DETERMINANTS OF CHILD MORTALITY IN KENYA

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DECLARATION

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

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

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DEDICATION

To my dear mother, for supporting and seeing me through every academic milestone, including this one which you gave your unwavering support even with the numerous delays in completion of this project.

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ABSTRACT

Child mortality has been considered an index that reflects the degree of poverty and deprivation of a population. Millennium Development Goal 4 specifically describes targets which countries should aim for as a show of improvement of the overall health of a population by reducing child mortality. In the recent decades, information on trends and determinants of child mortality have been the basis of planning, implementation and evaluation of health policies and programs. Proximate determinants that directly influence morbidity and mortality as outlined by Mosley and Chen 1984, are the foundation of the Demographic and Health Surveys which have over the years increased knowledge on the determinants of child survival in many countries.

Using the KDHS of 2008/9, this study presents an analysis of determinants of child mortality with the aim of establishing whether child survival strategies which aim at reducing the effect of child mortality determinants should be continued or sustained over years to win the war on child mortality. In some instances, reference will be made to the preceding KDHS of 2003 to bring out the trend element in the reduction of child mortality.

For the study methodology frequencies provided a description of the study population while the Logistic regression was used for the bivariate analysis which showed the association between study variables and dependent variables. Of significance was age at first birth of the mother, birth order, birth interval, mother's and father's level of education, mothers working status-confounded by whether formal or informal and households access to sanitation and water. Multivariate analysis using the three models of demographic factors, socio economic and cultural factors and environmental factors was used to measure the net effect of demographic variables on the risk of death before age five.

The study findings showed that at the multivariate level, significant determinants of child mortality according to KDHS of 2008/9 are the duration of the succeeding birth interval; where a child was less likely to die when the interval between births is 24 months and above. The region of residence was also a significant variable; with children from all regions in the country being less likely to die when measured against Nairobi. The data from the study also showed that socio-culturally a child whose parents are Muslims or do not subscribe to any religion was less likely to die and finally, a child residing in a household with no access to piped water has reduced likelihood of mortality.

The study therefore concluded that factors affecting child mortality can over time change in intensity and should therefore be reassessed regularly. Key of these is region of residence, religion and access to piped water. However there are still other factors that retain their significance as determinants of child mortality at the same level e.g. age at first birth of the mother, birth order of the reference child and duration of the succeeding birth interval are consistent with reviewed literature on child mortality determinants where for example a child of higher birth order is more likely to die and one whose birth interval is 24 months or more is less likely to die.

Key recommendations deduced from this study and also based on the literature reviewed for the purpose of the study show that there is indeed room for further analysis of determinants of child mortality found to be significant. This include region of residence, religion and access to piped water. At the same time, the study recommends that because of the role succeeding birth interval of 24 months and above have played in reducing mortality, the incentives that have reinforced these intervals should be encouraged if child mortality is to be reduced over time.

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CHAPTER ONE

INTRODUCTION

1.1 Background

By definition, childhood mortality is the probability of dying before the fifth birthday. It is also commonly referred to as under five mortality. Child mortality on the other hand is a subset of childhood mortality. Child mortality is defined as the conditional probability of dying between age one and before age five. KDHS (2003) Child mortality can be viewed as a measure of children's wellbeing. This clear distinction exists because before the first birthday, primary factors of mortality are related to biological conditions. After one year of age, mortality is mainly as a result of diseases and accidents.

Levels of child mortality are an indication of the quality and efficiency of a range of societal factors such as economic advancement, levels of hygiene, public health interventions, and the environment a population is exposed to among other factors. This has resulted in child mortality being rated and recognized as one of the best indicator of socio-economic development since a society's life expectancy at birth is determined by the survival chances of infants and children. Child mortality rate is a refined and sensitive index of the total cultural milieu of a community or a country. It reflects among other things, the state of public health and hygiene, the environmental sanitation, cultural mores about feeding and clothing, socio-economic development, and above all, the people's attitude towards the dignity and value of human life itself. Kwabena A Kyei, (2011).

Child mortality trends have varied in the course of history. For instance, the period between World War II and the early 1970s, saw child mortality being halved in both developed and developing nations (Kiragu, 2006). These tremendous gains were achieved partly through

interventions aimed at communicable diseases: diarrhea, respiratory infections, malaria, measles and other vaccine preventable diseases. Despite the gains that resulted in this reduction, a sizeable gap still exists between most developed countries (MDCs) and least developed countries (LDCs). According to the Countdown report of 2012 since 1990 child deaths have reduced from 12 million to 7.6 million in 2012. However this number of child deaths is still high. The report additionally notes that every two minutes 30 children die of illness that could have been prevented or effectively treated. Of the worst performing countries in achieving their child survival goals, nine out of ten are in Africa.

Until the 1960s, most of the highest child mortality countries were in West Africa with the lowest mortality countries being found in South and Eastern Africa (Kiragu, 2006). Come the 1970s and early 1980s, the trend changed and child mortality fell rapidly in some Western African countries, but stagnated at relatively high levels in parts of Eastern and Southern Africa (Timaeus, 1997). In Kenya, the 15-20 year period of strong economic growth following independence provided a conducive environment for a decline in under five mortality in general and child mortality specifically through an increase in government expenditure in public health interventions. As such, before the economic decline experienced in the 1980s, Kenya's under five mortality fell at an annual rate of 4% per annum with this decreasing to 2% per annum in the early 1980s (Kiragu, 2006) and the same can be said of child mortality in the same period. The economic hardships led to a reduction in government expenditure which coincided with a reverse of these mortality rates; it not only stopped decreasing but also begun heading in the opposite direction (Hill et al, 2001). Other associated factors during this period include stagnation in growth of per capita income, declining immunization levels, falling school enrollment and the emergence of the HIV/AIDS epidemic (ibid).

Based on KDHS in the year's preceding 2008/2009, child mortality in Kenya increased between 1998 and 2003 from 40 to 41 per 1,000 live births. In the subsequent KDHS of 2008/9 child mortality decreased significantly to 23 per 1,000 live births. It has continually been observed that several broad factors explain child mortality in Kenya and other developing countries. These factors can be categorized into Socio economic - cultural factors, Demographic factors and Environmental factors.

1.2 Problem Statement

Globally, reductions in child mortality have been achieved through interventions that are in most instances promoted by government and development agency programmes that promote child survival. In the period preceding the 2003 KDHS, it was observed that Kenya's socio-economic growth was sluggish, (NCAPD and MEASURE, 2006) and thus had a negative effect on government expenditure. However, public health interventions are not the sole factors associated with reduction in child mortality rate; it has been established that determinants also exist in the household in which a child is located. According the World Health report of 2008, primary health care embraced a holistic view of health that went well beyond a singular medical model. It recognized that many root causes of ill health and disease lie beyond the control of the health sector and thus must be tackled through a broad, whole of society approach.[1] An assessment of KDHS findings over the years has revealed that where approaches that are known to work in sustaining reduced mortality rate are not consistently applied, reversal in positive trends is inevitable. Therefore a clear understanding of this perceived point at which causes of

[1] A summary of world health report 2008. "Primary Health Care: Now More Than Ever"

death can be attributed factors beyond disease and ill health is important for policy makers to allow for a bench mark against which interventions can be measured for potential of success.

In order to implement effective child survival programmes, there is the need to continually identify the factors that contribute to child deaths and assess their effects. More so, with the changing times, it is necessary to give more emphasis on using the current data to identify the segment of population where programmes need to be strengthening in order to achieve the goal for reducing child mortality. The goal of this study is to therefore gain a further understanding of the determinants of child mortality based on the KDHS of 2008/9 and backed by literature reviewed gain a further understanding of these determinants. It is against this background For example, It is important to take note of sharp mortality differentials among various regions in the country as different intervention strategies may be required to arrest the situation. In some instances, contrasts will be made to the preceding year to better understand the varying changes in trends.

1.3 Research Questions

This study aims to answer the following question:

What are the determinants of child mortality in Kenya according to KDHS 2008?

1.4 Objectives of the Study

The general study objective is to examine the determinants of child mortality in Kenya according to KDHS 2008.

Specific Objectives

1. To determine the influence of socio-economic factors on child mortality
2. To examine the effects of demographic factors on child mortality.
3. To determine the influence of environmental factors on child mortality.

