EXPLORING POVERTY HEALTH LINKAGES: A CASE OF CHILD MORTALITY IN KENYA

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DECLARATION

This research paper is my original work and has not been submitted for a degree award in any other university.

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I however bear the sole responsibility for any errors and /or omissions in this study.

DEDICATION

This research project is dedicated to my loving parents, Mr. Boaz Vincent Odima and Mrs. Mary Atieno Odima, to whom I owe so much.

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

It is argued that a healthy nation is a wealthy nation. However, most of the Sub-Saharan African (SSA) countries experience adverse health outcomes coupled with relatively high levels of poverty. The causality between poverty and health has been found to run both ways. Various studies show that poverty is linked to health status and vice versa. Studies investigating the linkage between poverty and ill-health are however few in Kenya with mixed findings.

This study investigates the linkage between poverty and ill-health in Kenya using child mortality as a proxy indicator of health and household wealth index as a proxy for poverty. We use data from KDHS 2008-09 and two-stage least squares instrumental variable methods in estimating the link between poverty and health (child mortality). The results show that poverty (wealth index), residence type, mothers education, access to water, access to sanitation and source of cooking fuel and gender of household head have significant effect on child mortality rates in Kenya.

This study recommends policies and programs such as economic empowerment and maternal education aimed at reducing poverty and child mortality rates especially in rural areas to be designed and implemented. In addition, the government should promote public awareness on the importance of sanitation and intensify promotion of basic health education in learning institutions. Most importantly, the government and other development agencies should ensure that there is an increased supply of clean water and promote the use low polluting fuels in rural areas.

ACRONYMS

ANC	Antenatal Clinic
CBS	Central Bureau of Statistics
CM	Child Mortality
ERS	Economic Recovery Strategy
GDP	Gross Domestic Product
IPRSP	Interim Poverty Reduction Strategy Paper
KDHS	Kenya Demographic Health Survey
KEPI	Kenya Expanded Programme on Immunization
KIHBS	Kenya Integrated Household and Budget Survey
KIPPRA	Kenya Institute of Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
LDC	Least Developed Countries
LSMS	Living Standard Measurement Surveys
MDG	Millennium Development Goals
MHCS	Maternal Health Care Services
MMR	Maternal Mortality Ratio
MOH	Ministry of Health
MTEF	Medium Term Expenditure Framework
NGO	Non Governmental Organization
NHSSP	National Health Sector Strategic Plan
PRSP	Poverty Reduction Strategy Paper
SAPs	Structural Adjustment Programs
SES	Socio Economic Status
UNICEF	United Nations Children Education Fund
WHO	World Health Organization
WMS	Welfare Monitoring Surveys

CHAPTER ONE

1 INTRODUCTION

1.1 Background information

Poverty and health are important measures of personal wellbeing and they are closely related in terms of how they interact (Adams et al., 2003). Understanding how health and poverty are determined and how they evolve over time has important policy implications. Numerous studies have documented a close association between socio-economic status (SES), often measured by income, and health (Adams et al., 2003).

Theoretically, the linkages between socio economic status and health can run either way. On one hand, low socio economic status (say, income poverty) may cause poor health due to malnutrition and less access to medical services. On the other hand, ill-health may lead to low income and thus poverty because ill-health reduces the ability to work (Smith 1999, 2004; Fuchs 2004; Meer et al., 2003; Deaton 2002; Frijters et al., 2005).

1.2 Poverty

Poverty means not having an income sufficient to support specific normative functionings (Ravallion 2010). These comprise both survival needs and minimum social inclusion costs for participating in social and economic activity (Ravallion 2010). Absolute poverty refers to the cost of the minimum necessities required to sustain human life while relative poverty is the minimum economic, social, political and economic goods required to keep up with an acceptable standard of living in a given society (Foster, Greer and Thorbecke, 1986; World Bank, 2000).

Food poverty means not being able to meet the minimum nutrient requirements (calories) for a healthy growth and maintenance of the human body. Food poverty line is the amount of expenditure needed to meet the recommended daily average allowance of 2,250 calories based on the agreed food basket. A household whose food expenditure is below the food poverty line is assumed to be food-poor (Manda, 2003).

Overall poverty implies lack of both food and non food basic requirements. Hardcore extreme poverty exists when one cannot meet her/his minimal calorie requirement even if one concentrated all her /his spending on food (Foster, Greer and Thorbecke, 1986).

1.2.1 Poverty trends and status in Kenya, 1992-2005 (%)

Poverty trends in Kenya have remained rather high in spite of government commitment to fight poverty. The overall poverty levels for 1992, 1994, 1997 and 2005/06 were 44.8%, 40.3%, 53.3% and 45.9% respectively (KIHBS 2005/06). Poverty levels were estimated to have remained constant at 45.9% for six years from 2006 to 2012. By end of 2012, the figures were estimated to have dropped to 42% (World Bank Global Monitoring Report, 2012). With close to half of the population classified as poor, understanding the causes and consequences of poverty is important in order to informant poverty policy. Other than 20005/06 KIHBS, no other latest comprehensive Household Budget Survey has been carried out to show current poverty levels in Kenya.

1.2.2 Anti- Poverty strategies in Kenya

Efforts of fighting poverty in Kenya can be traced from independence. The Sessional Paper No 1 of 1965 detailed the Government commitment to alleviate poverty together with ignorance and disease. These commitments have been propagated through long-term strategic plans, sessional papers, development plans and other policy documents (Republic of Kenya 2000).

