education on infant and child mortality in rural Kenya. The effects of maternal education on infant and child mortality in the hiuh (Nyanza/western) and low (Central/Rift valley) regions were also to be compared.

To achieve the said objectives, both the bivariate and multivariate logistic regression analysis was used in this study. The study employed the 1998 Kenya demographic and health survey data (KDHS).

Selected socio-economic, demographic and environmental variables were used in this study. Specifically this study used, preceding birth interval, maternal education, toilet facility, birth interval, source of drinking water, main house floor material, assistance at birth, place of delivery and clinic attendance and its timing, for infants, and for children, all except clinic attendance, its timing and assistance at delivery were used. The three variables were excluded for children because they only apply to recent births.

Since birth interval, birth order, source of drinking water, type of toilet facility, and maternal highest education level were found to be strong predictors of infant and child mortality, the government should encourage the schooling/education of the girl child as this promotes spaced and fewer births. This can be done through providing bursaries in schools for the girl child. The government should also provide financial assistance to the people in the rural areas of Kenya to enable them have toilets or better toilet facilities. The government should also provide directly or indirectly through community projects clean piped water as the two lowered the risk of infant and child mortality.

In general the government in collaboration with other development partners and community-based projects should emphasise and encourage the use of both preventive and curative health care practices/services and better nutrition.

(>.5 Recommendation for policy makers and further research

Recommendation for policy makers

Since maternal education, according to the bivariate logistic regression results of this study affects the risk of both infant and child mortality, education and especially for girls should be enhanced by policy makers by providing the girl child, particularly from poor families with

Specifically, whereas population policies and programmes in the low mortality region should emphases increased maternal education, number of antenatal visits and its timing and increased birth intervals to lower the risk of infant and child mortality respectively, the same should emphases increased birth interval together with possession of better toilet facilities and increased maternal education to lower the risk of infant and child mortality in the high mortality regions respectively.

Finally, birth interval, the number of antenatal visits and its timing and maternal education should be enhanced in the low and high morality regions respectively as these factors lower the risk of infant and child mortality.

Recommendations for further research

First, future research should concentrate its efforts in investigating which variables captures the effect of maternal education on the risk of Infant and child mortality.

Secondly, future research should l^pus on the causal mechanisms through which maternal education operates to affect the risk of infant and child mortality in rural Kenya and the country at large.

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