1.5 Justification of the Study.

Reducing child mortality is the fourth Millennium Development Goal (MDG)- specifically with a target of reducing the mortality rate by two thirds between 1990 and 2015. Despite numerous interventions and action plans, very little evidence exists on why child mortality rates are still quite high in Kenya (Macharia, 2008). This study will complement others that have been carried out on the determinants of child mortality and in particular, examine these factors as per the 2008/2009 KDHS.

By studying the determinants of child mortality in the five years preceding the 2008/9 KDHS, it is possible to assess the performance of effectiveness of programmes targeted at child improving child survival outcomes. There is need to reassess determinants of child mortality with an aim of informing policy that will even further narrow the gap of mortality rates in line with the improvements in per capita income level of a developing country like Kenya. In addition, knowledge of the determinants of child mortality also informs policy and programme designers to concentrate their efforts on the significant variables that require improvement or review and thus work towards lowering the high trends of mortality. As the world draws closer to 2015; the year by which countries should have achieved MDG targets, an understanding of the most up to date figures on levels that impact one of important targets like the reduction of child mortality is necessary as it is through this that interventions can be intensified and effectiveness measured against.

The paper focused on the determinants of child mortality as they relate to socio-economic and cultural factors, demographic factors and environmental factors. The preceding KDHS of 2003 for the first time included data from North Eastern province; this region had been omitted

in previous DHSs. The 2008/9 data therefore presented the first opportunity in which data on Kenya as a whole (all eight provinces) could be compared between two DHS.

1.6 Scope and Limitations

This study focused on the child file derived from the KDHS of 2008. A fundamental limitation of this study is the reliance on secondary as opposed to primary data. As a result, not all variables relevant to the study were used as the study was only limited to variables that were collected during the KDHS which had a different purpose than that of this study. For example, other studies have been found to utilizing data on type of birth (when the distinction is made between a singleton and multipleton). The study was also bound to be affected by the limitation of the rarity of the dependent variable in question. Child mortality is a rare event in the population and therefore upon filtering for mortality of children between the ages of 1 year and 5 years, very few cases are reported thus hindering generalization. Social dynamics is also a limitation of the data as the survey was carried out in 2008/9 and between then and now, society has been changing.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section looks into various studies on the factors associated with child mortality. It is from such a review that an appropriate theoretical framework will be chosen to guide the study. It will also aid in selecting variables for analysis.

2.2 Theoretical Background

The determinants of child mortality all over the world have been seen to center on socio-economic, socio-cultural, bio-demographic and environmental factors. Further, it has been established that many of these determinants are properties of the household within which the child is located (Caldwell, 1979; Preston 1978) (cf Kiragu, 2006). There is a general agreement among scholars that the analysis of mortality in a given population is a complex issue since it relates to a great number of frequently interrelated bio-demographic, social, economic, cultural and environmental features of the individual, family and community (Muganzi 1984, WHO 1981) (cf Githaiga, 2006).

According to Goro (2007) using data from 1993, 1998, and 2003 DHS in Ghana and using multivariate logistic regression model, found out that mother's education is an important determinant of child mortality. Kombo and Ginneken (2009), when examining the 2005 Zimbabwe DHS used Cox regression model. The findings revealed that birth order (6+) accompanied by short birth interval is associated with high risk of child mortality. Kumar and

Gemechis (2010) employ cross tabulation technique to examine socioeconomic, bio demographic and maternal health factors that determine child mortality in Ethiopia using the DHS 2005. The results revealed that birth interval with preceding birth and mothers education have significance to lowering the risk of child mortality. Sahn and Stifle (2003) used data from 24 African countries and found that the mortality in urban areas is lower relative to rural areas. The factors that contribute to this include better education and improvement of public health infrastructure. However, the HIV epidemic is responsible for the high risk of child mortality in sub-Saharan Africa. With such information, the accumulated literature show the following to be important determinants of child mortality: maternal education, paternal education, maternal work status, access to piped water, access to flush/pit toilet, birth order, duration of succeeding birth interval, type of marriage, type of place of residence, region and religion.

A progression of previous studies on determinants of child mortality show that in the 18th century, studies discussed crude mortality and gradually introduced some factor or cohort related with geographical, racial, age and other characteristics. During the last decades, socioeconomic characteristics are introduced in mortality studies, where they classify determinants in five different groups; maternal factors, nutritional status, environmental contamination, personal control and practices and injuries. Theories have been proposed that current child survival interventions are more effective at reducing high mortality rates. In India there is a positive relationship between reduced child mortality rates and key child health interventions – immunisation, care seeking behavior for respiratory infections and Oral rehydration therapy WHO (2002). Improvement in maternal background characteristics is key in reducing child mortality – female education, nutrition, use of health services during pregnancy and delivery.

Similarly in sub-Saharan Africa, child mortality is still a large cause of concern to governments and donor agencies. This is evidenced by the MDGs which were developed as a global call to action to move countries towards reduced morbidity and mortality by reducing poverty levels and improving education, nutrition and health of a community. A study of the social economic factors that affect child mortality in South Africa concludes that, parental education, marital status of the mother as well as her occupation play a major role in influencing mortality between ages 1year and 59 months. A comparative study (comparing GDHS data of 1993, 1998 and 2003) of determinants of child mortality in three regions in Ghana, found the significant determinants of the incidence of mortality are education of mother, birth order of the mother and the marital status of the mother.

2.3 Socio-Economic Factors

These are individual variables that act through the proximate determinants to influence the level of mortality. They can be grouped into individual level variables, household variables and community variables. They include: maternal education, paternal education, maternal work status, type of place of residence, region and wealth index.

Maternal Education

Education is a prerequisite to development. It empowers the population to change their attitudes and practices so as to improve their living standards. With regard to child mortality, higher levels of educational attainment are generally associated with lower mortality rates since education exposes mothers to information on better nutrition, use of contraceptives for birth spacing, and knowledge on childhood illnesses and treatment Mutunga (2006). On the other hand, children born to mothers with no or incomplete primary education have the highest

mortality risks. Findings from a research conducted in Goa, India by T.S Syamala in 2004 show that the association between mother's education and survival rate of children is strong and direct.

A statistical analysis by Uddin et al (2009), showed that, among socio-economic variables, maternal education has a strong relationship with child mortality and child survival. Various studies have supported a direct causal relationship between mother's education and child mortality. The result indicates that the child mortality rate was highest (1.64%) for the children of illiterate mothers and lowest (0.54%) for the children whose mother's educational level is secondary and above. It is clear that the child mortality rate decreases with the increase of mother's education.

On the integration of demographic research on mortality in Kenya, the differences in child mortality by mother's education are apparent in almost every analysis of mortality differentials in Kenya, Ewbank et al (1986). For example, in both the 1969 and 1979 censuses, the more educated women in every age group reported a lower proportion deceased among their children. Data analysed from the 1977/1978 Kenya Fertility Survey found out that both mother's and father's education have the same effect on child mortality. The importance of this variable is attributed by some scholars to enhancing better childcare and giving mothers more understanding of what their children require to survive and grow.

Paternal Education

Just like maternal education, this variable affects child mortality through direct and indirect mechanisms. The level of a father's education has a bearing on household decisions on utilization of health care systems. Furthermore, his education determines his work status and ultimately, the household's access to resources. Educated fathers may initiate changes in family

hygiene and food preparation practices that may have a direct effect on child health. In a study on the determinants of child mortality in Kenya, Githaiga (2006) found a significant association between paternal education and child mortality.

Mother's Work Status

According to Farah and Preston (1981) the occupation of the mother is an important factor that influences child mortality. Women's economic activities will have a negative impact on child care only when the activity is incompatible with simultaneous childrearing or where a mother lacks access to another person able to care for the child. Child rearing is often thought of as being incompatible with women's economic activities only where women work in the modern formal sector. There is evidence of some regions in developing countries e.g. Sudan, and Nepal where children of working mothers experience higher mortality than those of stay at home mothers. This, according to Pant (1995) (cf Githaiga, 2006), can be explained by the inadequate time working mothers allocate to child care as compared to their non-working counterparts.

Studies in Kenya have also produced contradicting results, for instance, based on the 1989 KDHS, Ikamari (1996) found out that mother's work status had no significance to childhood mortality.

Household Wealth Index

Household wealth in most DHS questionnaires is derived from information on housing amenities and ownership of household durable goods such as radio, television, refrigerator, bicycle, motorcycle or car. All these items were considered household assets and were used to construct a composite index. Household members were then classified into five categories (quintiles) according to the score of their household: lowest, second, middle, fourth and highest.