The early efforts geared towards poverty reduction included land resettlement programmes, the District Focus for Rural Development Strategy, the social dimensions of development programmes and other targeted initiatives undertaken by Non Governmental Organizations, Development Partners and communities (Institute of Policy Analysis and Research, 2004).

In June 2000, Kenya adopted the interim Poverty Reduction Strategy Paper (IPRSP). The objectives of IPRSP were not realized as most of the welfare indicators like health and poverty remained high (Nyanjom, 2006).

The IPRSP coincided with the first Medium Term Expenditure Framework (MTEF) budget and formed the basis of the full PRSP. The PRSP process was twined with anti-poverty and economic growth MTEF budget. Both PRSP and MTEF recognized sector priorities and inter/intra sectoral linkages (Collins et al., 1996). Shortcomings in poverty reduction initiatives which include non implementation, inadequate resource allocations, lack of prioritization, lack of participation and involvement of the poor, poor planning and budgeting for key social sector are some but not all the reasons as to why poverty has not declined significantly (Odongo and Karanu, 2004). Other poverty reduction strategies include the Economic Recovery Strategy for Employment and Wealth Creation 2003-2007, this was followed by the First Medium Term Plan 2008-2012 (MTP I) which took into account the successes of ERS 2003-2007. Currently the Second Medium Term Plan (2013-2017) and Vision 2030 are under implementation (Republic of Kenya, 2013).

1.3 Health

Ill-health is a psychological or physical state of body balance, which impairs a person's ability to perform normal activities. Ill-health is viewed in the aspects of life science incorporating health and medicine (Grant, 2005).

1.3.1 Health Situation in Kenya

Since independence in 1963, Kenya has worked on improving the health of its population. By the 1980s, Kenya had improved its health facilities by about four times. This helped to improve the life expectancy from 40 years to 62 years and also helped improved child survival rates (Ministry of Medical Services, 2008).

The economic crisis of the 1980s and the onset of the HIV/AIDS pandemic in the 1990s intensified the health challenges for Kenya as a country. These include the challenges of extending health services to impoverished and geographically dispersed populations, providing sufficient funds to maintain and extend health infrastructure; and to ensure the availability of health workers where they are most needed (Ministry of Medical Services, 2008).

Besides fighting with a high burden of infectious diseases, Kenya faces an emerging chronic diseases problem characterized by increasing rates of cardiovascular disease, cancers, and diabetes. Since the 1990s, some of Kenya's early achievements in health have taken a down turn. Over the past two decades, life expectancy has reduced to 53 years, and mortality rate among children under the age of five has risen slightly (Ministry of Medical Services 2008). However, in 2012 life expectancy in Kenya was estimated to be 63.07 years with child mortality taking a declining trend at 73 per 1000 live births (Kenya Economic Survey, 2013).

During the 1994- 2010, health policy period, life expectancy at birth in Kenya declined to a low of 45.2 but was estimated to have risen up to 60 years by 2009. However, deterioration of the health situation was seen across all ages demonstrated by poor performance of various health indicators especially adult, infant and child mortality (WHO 2010, World Health Statistics).

During the period 1994-2010, child health interventions showed improvements in coverage. However, welfare reports indicated that ill health amongst children remained high, with no indications of significant improvement. By 2012 under five and infant mortality were estimated to be 73 and 49 respectively (Ministry of Medical Services, 2012).

The health sector has been adversely affected by globalization, political instability and the emerging regional and national macroeconomic challenges triggered by the global economic downturn, coupled with climate change. The national health risks and priorities have been influenced significantly by the increased cross-border movements of people, goods and services as well as international rules and institutions (Ministry of Public Health and Sanitation, 2012).

1.3.2 Child Mortality

Child mortality is the probability of a child dying between 12 months and 60 months. Infant mortality refers to the probability of a child dying before the first birthday, while under-five mortality refers to the probability of dying between birth and the age of five years (Republic of Kenya, 2008)**.**

Table 1.1. Child Mortality in Kenya: Levels and Trends

Year	1962	1969	1979	1989	1993	1998	2000	2003	2006	2008	2010	2012	2013
Under-5 Mortality	219	190	157	113	93	105	116	115	92	74	74	73	71
Infant Mortality	126	119	104	59	62	71	73	77	60	52	52	49	42

Sources: UNICEF Statistics. http//www.childinfo.org/areas/childmortality.

The Economic Recovery Strategy (ERS) aimed at reducing under-five mortality rates from 115/1000 in 2003 to 100/1000 by the year 2008. On the other hand, Kenya's Millennium Development Goals targets to reduce infant mortality rates to 25 per 1000 live births and reduce under-five mortality rates to 33 per 1000 live births by 2015 (Republic of Kenya, 2009). However, in the year 2012, child mortality remained high at 73 per 1000 live births (World Bank Report, 2013). In light of the current figures in infant and under five mortality in Kenya, the country is experiencing difficulties achieving the MDGs given that the initiatives have not addressed healthcare in relation to poverty levels. This calls for a need to understand factors driving high childhood mortality rates in Kenya.