There is an inverse relationship between wealth and mortality rates; children living in richer households have lower mortality. (IDHS)

With regard to household wealth index, better survival prospects are found to exist for children born in wealthier families (Casterline et al, 1992; Mutunga, 2006). Lower mortality rates have also been found in households with electricity, and household size is negatively related to child mortality, meaning that lower child survival prospects are experienced in smaller households. Similarly in a study carried out in the Bushenyi district in Uganda, it was found that the poorer the housing condition, the higher the mortality rate. Wealth index is measured in terms of household per capita income. It has a bearing on child mortality through enhancing or curtailing access to goods and services that affect health (Ikamari, 2006). Poverty has a positive effect on infant and child mortality. Anker and Knowles (1980) found a weak but positive association between household annual per capita income and child survival in Kenya.

Place of Residence

According to K'oyugi (1982), child mortality is higher in the rural areas than in the urban areas. The pattern of mortality in urban areas is lower as a result of better sanitation, housing facilities, shorter distances to health centers and higher income level in the urban areas. Kadhir and Chowdhury (1993) explained that urban-rural differentials may be attributed to different health care services including higher coverage with immunisation, safe delivery of births and access to health care services. This can however be disputed by the recent increase in informal urban settlements in the form of slums. This situation was however contradicted by Mutai (1987) when he observed that child mortality is higher in urban and not rural areas. He attributed this to higher agricultural potentials in the rural areas which enabled rural populations to be better nourished than their urban counterparts.

Rural residence in developing countries has been associated with higher child mortality risks than urban areas (Ikamari, 1996). Gaisie (1980) attributes these differentials to the distribution of health technology, sluggish economic growth, poverty, malnutrition, poor housing, unhealthy environment and low levels of education found in rural areas.

Region

Regional differences in child mortality risks can be explained by the varying ecological/climatic conditions which in turn may influence the prevalence of infectious and parasitic diseases. Differences may also reflect access and utilization of health services, levels of social and economic development and nutritional status. According to a study based on the regional inequalities of child mortality in Nigeria, it was found that the diverse ecological and socioeconomic circumstances of geographical regions may have different disease exposures and child health outcomes (Antai, 2011).

Religion

Studies have shown that infant and child mortality is affected by a number of socio-cultural factors. One such study was conducted by Mittal and Ketkar (1970) and it revealed that religion is capable of exerting an independent influence on pregnancy outcomes as well as infant and child survival, through attitudes toward maternal health. In relation to this, Caldwell (1980) found out that child mortality is higher in Muslim countries as compared to non-Muslim countries while Palloni (1981) found out that Nigerian women who had attended Koranic schools had a higher rate of child mortality as compared to those who had not received any education.

Differences in theological doctrines have been associated with different fertility behaviours in both developed and developing countries. E.g. the pronatalist Roman Catholic religion which

supports large families, or the Zione of Mozambique who are against contraception and pro large families. In terms of injuries – to a population and children included. For example the Nigerian muslim north and Christian south, have witnessed religious riots which have had fatal outcomes for children.

The effect of religion on child mortality stems from some of the beliefs and attitudes held by these groups. They may be at odds with modern rationalism and thus hinder individual wellbeing and health status. i.e. affiliation to any denomination significantly decreases the odds of a woman experiencing child death in a given year. Studies have suggested that mother's church membership decreases the likelihood of child death and leads to better child health outcomes, relative to not belonging to a church. Analysis of a study conducted in Mozambique, found that there is a relationship between mothers' religious affiliation and child survival and selected child health measures.

Marital Status

In a study of the determinants of infant and early childhood mortality in Cameroon, assessing the role of socioeconomic factors, housing characteristics, and immunization status from 1978-81, it was found that all socioeconomic factors influenced significantly infant and child mortality. Children of unmarried were disadvantaged at all ages. In the further analysis of KDHS 2008 it was found that among other determinants, mothers who are married experience lower child mortality than their counterparts who lack the qualities. Similarly a study of the Ghana Demographic Health Survey revealed that children born to women who are not currently in union are almost two times more likely to die than children born to women who are currently in union. Meaning that marital status has a significant influence on the survival rate of children. A child born to a married mother was almost twice as likely to on whose mother never married.

Type of Marriage

Marital status has also been found to influence health and mortality. According to Ewbank et al., (1986) polygamous women reported a child mortality rate of 10-25 percent above monogamous women who were in their first union. They attributed this to a range of factors such as a strain on resources in polygamous marriages, as well as short inter-birth intervals because of competition to bear more children amongst wives. The Kenya Fertility Survey (KFS of 1977-1978 revealed that the lowest level of child mortality was found among children of monogamously married women who were in their first union.

However, some scholars argue that men become polygamous due to their wealth status. Therefore, polygamous unions have more resources for child rearing. This proposition was discredited by Kibet (1981) when he argued that the larger the family (wives and children), the lesser the resources to satisfy all their needs.

2.4 Environmental Factors

According to World Bank (2000), environmental health risks fall into two broad categories. The first are the traditional hazards related to poverty and lack of development, such as lack of safe water, inadequate sanitation and waste disposal, indoor air pollution, and vector-borne diseases. The second category is the modern hazards such as rural air pollution and exposure to agro-industrial chemicals and wastes that are caused by development that lacks environmental safeguards. Environmental risk factors account for about a fifth of the total disease burden in low income countries (World Bank, 2001). Unfortunately, young children bear the brunt by being the most vulnerable group to the associated risks. According to UNICEF (2006) children are at the highest risk posed by contaminated water and poor sanitation. Unsafe drinking water, inadequate availability of water for washing and cooking, and lack of access to

sanitation, together contribute more than 1.5 million of the 1.9 million deaths by children each year due to diarrheal diseases.

The availability of a safe source of water has a negative significant effect on child mortality risks. The same holds true for those with access to sanitation, which in most cases is taken to mean access to a flush toilet or a ventilated improved pit latrine. In 1997, K'Oyugi confirmed this when he found out that children living in households with modern toilet facilities, better quality housing and floor materials, and less contaminated water, had a significantly lower risk of death relative to their counterparts in worse of households.

Access to Piped Water

Access to piped water is ranked higher than other sources due to the possibility of contamination posed by sources other than piped. Piped water limits the chances of contamination as water is treated at the source and channeled straight to the household. Other sources are prone to contamination e.g. fetching water from the river poses the risk of contamination due to other users like livestock and also through the containers used for transportation. In addition, source of water is a proxy for household wealth and environmental sanitation.

There are various ways in which water affects health; Kiptui (2001) cites three:

1. Water can carry pathogens, which when ingested in sufficient quantities, can affect the drinker and cause microbiological diseases (e.g. cholera and typhoid)
2. It is important for cleanliness, especially flushing away faeces and urine. Associated to this, hand washing is an important public health measure since it reduces the incidences of diarrheal diseases, skin and eye infections among others.

3. It can be a conduit for diseases transmitted by animals and/or insects that spend some or all their lives in water e.g. malaria

As environmental factors, the above significantly contribute to diseases in children within a household as exposure is increased when the child is over one year of age. In the absence of control and preventive measures morbidity and mortality in extreme cases occurs.

While studying the effects of tapped water on early childhood mortality in Brazil, Merrik (1970) found a strong correlation between poor nutrition and environmental factors. According to him, children who were undernourished after birth were also more susceptible to infections associated with unsafe drinking water, poor sanitation and inadequate housing. As they are more susceptible to infection and once it occurs they are not able to fight is effectively due to their undernourished bodies which compromise immunity.

Gyimah (2002) found out that residence in a house with piped water is associated with 35% reduction in the risk of childhood death as compared to households that use river/stream water. Kiragu (2006), while studying the determinants of infant and child mortality in Kenya and Ghana, found out that children borne of mothers in households without piped water had a higher risk of death in both countries. In Kenya, the highest risk was exhibited by households who drew their water from wells.

Access to Proper Sanitation/Toilet

More than 2.9 billion people living in developing countries have no access to adequate sanitation which is one of the essentials of good hygiene. Mutunga Clive, 2004. From studies in India and Guatemala, access to safe water or sanitation reduces child mortality risks by about 34% in rural areas. The means employed by a household in disposal of human waste has a bearing on their health outcomes. Infected persons shed many of the major infectious agents of

disease through faeces and urine. Thus, if not properly handled, human waste can and does contaminate crops and water supplies. Sanitation variables are more important during childhood than during infancy.

2.5 Demographic Factors

Demographic factors are statistically expressed characteristics of a population. Those that have a bearing on child mortality are age of the mother at the birth of index child, birth order of child and duration of succeeding interval. Studies reveal that births to women aged less than 18 years, first and higher birth orders (5 and above), and short inter-live birth intervals, have a higher risk on child mortality (Hobcraft et al, 1985). According to Githaiga (2006) these variables are associated with child mortality due to their links with maternal depletion syndrome, impaired lactation due to poor health and nutrition status of the mother, transition infection as well as lack of time to attend maternal healthcare services.

Age of the Mother at the Birth of the Index Child

A woman's age at the birth of her child is considered important since it's a proxy for biological/physical, mental and emotional maturity. It is said that young mothers, particularly teenage mothers, are normally not biologically ready for pregnancy and motherhood. Thus, they may experience pregnancy-related complications. In addition, they are also likely to have limited knowledge and confidence in caring for their infants and young children. The 2008 KDHS found that the relationship between mother's age at birth and childhood mortality shows the expected U-shaped pattern, with children of youngest and oldest mothers experiencing the highest risk of death. Even at the neonatal stage child mortality is higher among teenage mothers due to complication in pregnancy and delivery, premature birth and other related causes. Geronimus

and Korenman (1993), also add that young mothers are socially and economically disadvantaged. Young mothers may be in the school going age and therefore not in any gainful employment. This has an impact on their ability to access necessary services like healthcare. Their children also face the risk of being born into polluted environments due to poor housing. At this point, they are exposed to disease-causing germs that have an impact on their health.

On the other hand, older women (30 and above), also experience biologically related complications, but they differ with young mothers in that theirs is a problem with a weak body system (Macharia, 2006). According to Sullivan 1994, repeated child birth and complication of pregnancy that is the deterioration of reproductive system might explain the high risk of child mortality at older ages.

Birth Order

Birth order is the chronological order of siblings in a family. First time mothers may be poorly prepared to handle new roles and responsibilities. On the flip side, higher birth order may be related to adverse social and economic factors, both the cause and consequence of high fertility. Vella, et al, (1992) conducted a study in South West Uganda to examine socio-economic risk factors for child mortality. They found out that children of birth order 5 and above were more likely to die while those of birth order 3-5 had the greatest survival chances. In Kenya, this variable has been found to be important by Akwara (2000), Ikamari (1996) and Nguru (1998). Kombo and Ginneken (2009)using the result of 2005 – 2006 Zimbabwean DHS, evidence was found that birth order (6+) with short preceding interval are significantly associated with high risk of child mortality.

Duration of Succeeding Birth Interval

Birth interval is the duration of time between two successive live births of a woman. According to the World Health Organisation (WHO), an interval is considered short if it's less than 24 months and long if it exceeds 36 months. With the ideal and recommended being between the two (24 – 36 months). The recommended duration is 24 months and above. The duration of the succeeding birth interval is important since it determines the amount of time allocated for the index child to grow. Where the interval is short, the index child is weaned prematurely while the mother suffers from maternal depletion syndrome. Having not fully recovered from her initial pregnancy, there is a risk of the next child being born pre-maturely and having a low birth weight. Da Vanzo et al, (1983) also add that a high number of children in the household increases the contagion of infectious diseases and greater competition for resources and child care.

In summary, from the literature reviewed, twelve variables have been considered crucial in explaining child mortality. These are maternal age of first birth, birth order, duration of succeeding birth interval, maternal and paternal education, wealth index, region, type of place of residence, type of marriage, religion, access to water and sanitation.

2.5 Conceptual Framework

In research a conceptual framework is used to outline possible courses of action or to present a preferred approach to an idea or thought. In the case of the subject of study the framework that has been used in past studies on a similar subject is the Mosley and Chen analytical framework for the study of child survival in developing countries.

In 2003, it was documented that Africa contributed nineteen of the twenty high mortality countries in the world (World Health Report, 2003). It is also known that interventions aimed at

communicable diseases such as diarrhoea, respiratory infections and malaria among other diseases, led to a reduction of child mortality by half, in the period between the end of world war two and the early 1970s. Alongside these developments is the growth in literature on the phenomenon of child and childhood mortality. Various analytical frameworks have been proposed and one of them stands out in this case.

In 1984, Mosley and Chen developed a framework for analyzing child mortality. This framework outlined that key concept in child mortality was a set of proximate determinants, or intermediate variables, that directly influence the risk of morbidity and mortality. They made a distinction between variables considered to be exogenous or socioeconomic (i.e. cultural, social, economic, community, and regional factors) and endogenous or biomedical factors (i.e. breastfeeding patterns, hygiene, sanitary measures, and nutrition). They held that the exogenous variables operate through the endogenous variables to influence child mortality. The latter are also called intermediate variables or proximate determinants because they constitute the middle step between the exogenous variables and child mortality (Jain, 1988; Mosley and Chen, 1984; Schultz, 1984).

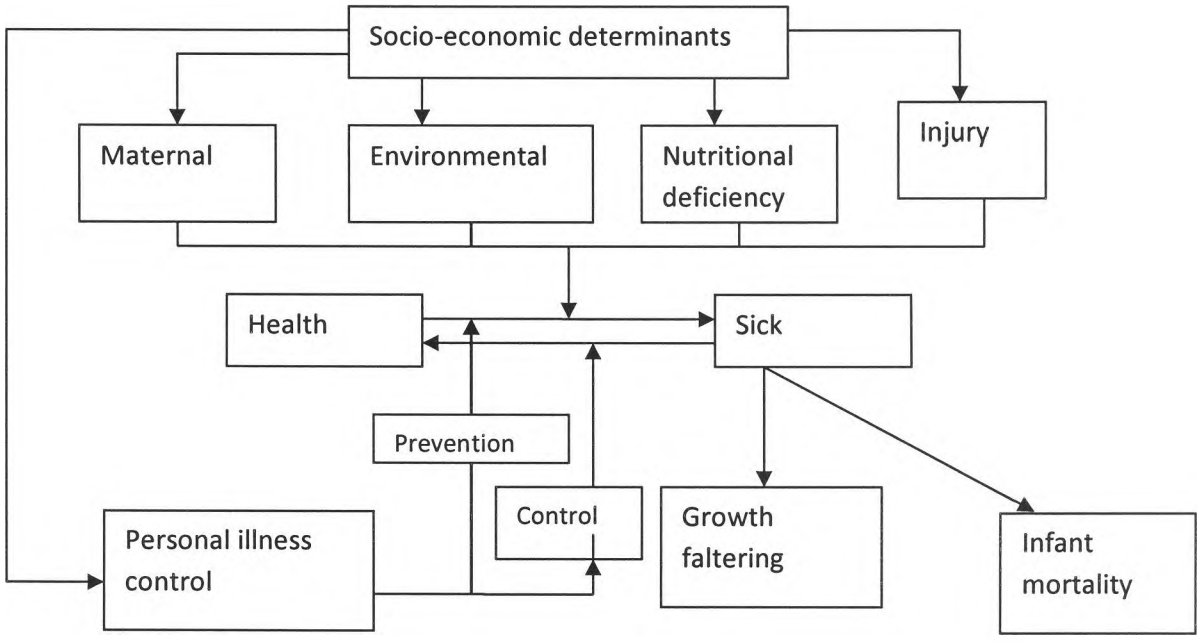
Therefore this study will be guided by Mosley and Chen's theoretical framework. According to the framework, child mortality can be explained using background/exogenous and proximate/endogenous factors. Background factors include the socio-economic, cultural factors and demographic characteristics while the proximate determinants include personal illness control, nutrient deficiency and injury among others. The theory holds that the background factors operate through the proximate factors to influence child survival.

Mosley and Chen categorized socioeconomic determinants into individual levels, household levels and community levels that child mortality could have reduced due to the change

of those socioeconomic categories operating through proximate determinants and proximate determinants categorized into five generalized groups e.g. maternal factor, environmental contamination, nutrient deficiency, injury and personal illness that the decrease of child mortality may be due to the change of those proximate determinants Makinen Desta (2011).