1.3.3 Recent and Current Health Policy Response

The 1970 global crisis adversely impacted on Kenya economic growth. The decline in economic growth seriously impacting on the government's ability to provide welfare services like health care. Consequently Kenya implemented Structural Adjustment Programs (SAPs) to revive economic growth. The SAPs saw the introduction of health user fees. During this period there was a downward trend in both heath care gains and economic gains of the early independence period (Collins et al., 1996).

During the 1990s, Kenya became part of the global community in promoting anti-poverty initiatives which culminated into national poverty eradication plan. This was followed by the launch of Medium Term Expenditure Framework/Poverty Reduction Strategy Paper budgeting which was incorporated in the health sector (Republic of Kenya 2004).

The Kenya Health Policy Framework sets out six policy imperatives that the Government focused on for the period of 1994 to 2010. To support the implementation of the strategic imperatives, the sector developed five-year strategic plans. These include: the first National Health Sector Strategic Plan of 1999- 2004 (Ministry of Health 2000a). By the end of the 1999-2014 plan period outcomes stagnated and poverty rates increased (Republic of Kenya 2004).

The second National Health Sector Strategic Plan (NHSSP II) 2005 - 2010 was designed to reduce health inequalities and reverse the downward trends in health related outcome and impact indicators seen during the period of the NHSSP I of 1999-2004 (Ministry of Health, 2005). The trends of the various health indicators took a slight downward trend during this period reflecting some degree of effectiveness of the NHSSP II.

By the end of NHSSP II, the key health indicators had not improved significantly and consequently the Kenya Health Policy, 2012 – 2030 was formulated focusing on the two key obligations of health: contribution to economic development as outlined in the Vision 2030 and realization of fundamental human rights as enshrined in the Constitution of Kenya 2010 (Ministry of Medical Services, 2012).

1.4 The Linkages between Poverty and Ill health

The various ways through which aspects of ill-health link with other components of poverty include: poor nutrition; poor shelter; poor working conditions; health care costs; erosive livelihood and coping strategies (Kyegombe, 2003). The poorest households in most societies are believed to experience higher levels of morbidity, die younger and face higher levels of child and maternal mortality (Spencer, 2005).

The poverty ratchets model points out that sickness impoverishes already poor households, consequently plunging them into a progressive spiral of decline in health and economic status (Corbett, 1989). The decreased capabilities of poor households such as low nutritional status, hazardous living and working conditions and inability to adequately meet the costs of treating illnesses imply that ill-health shocks are more

often repeated for poor household and they take longer to recover (Goudge and Govender, 2000).

Poor shelter and environments are associated with poverty. Consumption patterns of households take a reverse trend and households may be forced to sell their assets like land and income generating assets in order to meet the costs of health care. Sale of assets is likely to move the household to downward poverty spiral. Poor environments make the poor susceptible to diarrheal diseases caused by unsafe drinking water and poor disposal of waste. In addition, the poor are likely to take hazardous work in poor working conditions with inadequate health and safety protection hence increasing their vulnerability to health risks. Ability to meet the cost of quality health care is lowest amongst the poor households. Inadequate education of such households implies that they are unable to access the right health care consequently low value for money on service utilization (Grant, 2005).

Poor households depend on livelihood strategies that are likely to erode completely their assets during illness. For example, sale of land, sale of income generating assets, and withdrawing children from school to take care of the sick. Moreover such households may be forced to cut on long term investment and savings in order to cope with household illness. This worsens their socio economic status (Kyogombe, 2003).

Children born of poor mothers are likely to have low birth weight and experience low levels of breast feeding, face high levels of acute and chronic illness and increased rates of disability increasing their chances of morbidity and mortality through childhood to adulthood. (Spencer, 2005). People who are chronically sick or disabled face a double jeopardy as their ill-health exposes them at higher risks of poverty and their poverty level is likely to worsen their health status further (Whitehead & Bird, 2006). This study investigates the relationship between poverty and child mortality in Kenya.

1.5. Statement of the Problem

The effect of poverty on health is of research interest in the social and medical disciplines (Smith, 1999, 2004; Fuchs, 2004; Meer et al., 2003; Deaton, 2002; Frijters et al., 2005). From policy makers' viewpoint, knowing the correlation between poverty and health is inadequate because policy formulation aimed at narrowing health inequality requires understanding of the strength of the relationship. Medical scientists and researchers in the public health field tend to believe that the association is from socio economic status to ill-health (Smith, 1999; 2004).

There is increasing research interest in the determinants of health with the emphasis shifting from medical treatments and health care services to socio-economic factors, including income, employment status, environment and income distributions (Wilkinson and Marmot, 1998; Marmot and Wilkinson, 1999). Economists on the other hand seem to be more interested in the effect of health on socioeconomic status, particularly the effect of health on labour supply and wages (Cai, 2009a; Grossman and Benham, 1974).

With respect to child mortality, early studies are of the opinion that as much as infant and child mortality rate are directly linked to incomes, the distributional characteristic of infant and child mortality tend to be more responsive to the welfare of the poor (Younger, 2001). Spencer (2005) argues that poverty and low socio economic status have profound effects on health. The steep decrease in the incomes due to either macroeconomic crisis or other factors may cause adverse health outcomes (Paxton and Shady, 2004).

Other studies however, argue that the health status is not necessarily associated with incomes and expenditure and this therefore presents an opportunity to study health in relation to poverty (Younger, 2001). In Kenya there is a dearth of studies that investigate the relationship between poverty and ill-health. The existing empirical studies in Kenya have not adequately explored the effect of poverty on child mortality. The study bridges the gap in knowledge by investigating the link between poverty and child mortality.