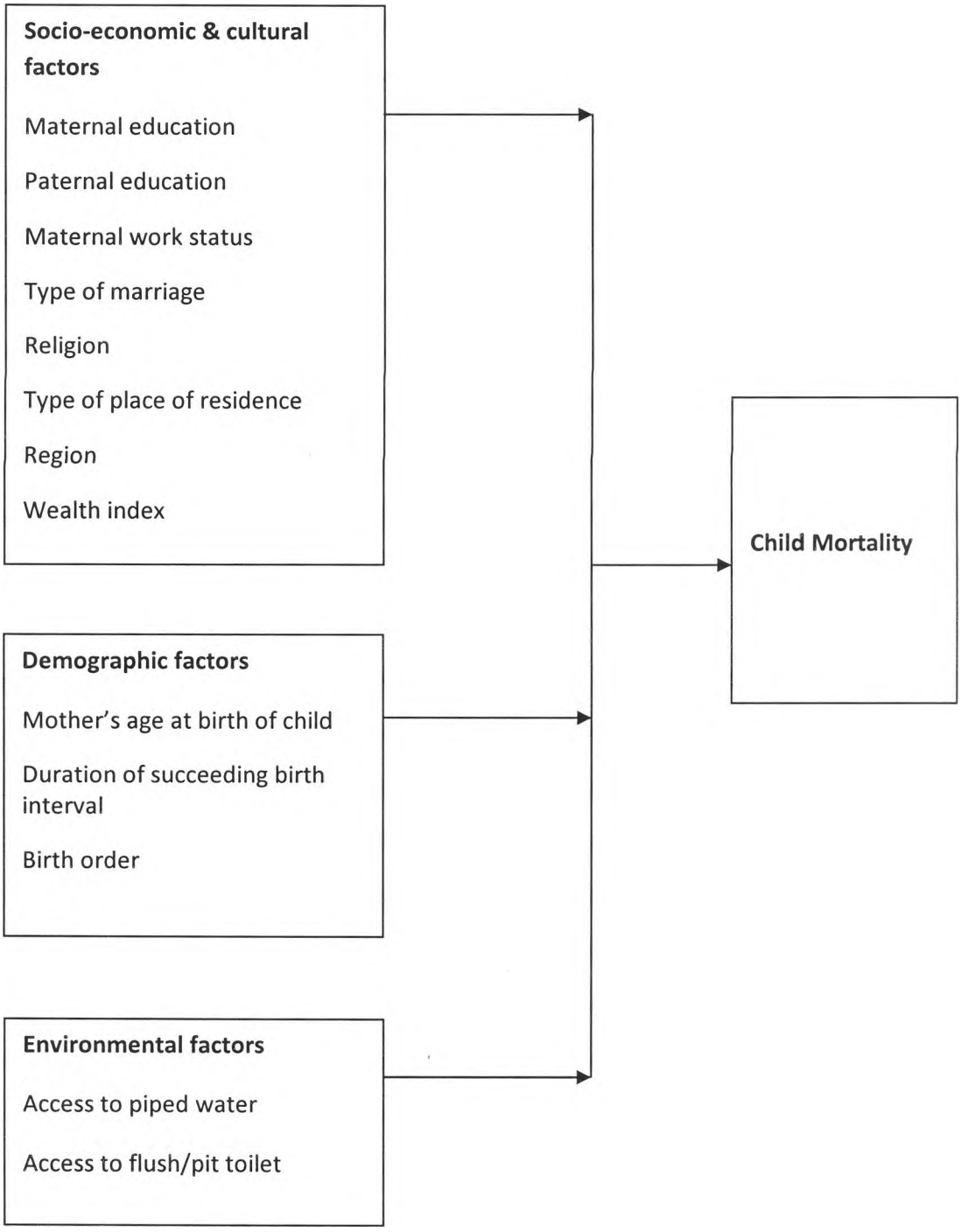
Five premises were suggested as a background for the model. These are: (1) under optimal conditions, child survivability rates for newborn infants can be expected to reach 97 percent. (2) In the real world, this rate is lowered by social, economic, biological and environmental factors. (3) Socioeconomic determinants must operate through the "proximate determinants" in order to influence disease and disease processes. (4) The proximate determinants can be indicated by the diseases and deficiencies of surviving population. (5) Child mortality is the result of the cumulative consequences of multiple disease processes.

Figure 1: Mosley & Chen Analytical Framework for the study of Child Survival in Developing Countries.



Source: Mosley W.H and Chen L.C (1984). Population and development review, a Supplement of volume 10:29

2.6 Operational Framework



2.7 Operational Hypothesis

1. The higher the education level of the mother, the less likely child mortality.
2. The longer the duration of a preceding birth interval, the less likely child mortality.
3. Region of residence in Kenya influences child mortality
4. The less formal maternal work status, the more likely child mortality
5. Child mortality is more likely when the duration of birth between the index child and the next is less than 24 months..
6. Child mortality increases with increase in birth order from the preceding child.

CHAPTER THREE

DATA AND METHODOLOGY

3.1 Introduction

This section presents a description of the sources of data that will be used in the study as well as the analytical methods that will be employed. It outlines data from the KDHS 2008/9 and analytical methods at both bivariate and multivariate level using the statistical package SPSS.

3.2 Data Source

Data for the study is drawn from the 2008-9 KDHS. This was a nationally representative survey of 8,444 women aged between 15 and 49 and 3,465 men of ages 15 to 54 selected from 400 sample points throughout Kenya. The data was obtained from the Measure Evaluation website www.measuredhs.com/data. Specifically the child recode file titled KEKR52.SV.21D. The variables that were retained in SPSS for analysis were all those that pertained to children between the age of 12 months to 59 months.

3.3 Method of Analysis

A descriptive distribution of the study population provided the opportunity for comparisons of individual and background determining factors. Various statistical tools have in addition been employed to interpret associations and test statistical significance. Such tools include frequency distributions, which show values and distributions of background variables and cross tabulation. Frequencies were used to indicate distribution of background factors.

The statistical tool used to test the model was logistic regression. This tool was selected because of the nature of both the dependent and independent variables. As supported by literature, when independent variables are either discrete or categorical and dependent variables discrete logistic regression is the most appropriate statistical tool to use. Of the other tools that can be used to to test such models, logistic regression is of particular importance because it can isolate the effect of the independent variables on the dependent variable. Specifically, bivariate and multivariate logistic regressions were used to establish the nature of the relationship.

According to Jacoby and Wang (2003), when viewed from a mathematical point of view, logistic regression is an extremely flexible and easily used function which lends itself to a biologically meaningful interpretation. Logistic regression is derived from the principle of odds ratio, i.e. the ratio of the probability that an event will not occur (1-P). It is often expressed in the basic form:

Logit (P) $=\text{Ln}(P/1-P)$

$=a+B_1X_1 + B_2X_2 + B_3X_3 + \ldots\ldots\ldots B_nX_n\epsilon$

Where:

P – is the probability that an event will occur

Ln – is the natural logarithm

1-P – is the probability that an event will not occur

a = is the constant or intercept of the model

B_s – is the logit coefficient

X_s – are the explanatory variables

ϵ - is the error term

Interpreting the output of a logistic regression involves checking three items. The beta (β), significance and exponential B outputs. The significance output tells us at what level the variable is statistically significant while the beta output guides one in interpreting the exponential B output. The former can either be positive or negative implying that a variable has an increasing or reducing effect on the dependent variable respectively.

3.4 Definitions of Key Variables

This study is employing terms which under normal circumstances could have multiple meanings to different audiences. These definitions are based on the questions from the KDHS women's questionnaire. For the purposes of this study, the terminologies as they later appear herewith will have the meaning as listed below.

Child Mortality – this is the dependent variable. It measures whether or not the index child died during the specified age under consideration. In this case, between 1 year and 5 years It is categorized into two: dead or alive.

Maternal Education – this is the highest level of formal schooling attained by the mother. It's coded as: no education, primary and secondary plus

Maternal Work Status – refers to whether the mother was working or not during the time of the survey. This variable measures access to resources and is a proxy for household economic status and time allocated to childcare. It is categorized into two: working in the formal sector and non-working in the formal sector

Paternal Education - this is the highest level of formal schooling attained by the father. It's coded as: no education, primary and secondary plus

Type of Place of Residence – this is the place where the respondent was at the time of the interview. It's coded as either urban or rural

Region of Residence – refers to the province where the respondent was at the time of the interview. This is coded as follows: Nairobi, Central, Coast, Eastern, Nyanza, Rift Valley Western, and North Eastern.

Source of Drinking Water – refers to the main sources of water used for consumption through drinking and/or cooking purposes. This variable captures household environmental conditions that have a bearing on disease causing agents. It is categorized into two: piped source and non-piped source.

Toilet Facility/Sanitation – this variable captures the household's environmental status and acts as a proxy for household economic status. It is coded as flush/pit latrine and no toilet.

Religion – refers to the religious group the mother is affiliated to. This is categorized into three: catholic, protestant/other Christian and Muslim/no religion/other religion. The variable is intended to measure attitudes toward family size, contraceptive use and health seeking behavior that have an indirect bearing on the risk of child mortality.

Type of Marriage – refers to whether the marital union of the mother is monogamous or polygamous.

Mother's Age at Birth of Index Child – refers to age in years of the mother at the time of birth of the index child. It is a proxy for mother's physiological, mental and emotional maturity. It is categorized into three: 15-24, 25-34 and 35 and above.

Birth Order – measures the chronological order of siblings in a family. This has been coded as 0-3, 4-5 and 6 plus.

Wealth Index – refers to the level of wealth and economic status of the household. Asset ownership is the proxy for wealth and economic status. It's categorized into low, medium and high.

Table 1 below outlines the list of study variables, their measurement and coding.

Table 1: List of Study Variables and their Definitions

VARIABLE	MEASUREMENT	CODE	TYPE
Child mortality	Dead Alive	0 1	Dependent
Maternal education	No education Primary Secondary plus	0 1 2	Independent
Paternal education	No education Primary Secondary plus	0 1 2	Independent
Maternal work status	Works in formal sector Non-working in formal sector	0 1	Independent
Type of place of residence	Rural Urban	0 1	Independent
Region of residence	Nairobi Central Coast Eastern Nyanza Rift Valley Western North Eastern.	1 2 3 4 5 6 7 8	Independent
Religion	Catholic Protestant/other Christian Muslin/no religion/other religion	0 1 2	Independent
Wealth index	Low Medium High	0 1 2	Independent

List of Study Variables and their Definitions...continued

VARIABLE	MEASUREMENT	CODE	TYPE
Birth order	0-3 4-5 6+	0 1 2	Independent
Length of succeeding birth interval	<24 24-36 >36	0 1 2	Independent
Maternal age at birth of index child	<25 25-34 35+	0 1 2	Independent
Access to water	Piped sources Non-piped sources	0 1	Independent
Access to toilet facility	Flush toilet/pit latrine No toilet	0 1	Independent

3.5 Data quality

This section discusses the quality of data used in the analysis as well as presents a description of the characteristics of the study population. The analysis and interpretation was based on the whole set of 5,181 children under the age of five in the survey. As a subset of the whole, 3,872 aged 12 – 59 months were considered with the occurrence of death in the age group being 55 children.

Survey data is prone to coverage and content errors. Coverage errors occur when there is over-reporting and/or under-reporting of cases. For this study, it is known that children tend to be under enumerated in surveys mainly due to the respondent's forgetfulness and/or the manner in which interview questions are framed. Content errors pertain to the qualitative characteristics such as age, sex and marital status. The retrospective nature of the DHS makes it susceptible to recall bias and hence the content errors. Two checks will be performed to assess the quality of data. They are: calculation of a sex ratio to determine omission and misplacement of births and

deaths; assessment of age misreporting and misplacement; and checking for heaping of children's ages.

3.5.1 Omission and Misplacement in the Reporting of Births and Deaths

To evaluate the extent of omission and misplacement in the reporting of births and deaths, sex ratios were calculated for both child birth and deaths. Calculation of sex ratios by age give an indication of the defects in the data since in any given population, the ratio should not fluctuate from one age to another unless migration has played an important role. Omission was determined by examining the extent to which the calculated sex ratio differed from the expected ratio of 1.08. If smaller than 1.08, male births were omitted while if the ratio was larger than 1.08, female births were omitted.

Male births -	2668
Female births -	2513
Sex ratio	= male births /female births
	=2668/2513
	= 1.06

At 1.06, male births had been omitted.

To assess the quality of death data, the percent distribution of children deaths is plotted against the month of death. Figure 2 shows that there was heaping for death at 4, 7, 9, 12, 18, 24 and 36 months.

3.5.2 Age Misplacement and Misreporting.

According to Ikamari (1996), women who misreport their age are also likely to misreport their maternity history. To assess the quality of age data, the percentage distribution of women is

plotted against the current age of the respondent. The peaks and troughs in Figure 2 reveal that there was preference for digits 20, 25, 28, 35, 38, 40, 43 and 45.

3.5.3 Heaping of Children Ages

Recall problems may produce errors in the reporting of child ages. The extent of age heaping was assessed by plotting the percentage distribution of all living children by their reported ages in single years. Figure 3 reveals that there was preference for age 1 and 3.

Figure 2. Data on Women's Ages

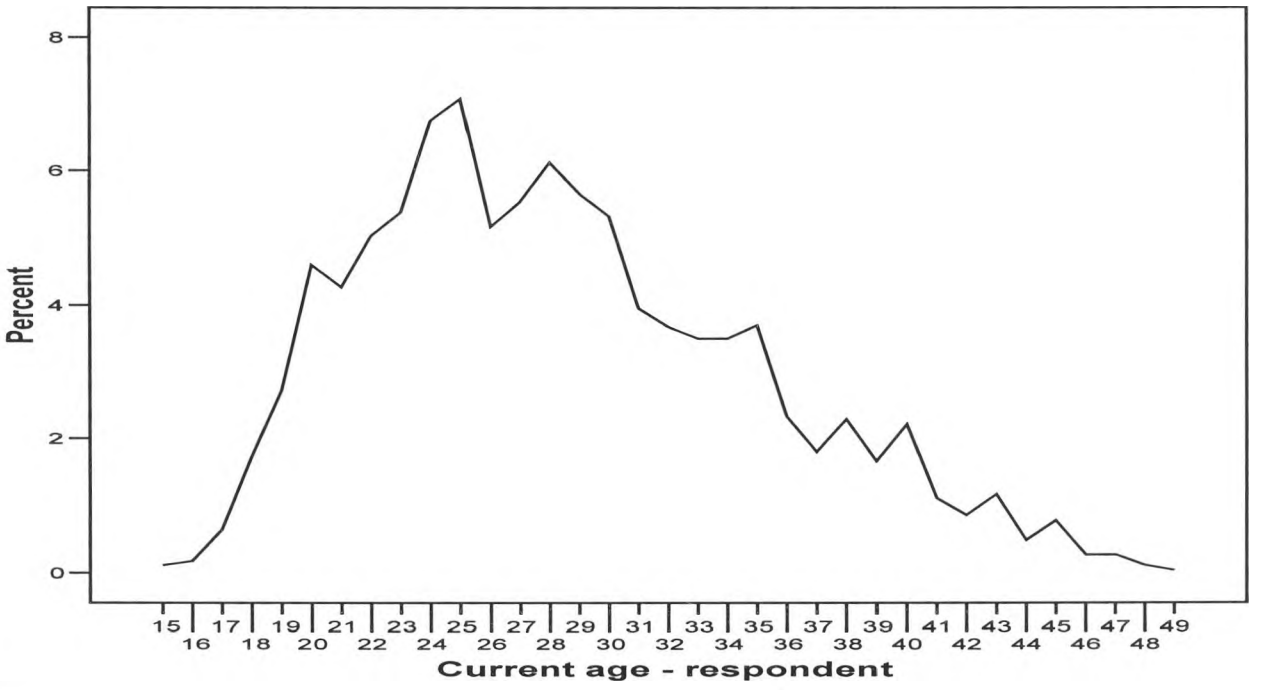
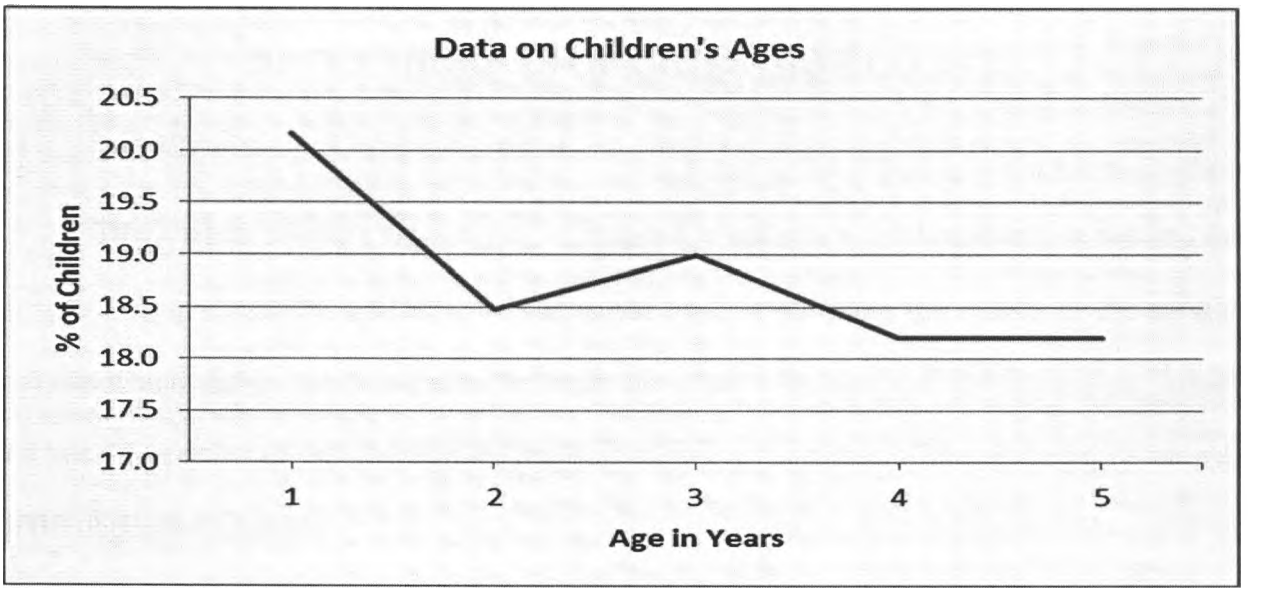