Past studies in Kenya relating poverty and child mortality used KDHS data for 2003 and KIHBS data of 2005/06 and focused on different specific variables. For instance, Amina (2008) focused on levels, patterns and differentials in child mortality with respect to poverty. Mariara et al. (2012) focused on physical environment and child survival. Mutunga (2004) investigated the impact of socioeconomic and environmental characteristics of households on infant and child mortality. These empirical studies in Kenya have not explored the effect of poverty on ill-health taking into consideration that the direction of the relationship may run from poverty to ill-health. More important is the need to establish the effect of poverty on child mortality given that the above mentioned studies did not adequately focus specifically on the effect of poverty on child mortality and the mechanisms involved. This study partially fills this gap in knowledge.

This research project addresses the following research questions: First, what is the relationship between poverty and child mortality in Kenya? Secondly, what is the strength of the relationship between poverty and child mortality in Kenya? Lastly, what factors condition the poverty child mortality relationship?

1.7 Research Objectives
The general objective of this study is to investigate the relationship between poverty and ill-health in Kenya. The specific objectives are:
   (i) To determine the effect of poverty on child mortality rates in Kenya.
   (ii) To determine the factors that condition poverty child mortality relationship
   (iii) To make policy recommendations on how to address health care needs of
        poor children in Kenya.

1.8 Significance of the Study
Understanding the relationship between poverty and health outcomes will help the health policy makers in the design and implementation of health interventions that take into account the health care needs of the poor. The study has the potential to enable economic health policy designers and implementers to come up with policy interventions that are bi-dimensional tackling both poverty and adverse health outcomes. The study will also be useful as a reference point for action by the Non

Governmental Organizations, Civil Societies and other health sector actors to advocate for provision of pro poor health care policies. The policy interventions in place have treated poverty and health outcomes in isolation. The study therefore provides a pointer to policy makers for the need of change in approach. Last, the study contributes to the existing empirical studies on poverty and child mortality based on demographic and health survey data and forms a basis for further research.

1.9 Organization of the Study

This study has three chapters. Chapter two presents the literature review while the methods used in the study are presented in chapter three. Chapter four presents the analysis results and interpretation of the findings. Lastly, summary, conclusions, policy implications and further research are presented in chapter five.

<div align="center">**CHAPTER TWO**</div>

2 LITERATURE REVIEW

2.1 Introduction

This chapter presents some of the theoretical and empirical evidences that point out the relationships that exist between poverty and health. The chapter begins by presenting the theoretical literature followed by empirical literature.

2.2 Theoretical Literature

This section presents a summary of some of the broad theoretical perspectives on why one might expect a linkage between poverty (or socio economic status) and health. However these theories seem to suggest that the direction of the effect is from poverty to ill-health.

 (i) The absolute income hypothesis

This theory links the socio- economic status (SES) to population health. It suggests that health status improves with the level of personal income, but at a declining rate (Preston and Samuel, 1975). This hypothesis implies that if income is redistributed from the rich to the poor whose health is more responsive to income, then the result is an improvement in population health. Societies with more equal distribution of income will have better health (Deaton, 2001). However, this theory is criticized on the basis that this relationship cannot account entirely for the link between income and health (Wolfson et al. 1999).

(ii) The absolute deprivation hypothesis

This may be regarded as an extreme version of the absolute income hypothesis. It postulates that very low standards of living are bad for health, however, past some deprivation threshold, additional income is not particularly important for health. It is noted that the emphasis here is that individuals living with very low incomes will experience physical conditions that may adversely affect their health, such as poor nutrition, limited access to health care, hazards from poor environmental quality, health limiting behaviors such as smoking and sedentary lifestyle and stress due to

<div align="center">11</div>

coping with very low income (Phipps 2003). The theory focuses on physical conditions which is a key limitation.

(iii) The relative position or psycho-social hypothesis.

The hypothesis focuses on an individual's position within a social hierarchy independent of standard of living as the key to understanding the link between inequality of socio-economic status and health. The hypothesis argues that the ongoing stress associated with being lower down and not just at the bottom on a social ladder leads to biological processes that are harmful to health (Osberg & Lars 2000). It also emphasizes the negative implications of income inequality for the creation of social cohesion. A major drawback associated with the relative position hypothesis is the correct identification of the most relevant comparison group with whom individuals do compare themselves (Phipps, 2003).

(iv) Neo-materialist hypothesis.

This is of the opinion that high levels of income inequality are simply one manifestation of underlying historical, cultural, political and economic processes that simultaneously generate inequalities in social infrastructure such as medical, transportation, educational, housing, parks and recreational systems (Lynch et al., 2000). From this perspective, inequalities in health derive from inequalities in all of the above mentioned aspects of the material environment. Questions were however raised on how class can be measured as income was seen not to be the best measure of class. It was also difficult to see how the ownership of certain goods impact on health as argued by the theory (Bottero, 2005).

(v)Wealthier is healthier hypothesis (Pritchett and Summers, 1996) asserts that income is the main determinant of health and that the international correlation between income and health is sufficiently tight for income rankings to indicate well-being more broadly. The theory does not give adequate account of the other determinants of health other than focusing on income.