Figure 3. Data on Child's Age



CHAPTER FOUR:

DETERMINANTS OF CHILD MORTALITY

4.1 Introduction

This chapter presents the analysis of factors that influence child mortality in Kenya based on results from the 2008-9 KDHS. It is arranged by first outlining the results of the bivariate analysis which shows the association between the study variables and the dependent variable, and later the results of the multivariate analysis showing the effect of the explanatory variables on the dependent variable.

4.2 Descriptive Statistics of the Study Population

Table 2 shows the results of the percentage distribution of the study population by the background characteristics of women. With regard to the mother's age at first birth, almost all of the women sampled in 2008-9 were less than 25 years (92%) when they had their births. This was followed by ages 25-34 at 8%.

Over half of all births were of a lower birth order, 0-3, at 58% of all children, while those of birth orders 4-5 and 6+ represented were approximately 20% each. One in every five children (21%) were born of women who spaced their succeeding birth by more than 24 months while those whose mothers spaced their births by less than 24 months accounted for only 13%.

In the socio-economic and cultural category, data shows that most children (56%) were born to mothers who had primary level of education. Approximately one in every five children were born of women who had received no education with a similar number being observed for those born of women who had secondary and above levels of education. On the other hand,

children born of women whose partners had primary level of education constituted approximately half of all sampled respondents (49%).

With regard to work status, there was an increase in the percentage of children born of women who reported working in the formal sector (from 19% in 2003-4 to 25% in 2008-9). This increase was accompanied by a decline in the percentage of children born of women working in the non-formal sector (from 42% to 31%). Nearly half of all children (48%) were born in poor households while their counterparts born in the upper wealth index category came second (36%).

An analysis by region showed that most of the sampled children were born of mothers who resided in Nyanza province (18%). This was followed by those residing in Rift Valley (17%) and Western at 13%. With regard to place of residence, three quarters of all children were born of rural women. As for type of marriage, 4 of every 5 children were born of mothers who were in monogamous unions. Analysis by religious affiliation showed that over half of all children were born of mothers affiliated to Protestant or Other Christian groups followed by those who professed to being Muslim/Other religion/no religion at 26%.

Finally, environmental variables show that 71% of children came from households which relied on non-piped sources of water while only 27% of their counterparts had access to piped water. With regard to sanitation, approximately a quarter of all children came from households which had no access to a toilet, while the majority either had access to a flush or pit latrine.

Table 2. Percentage Distribution of Study Population by Background Characteristics of Women

	2008-9	
VARIABLE/CHARACTERISTIC	CASES	PERCENTGE (%)
Age at First Birth		
<25	4784	92.3
25-34	391	7.5
35+	6	0.1
Birth Order		
0-3	3007	58.0
4-5	1163	22.4
6+	1011	19.5
Duration of SBI		
<24	692	13.4
24+	1062	20.5
Missing	3427	66.1
Maternal Education		
No Education	1187	22.9
Primary	2879	55.6
Secondary & Higher	1115	21.5
Paternal Education		
No Education	880	17.0
Primary	2556	49.3
Secondary & Higher	1743	33.6
Maternal Work Status		
Formal Sector	1288	24.9
Informal Sector	1618	31.2
Not Working	2275	43.9
Wealth Index		
Low	2449	48.2
Medium	826	15.9
High	1856	35.8
Region		
Nairobi	414	6.8
Central	496	8.2
Coast	883	14.5
Eastern	744	12.2
Nyanza	1109	18.2
Rift Valley	1060	17.4
Western	790	13.0
North Eastern	583	9.6

Percentage Distribution of Study Population by Background Characteristics of Women...continued

VARIABLE/CHARACTERISTIC	2008-9 CASES	2008-9 PERCENTGE (%)
Type of Place of Residence		
Urban	1467	24.1
Rural	4612	75.9
Type of Marriage		
Monogamous	4290	82.8
Polygamous	824	15.9
Religion		
Catholic	860	16.6
Protestant/Other Christian	2969	57.3
Muslim/Other Religion/No Religion	1352	26.1
Access to Water		
Piped Sources	1417	27.3
Non-Piped Sources	3697	71.4
Access to Toilet/Sanitation		
Flush/Pit	3753	72.4
No Toilet	1361	26.3

4.3 Relationship Between Child Mortality and the Study Variables

Table 3 shows results of the bivariate analysis. All the study variables were statistically significant at the bivariate level except age at first birth. For instance, children of birth orders 6 and above had their risk of death reduced by 7 percent compared to their counterparts of birth orders 0 to 3. It was also observed that children whose births were succeeded by a birth interval of more than 24 months were 6 percent less likely to die before aged 5 compared to the reference category of a succeeding birth interval of less than 24 months. In the socio-economic and cultural category, children borne of mothers who had attained primary and above level of education were 7 percent times less likely to die before reaching age five compared to their counterparts borne of mothers who had no schooling. A similar observation was seen with regard to paternal education.

Results of the bivariate analysis on maternal work status were confounding as the risk of child mortality was seen to be reduced for children borne of mothers working in the informal sector as well as those who had no work compared to children borne of mothers working in the formal sector. As with the findings by Pant, 1995, the children of mothers in the formal sector have inadequate time to allocate to child care. With regard to wealth index, table 3 indicates that being borne in a household in the high wealth index category reduces the risk of mortality by 0.1 times in 2008-9. In the environmental category, both access to sanitation and water were found to be statistically significant in 2008-9.

Table 3: Results of the Bivariate Logistic Regression

	2008-9	
VARIABLE	**B**	**Exp(B)**
Age at First Birth		
<25 (Ref)	....	....
25-34	-0.88 (0.209)	0.916
35+	-1.8483 (0.164)	0.000
Birth Order		
0-3 (Ref)	....	....
4-5	-2.584 (0.109)	0.075
6+	-2.597 (0.117)	0.074*
Duration of SBI		
<24 (Ref)	....	....
24+	-2.815 (0.127)	0.060*
Maternal Education		
No Education (Ref)	....	....
Primary	-2.671 (0.069)	0.069*
Secondary & Higher	-2.890 (0.122)	0.056*
Paternal Education		
No Education (Ref)	....	....
Primary	-2.570 (0.074)	0.077*
Secondary & Higher	-2.820 (0.099)	0.060*
Maternal Work Status		
Formal Sector	....	....
Informal Sector	-2.608 (0.089)	0.074*
Not Working	-2.869 (0.087)	0.057*
Wealth Index		
Low (Ref)	....	....
Medium	-2.525 (0.122)	0.080*
High	-2.880 (0.094)	0.056*
Region		
Nairobi (Ref)	....	....
Central	-2.548 (0.173)	0.078*
Coast	-2.771 (0.143)	0.063*
Eastern	-3.279 (0.196)	0.038*
Nyanza	-2.206 (0.100)	0.110*
Rift Valley	-3.093 (0.151)	0.045*
Western	-2.716 (0.148)	0.066*
North Eastern	-2.751 (0.174)	0.064*
Type of Place of Residence		
Urban (Ref)	....	....
Rural	-2.694 (0.060)	0.068*

Results of the Bivariate Logistic Regression…continued

	2008-9	
VARIABLE	**B**	**Exp(B)**
Type of Marriage		
Monogamous (Ref)	….	….
Polygamous	-2.489 (0.091)	0.083*
Religion		
Catholic (Ref)		….
Protestant/Other Christian	-2.645 (0.068)	0.071*
Muslim/Other Religion/No Religion	-2.952 (0.120)	0.052*
Access to Water		
Piped Sources (Ref)	….	….
Non-Piped Sources	-2.752 (0.064)	0.064*
Access to Toilet/Sanitation		
Flush/Pit (Ref)	….	….
No Toilet	-2.575 (0.099)	0.076*

Ref – Reference Category ……. Blank space all through – reference category
() standard errors
*** P<0.1 **P<0.01 ***P<=0.05**

4.4 Results of Multivariate Analysis

Three models were fitted to assess the net effect of the independent variables on the risk of dying between age 1 and 5. These are: demographic factors model, socio-economic and cultural factors model and environmental factors model. Table 4 presents the results of the net effect of the demographic variables on the risk of death between age 1 and 5 according to the 2008-9 KDHS. All the demographic variables that were significant at the bivariate level retained their statistical significance at the multivariate level.

Table 4: Demographic, Socio-economic and Cultural and Environmental Models 2008-9 KDHS

	B	Sig.	Exp(B)
Age at First Birth			
<25 (Ref)			
25-34			
35+	-0.024	0.945	0.977
Birth Order			
0-3 (Ref)		0.763	
4-5	0.120	0.544	1.128
6+	0.121	0.574	1.129
Duration of SBI			
<24 (Ref)			
24+	-1.277	0.000	0.279
Maternal Education			
No Education (Ref)		0.731	
Primary	-0.186	0.461	0.831
Secondary & Higher	-0.242	0.482	0.785
Paternal Education			
No Education (Ref)		0.766	
Primary	-0.238	0.373	0.789
Secondary & Higher	-0.309	0.312	0.734
Maternal Work Status			
Formal Sector		0.489	
Informal Sector	0.117	0.578	1.124
Not Working	-0.120	0.556	0.887
Wealth Index			
Low (Ref)		0.589	
Medium	-0.082	0.722	0.921
High	-0.254	0.305	0.776
Region			
Nairobi (Ref)		0.000	
Central	-0.503	0.273	0.604
Coast	-0.510	0.177	0.600
Eastern	-1.368	0.002	0.255
Nyanza	-0.677	0.072	0.508
Rift Valley	-1.677	0.000	0.187
Western	-0.949	0.015	0.387
North Eastern	-0.728	0.102	0.483
Type of Place of Residence			
Urban (Ref)			
Rural	-0.060	0.829	0.942
Type of Marriage			
Monogamous (Ref)		0.244	

Demographic, Socio-economic and Cultural and Environmental Models 2008-9 KDHS...continued

	B	Sig.	Exp(B)
Polygamous	0.294	0.102	1.341
Religion			
Catholic (Ref)		0.017	
Protestant/Other Christian	-0.109	0.607	0.896
Muslim/Other Religion/No Religion	-0.878	0.006	0.415
Access to Water			
Piped Sources (Ref)		0.001	
Non-Piped Sources	-0.808	0.000	0.446
Access to Toilet/Sanitation			
Flush/Pit (Ref)		0.043	
No Toilet	0.417	0.043	1.517

*** P<0.1 **P<0.01 ***P<=0.05**

Further, the second model was ran to show the results of the effect of both the demographic and socio-economic and cultural variables on the risk of death between age one and five. The effect of the demographic variables is seen to have been reduced with the introduction of the socio-economic and cultural variables. The only statistically significant variable was duration of the succeeding interval whose effect dropped slightly. The risk of mortality was reduced by 0.3 times in this model compared to 0.09 times in the first model, for children whose birth was succeeded by an interval of more than 24 months before the succeeding birth.

For the socio-economic and cultural variables, only region of residence and religion retained their effect on the risk of death compared to results from the bivariate analysis. Being borne of a mother residing in Eastern, Nyanza, Rift Valley and Western's reduced your risk of mortality compared to a counterpart in Nairobi province. The reduction of risk was highest in Nyanza and lowest in Rift Valley. Religious affiliation was statistically significant for children born of a mother affiliated to Muslim and other religions, as well as those with no affiliation;

their risk was reduced by 0.4 times compared to their counterparts born of mothers professing Catholicism.

From the third model results, i.e. the net effect of all independent variables on the dependent variable the introduction of environmental variables did not show a significant change. The duration of the succeeding birth interval was statistically significant for children whose mothers spaced their next births by 24 months or more. The effect was similar to what was observed in the second model where the risk of death was reduced by 0.3 times. A similar pattern was observed for region variables which were significant; Eastern, Nyanza, Rift Valley and Western. Only access to water was statistically significant among the environmental variables. Children who lived in households that had no access to piped water were 0.4 times less likely to die before their fifth birthday compared to their counterparts who had access to the same service.

CHAPTER FIVE

SUMMARY AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary and conclusion of the study results. The section also goes further to make recommendations arising from the findings.

5.2 Summary

The objective of the study was to identify the determinants of child mortality in Kenya based on the KDHS of 2008/9. The study specifically aimed to determine the influence of demographic, socio-economic and environmental factors on child mortality. The analysis of the data was undertaken using logistic regression statistical tool. The bivariate analysis showed that the following variables were important determinants of child mortality: birth order, duration of succeeding birth interval, maternal and paternal education, maternal work status, wealth index, region of residence, type of place of residence, type of marriage, religion, access to piped water and access to toilet and sanitation. This was in line with the literature reviewed for the study where the key variables include age of a mother at first birth, maternal and paternal education, wealth index; Casterline et al,1992, region; Antai, 2011, type of place of residence; Chowdhury 1993, religion; and access to water and sanitation; Merrik, 1970

In the multivariate analysis when measuring the effect of independent variables using three models, of significance was found to be succeeding birth interval, region of residence, religion and access to water as determinants of child mortality. It was interesting to observe that not all variables conformed to the studies reviewed. The factors affecting child mortality have by

and large remained the same but with some having significant reductions in the KDHS of 2008/9. For instance, in the statistically significant environmental factors of access to water, children residing in households with non-piped sources of water, according to the KDHS of 2008/9 were less likely to die than those from houses with piped water sources.

5.3 Conclusion

From the results of the study, the determinants of child mortality based on 2008/9 KDHS data vary in some instances from the findings of similar studies conducted in Kenya. Significant distinctions have been made when it comes to succeeding birth intervals, region, religion and access piped water. From the study it was evident that important changes do take place between surveys and studies. It can be noted therefore that effects of efforts to reduce child mortality have been felt over time and the dynamic nature of the population has continued to change to the extent that factors that have previously been found to have great effect on mortality have reduced or all together ceased to have negative effects and reverse of those that previously had no effects now have an effect.

5.4 Recommendation

Reduction in child mortality is one of MDGs (MDG 4) which Kenya is committed to achieving before 2015. Gradual reductions have been realized though more needs to be done. Even with all the investment in child survival strategies aimed at addressing demographic, socio-economic and environmental factors that influence child mortality, further reduction in mortality is required and in an even shorter time period.

Therefore, the results of this study recommend that further analysis is required for an in-depth understanding of why children in households with no access to piped water have reduced likelihood of death than those in households with access to piped water. Hygiene programs in future should probably target caregivers in houses with access to piped water in ensuring that even with piped water they remain vigilant in ensuring the safety of this water for children either by treating or boiling. Similarly this study recommends that determinants like region of residence also require further analysis to answer the question of the shifting reduced likelihood of children dying in particular regions. It is likely that because child survival programs have over time been concentrated is certain regions, the effect has begun to be felt. As for duration of succeeding birth interval, the practices that result in birth intervals of 24 months and above should continue to be encouraged e.g. through family planning programs with a focus on contraceptive use to ensure that the population benefits from reducing child mortality.

For this reason analysis like this should be continually used to confirm that the strategies that have been applied so far, through development projects that see an increase in levels of education, empowering of women to contribute to household incomes and exposing them to improved health care for delivery should be sustained and where possible accelerated to allow for even faster progression into reduced child mortality even faster.

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