Schultz (1984) in his theoretical framework pointed out that health outcome is a factor of biological endowment, preferences, economic endowment, regional prices and programs variables and proximate determinants of health. However, a limitation to the theory lies in deciding which economic and demographic behavior are demand determined and those that are interpreted as predetermined market prices and individual endowment.

The key message from the theories is that socio economic status is important in determining the health status of a society or a population. The theories further suggest that health status improves with improvements in socio economic status. Low socio economic status drives households or societies to poor health status. The study is anchored on wealthier is healthier hypothesis.

2.3 Empirical Literature

This section presents the various studies regarding the linkages between poverty (socioeconomic status) and health (child mortality). The relevant studies have been reviewed below.

2.3.1 Studies from Kenya and Africa

Mutunga (2004) investigated the role of socio economic and environmental characteristics (mother's education, cooking fuel source of drinking water, cooking fuel, sanitation and electricity) on child mortality at different ages using KDHS data for 2003. Hazard rate model was employed and a modified Shultz (1984) health production theoretical framework was considered. The finding showed that socioeconomic and environmental characteristics had significant impact on child mortality. The study however did not test for the effect of poverty on child mortality and the causal process therein. This study employs a model that estimates the causal process between poverty and child mortality.

Elmahdi (2008) studied the socioeconomic determinants of infant mortality in Kenya using data from KDHS for 2003. Logistic regression model was employed in the analysis. The findings showed that other than mother's occupation and wealth index, there was no significance association between the other socioeconomic factors and

infant mortality in both rural and urban areas. The findings further indicated that breastfeeding was the most important determinant of infant mortality followed by ethnicity, then fertility factors (birth order and interval) with gender being of least significance. The study however did not attempt to investigate the link between poverty and infant mortality.

Amina (2008) studied the levels, patterns and differentials in childhood mortality in light of poverty levels in Kenya. The study utilized Kenya Integrated Household and Budget Survey 2005/06. The Trussel (1974) variant form of the Brass technology was used to estimate the probability of a child dying between the time of birth to a certain age. The findings were that child mortality levels increased with poverty levels. A contrary finding was that there were higher mortality rates amongst the non-poor households than the poor in North Eastern and Central provinces. The study makes use of Kenya Demographic Health Survey 2008/09 unlike the study reviewed here which used Kenya Integrated Household and Budget Survey to find out the relationship between poverty and health using child mortality as the health indicator. Amina (2008) did not investigate the direction of the relationship between poverty on child mortality. This study also intends to find out the effect of poverty on child mortality by specifying the mechanisms.

Mariara et al. (2012) investigated the factors that affect child survival in Kenya. Child poverty was analyzed using survival models while asset index was used as a measure of well being. The study made use of Demographic and Health Surveys for the period 1993- 2003 supplemented with secondary micro-level data on Gross National Product per Capita, health expenditure and regional distribution of health facilities for the year of birth of a child. The proximate determinant framework was employed to analyze child survival. According to the findings of study, there was significant relationship between poverty (asset index) and child survival. Further, rural children were more subjected to poverty and hence more likely to die than their counterparts in urban areas. The study did not investigate the possibility of a casual relationship between poverty and child survival. This study investigates the linkage between poverty and ill-health by employing a model that allows for estimation of the relationship between them taking into account that they are both potentially endogenous.

14

Ngigi (2013) studied the determinants of infant mortality in Kenya using KDHS for 2008. Schultz (1984) framework and the logit model were employed to achieve the study objectives. The findings showed that mother's age, total number of children born by a mother, household wealth, infant's birth size, mother's education and religion were major determinants of infant mortality. The study however did not attempt to examine the effect poverty on infant mortality. This study utilizes a model that estimates the true effect between poverty and child mortality.

Ahmed et al. (2012) investigated the causal linkage between poverty and health with HIV/AIDS as the health indicator in Nigeria. The study used annual time series data covering the period 1990 – 2009. Granger causality test was employed to achieve the objectives of the study. The findings showed that there was no direct linkage between poverty and HIV in Nigeria implying that poverty had no effect on the rates of HIV in the country. However, HIV was found to have resulted in increased poverty rates. A critique of the study is that it did not investigate the relationship between poverty and HIV in the short run. This study however, uses cross sectional data and instrumental variable methods to investigate the relationship between poverty and ill health in Kenya.

Foloko (2009) investigated the determinants of child mortality in Lesotho using the dataset from Lesotho DHS for 2004/05. The study employed Rosenzweig and Schultz (1983) framework and hazard model in the analysis of child mortality. The findings indicated that household income, mother's education and sanitation facilities were significant determinants of child mortality. The study however did not investigate the causal effect of poverty on child mortality and the mechanism involved.

2.3.2 Studies from the rest of the World
Gwatkin et al. (2000) studied the socio economic differences in health, nutrition and population in Bangladesh. Using the DHS data from 40 developing countries, they analyzed the inequalities in: infant and under 5 mortality, levels of malnutrition, incidence of diarrhea and acute respiratory infection. The population in each country was divided in wealth quintiles, according to an asset index. The findings were that on average, across regions of the world, a child born in a household belonging to the

lowest wealth quintile is roughly twice as likely to die as a child born in a household from the highest quintile. Another finding of the study was that countries with lower mortality and morbidity rates among children were in general also characterized by wider disparities in socioeconomic status. The study did not attempt to explain the causal effect between poverty and ill-health. This study investigates the effect of poverty on child mortality.

Buddelmeyer and Cai (2009) analyzed the interrelated dynamics of health (adult health was measured as either ill-health or good health) and poverty using the Household, Income and Labour Dynamics in Australia (HILDA) Survey data for 2001-2006. The joint modeling approach together with panel data were used while controlling for the unobserved determinants of health and poverty. The results indicated that the causality between health and poverty runs both ways and the relationship is confounded by unobserved heterogeneity. They also found that families headed by a person in ill-health are more likely to be in poverty compared with families headed by a person with good health. On the other hand, a family head whose family is in poverty in the current year is more likely to be in ill-health in the next year compared with a family head whose family is not in poverty. In addition, there was evidence that health and poverty are affected by correlated un-observables, causing health to be endogenous to poverty even in the absence of a reverse effect from poverty on health. It was also found that inter-temporal persistence exists in both health and poverty even after controlling for observed and unobserved heterogeneity. The study did not investigate the mechanisms through which the causal effect existed other than the time invariant variables. This study uses data from a less developed country (Kenya) and employs an instrumental variable approach to find out the relationship between poverty and child mortality.

Subramanian et al. (2002) investigated the conceptual and empirical linkages that exist between poverty and poor health in developing and developed countries. In their studies of developing countries, data from Living Standard Measurement Surveys (LSMS) and the Demographic and Health Surveys (DHS) were used. DHS data from 40 developing countries were used to analyze inequalities in: infant and under-5 mortality; levels of malnutrition; and incidence of diarrhea and acute respiratory

infection. Data from 10 developed countries were used in the analysis. An asset index was employed to divide the countries' population into wealth quartiles. The results showed that child mortality was higher in the lowest wealth quartile households than the highest wealth quartile. The study however, did not investigate the direction of the direction of causality between poverty and poor health.

Christopher and Novick (2012) studied the relationship between poverty and ill-health in North Carolina in the United States using data from North Carolina Health Data Explorer from the Centre for Health System Research and Development. The health indicators used were: infant mortality, all cause mortality, heart disease mortality, cancer mortality, stroke mortality and diabetes mortality. Pearson Product Moment Correlation was used to analyze how poverty rate correlate with all the types of mortality. The findings indicated that strongest correlations existed between premature mortality rate and poverty rate and between premature mortality rates and median household income. As the poverty rate for counties in North Carolina increased, so did the premature mortality rate; and as the median household income for a county went up, the premature mortality rate went down. The associations of the poverty rate with infant mortality rates were also found to be strong. The association of the poverty rates and other measures of mortality like all cause mortality, heart disease mortality, stroke mortality, cancer mortality and diabetes mortality were found to be significant. A shortcoming of the study is that the direction of association between poverty and ill- health was not investigated. The reviewed study was done in a different context in United States of America which is a developed country while this study is done in Kenya a less developed country (LDC).

Benzeval and Judge (2001) studied the relationship between adult income and adult health. The literature review was based on evidence from 16 studies using eight different data sets from four different countries. Health status outcome measures included: mortality, emotional stability, chronic conditions, general life satisfaction and physical functioning. Socio-economic status measures used were current income level, recent income change, poverty flags, current earnings, multi-period averaged incomes, relative position in the income distribution and number of spells of poverty. Of the reviewed studies by Benzeval and Judge (2001), those that include measures of

17

income level found that income was significantly related to health outcomes. The study concluded that research studies that focused on individuals found a very robust relationship between an adult individual's income and his/her health, using a range of measures for both income and health indicators. Regardless of how measures of health status and measures of socio-economic status (SES) are combined, there is little doubt if any, that poverty results to ill health. The reviewed study however presented only a review of existing studies and did not attempt any empirical analysis. This study investigates the effect of poverty on child mortality by estimating a model that investigates the causal effects between the two.

2.4 Overview of Literature

The literature reviewed above point out that adverse health outcomes increase with increasing poverty levels and that poverty and ill-health are observed simultaneously. In the reviewed studies, various poverty and health indicators were used and it was found out that the two are significantly correlated. Moreover, evidence showed that poverty causes ill-health/poor health with poverty being significantly related to health (Benzeval and Judge, 2001). However, from the studies, the direction of causality mechanism was not specified as most of the studies have not examined the direction of causality between the two. The study by Buddelmeyer and Cai (2009) that analyzed the causality pointed out that it runs both ways and the relationship is confounded by unobserved heterogeneity. From the reviewed studies we learn that the direction of the relationship runs from poverty to ill-health. However, the studies in Kenya have not attempted to investigate the relationship between poverty and ill-health based on empirical findings that the direction of effect is from poverty to ill-health. This study therefore fits in by estimating a model that takes into consideration that the effect runs from poverty to ill-health hence adding value to the existing empirical studies in Kenya by contributing to the literature and forming a basis for future research.

CHAPTER THREE

3 METHODOLOGY

3.1 Introduction

This chapter presents the methodology and the data to be utilized in the analysis. The choice of methodology is guided by the literature reviewed and the variables.

3.2 Analytical framework

This study uses the framework proposed by Rosenzweig and Schulltz (1983), later modified by Schultz (1984) to analyse the factors affecting child health in Kenya. The basic idea of the framework is that households do allocate time and goods in producing commodities of which some are sold in the market and some for home consumption.

The household choices is represented by a utility function U, which is a function of composite consumption good X, composite health environment good Y and H the health status of n children in the household. This is represented as:

$$U= U(X\ Y\ H)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots1$$

According to Rosenzweig and Schultz (1983), child health is determined by health environment good (Y) (source of drinking water, cooking fuel, sanitation facilities and health service variable) a child specific health input (I), which does not affect parental utility directly and a child health endowment μ. Child health production is therefore as below:

$$H= F(Y,\ I,\ K,\ \mu)\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.2$$

Where

Y , I, and μ are as defined above and K is household health knowledge.

The household choice of Y depends on child health endowment (MC), maternal /household preference (PR), the prices prevailing in the market and specific constraints posed by the household's physical environment (P) and the household wealth (W).

The utility function (1) is maximized given the production function (2) subject to the household budget constraint. Household budget constraint is given as.

$$Z = P_X + P_Y + P_I \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 3$$

Where

Z- household income

P_X – Price of consumption goods with a direct effect on health

P_Y – Price of health related goods

P_I – Price of the child specific health input.

Prices and income are assumed to be exogenous to the household.

Following Mwabu (2008) and from the maximization equation (1) subject to health production function (2) and budget constraint (3), the reduced form household demand function can be derived as

$$D_X = D(P_Y, P_I, K, W, \mu) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4$$

$$D_Y = D(P_Y, P_I, K, W, \mu) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 5$$

$$D_I = D(P_Y, P_I, K, W, \mu) \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 6$$

By substituting the demand function for (4) and (5) into the health production function, Mwabu (2008) obtains:

$$H = F(D_X (P_Y, P_I, K, W, \mu), D_Y (P_Y, P_I, K, W, \mu), K, \mu) \dots\dots\dots\dots\dots\dots\dots\dots.. 7$$

$$H = F(P_Y, P_I, K, W, \mu) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.. 8$$

From expression (8) child health can be explained by the relative prices ((P_Y and P_I), the household health knowledge (K), the household wealth (W) and the child health endowment for all children (μ).

Given that DHS data do not provide information on prices, identical prices will be e assumed for all household in this study. The reduced form input demand function is hence given as:

$$H = F(Y, I, K, W, \mu) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 9$$

From equation (9) it can be seen that child health is explained by proximate inputs to child health (Y), child health inputs (I), household health knowledge (K), household wealth (W) and child health endowment (μ), (Mwabu, 2008).

20

3.3 Model Specification

Following Mwabu (2008), this study specifies a child mortality model based on equation (9) incorporating proximate child health determinants according to Schultz (1984). The literature suggests that child health is determined by a vector of socioeconomic factors, which affect the proximate determinants. The proximate determinants are the intermediate variables between socioeconomic variables and morbidity and mortality risks (Mosley and Chen, 1984).The child mortality model can be specified as:

$$CM= f(MED, BSIZ, G, MAGE, MREL, MMS, TNC, HHW, SCF, RT, AW, AS, PD, TTI, \varepsilon) \dots\dots 10$$

Where:

CM- based on the probability of a child dying before the fifth birthday, equal to (1) if reported dead and (0)-if reported alive. Table 2 gives the variable labels, definitions and apriori expectations of the variables in (10) above.

ε - error term

3.4 Model Estimation

To realize the objectives of this study and following Ajakaiye and Mwabu (2009), from equation (9), the study employs a structural model for measuring the causal effect of poverty(proxied by household wealth) on health. The model is formulated as follows.

$$Y= \varkappa + \beta X + \gamma Z + \epsilon \dots\dots 11$$

$$X = a + bK + cZ + e \dots\dots 12$$

Where Y is the health outcome variable (child mortality)

X is the treatment variable (poverty level proxied by wealth index)

Z is a vector of exogenous, control variables such as gender, age, area of residence

K is an instrument

$\varkappa, \beta, \gamma, a, b$ and c are parameters to be estimated (Mwabu, 2009).

21

β, the parameter in equation (11) can be interpreted as the causal effect of poverty on child mortality. However, identifying the causal effect is complicated because specification of the processes through which health production takes place makes poverty endogenous to child mortality. The process through which poverty is endogenised must be specified. This is because in the process of producing Y, the agent chooses X and in the process of choosing, unobservables such as preferences are introduced in equation (11) (Ajakaiye and Mwabu, 2009). The unobservable factors can affect both poverty and child mortality thus making it difficult to identify the true effect of poverty on child mortality. Equation (12) resolves this difficulty by coming up with a way of varying poverty (through instrumenting it with K- number of household members) without directly influencing child mortality. The effect of poverty on child mortality is therefore purged of any possible bias.

The choice of instrument is based on the argument fronted by Bhasin et al. (2009). Endogeneity of household wealth may result from two offsetting effects caused by total number of household members. First additional household members could contribute productively to household income and raise the expenditure and consumption of the household hence raise the household wealth index. On the other hand additional household members could negatively affect the asset accumulation by the household hence lower the household wealth index. Other variables like mother's education, woman's employment status, gender of household head could be used as instruments but studies have shown that they affect child mortality. However, it must be noted that finding a good exogenous instrument is a hard work (Wright and Yogo, 2002).

In the regression analysis, we estimate the IV as Two Stage Least Square in equation (11) and (12). In the first stage, we regress X on K and obtain predicted values of X. In the second stage we regress Y on $\hat{X}$, the coefficient on $\hat{X}$ is the Two Stage Least Square estimator $\hat{\beta}^{TSLS}$. This is represented by the equation below:

$$Y = \alpha + \beta\hat{X} + \gamma Z + \mu \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 13$$

Where $\hat{\beta}^{TSLS}$ is a constant estimator of β.

3.5 Variable Definition and Apriori Expectation

Table 3.1: Variable Definition and Apriori Expectation

Variable	Measure	Apriori Expectation
Maternal Characteristics		
Mother's education (MED)	The level of education attained by the mother captured by several education dummies(no education used as reference category) Primary-(1) Yes (0) No Secondary+ - (1) Yes (0) No	Child mortality is expected to reduce with higher maternal education (Mutunga, 2004; Anjali 2001; Mariara et al., 2012)
Mother's age (MAGE)	The age of the mother at the time of child birth. (Below 30-39 Years is used as the reference category) Below 20 years 20-29 Years -(1) Yes (0) No 30-39 Years -(1)Yes (0) No	High child mortality are likely to occur with very young and very old women (Anjali, 2001; Mariara et al., 2012; Ngigi, 2013; Mariara, 2008))
Residence type (RT)	Residence type of the household- show whether the household resides in rural or urban (Rural is used as the reference category) Urban –(1) Rural –(0)	Rural residents are expected to experience high child mortality than urban residents (Anjali, 2001; Mariara et al., 2012; Mutunga, 2004).
Mother's Religion (MREL)	The religion the mother subscribe to measured by several dummies. (No religion is the reference category. Roman Catholic –(1) Yes (0) No Protestant/other Christian (1) Yes (0) No Muslim (1) Yes (0) No	Roman Catholic, other Christians and Muslims religion impacts knowledge thus likely to improve health. Lower child mortality is expected in mother who subscribe to such religion (Anjali, 2001; Ngigi 2013; Mutunga, 2004).

Mother's Marital Status (MMS)	Mother's marital status measured as a dummy variable
	   1- Married
	   0- Otherwise
		Lower mortality risks are expected of children born of married women may take time off work as their husbands work to take care of their children (Kenya Demographic Health Survey, 2008-2009; Ngigi, 2013).

Total Number of children (TNC)	No of live children a mother has had for the past 5 years. (Above three is used as a reference category) Less than 3- (1) Yes (0) No	High mortality is expected in household with more than two children under the age of five (Elmahdi, 2008; Mariara et al., 2012)
Children Characteristics		
Gender(G)	Gender of child Male (1) Female (0)	Male children are expected to have high mortality than female children(Gupta, 1990; Mariara, Karienyeh and Kabubo, 2012; Mutunga, 2004)
Birth Order (BORD)	Child's birth order in the family. (reference category being first order) 2-3 birth order-(1)Yes(0) No Above 3 birth order (1) Yes (0) No	With more births, a mother is expected to be more skilled in child care. High mortality is expected at first birth and the same is expected with above the 3 birth order (Elmahdi, 2008; Mariara et al., 2012).
Birth Spacing (BSP)	Birth spacing between children. (Below 24 months is used as the reference category) Above 24 months –(1) Yes (0) No	Better birth spacing of above 24 months is likely to have positive effects on child mortality (Elmahdi,2008;Mariara et al., 2012)
Birth Size (BSIZ)	Baby size at birth as reported by the mother(Small/ very small is used as a reference category Large/very large- (1) Yes (0) No	High mortality risk is expected of very large and small infants (Anjali, 2001).

Household Characteristics		
Source of cooking fuel (SCF)	Source of cooking fuel used by the household (Non Biomass is used as reference category.) (Biomass include cooking fuel such firewood, grass, shrubs, charcoal, animal dung, agriculture crop. Biomass –(1) Yes (0) NoNon- Biomass (1) Yes (0) No	Child health is expected to improve with availability of clean cooking fuel (Anjali, 2001; Mariara et al., 2012; Mutunga 2004; Foloko, 2009).
Access to water (AW)	Source of household drinking water (Protected source is used as reference category) Non improved source(1) Yes (0) No	Child health is expected to improve with availability of safe drinking water (Mutunga, 2004; Mariara et al., 2012; Gyimah, 2002)
Access to Sanitation (AS)	Availability of sanitation facility to the household(No facility is used as reference point) Non Improved Toilet (1) Yes (0) No Improved Toilet facility (1) Yes (0) No	Child mortality is expected to improve with availability of clean waste disposal facility(Gyimah, 2002; Mutunga 2004; Mariara et al., 2012; Ngigi, 2013)
Health service Variables		
Place of Delivery (PD)	Place where child was born. Measured as a dummy variable: 1-Hospital 0-Otherwise	Mortality risks are expected to be lower with the availability of basic health facilities (Anjali, 2001; Rutstein, 2000; Mariara et al., 2012; Mutunga, 2004; Ngigi, 2013).
Tetenus Toxiod Injection (TTI)	Mother received immunization or not. Measured as a dummy variable 1-Immunized 0-Otherwise	Child health and survival improves with injection of pregnant mothers with tetanus toxoid (Mwabu, 2008; Mariara et al., 2012).

Poverty		
Household Wealth (HHW)	Wealth index of the household. (Middle is used as the reference category) Poor- (1) Yes (0) No Middle (1) Yes (0) No Rich (1) Yes (0) No	Wealthy households are expected to have low mortality rates (Mariara et al, 2012; Mutunga 2004; Ngigi, 2013; Foloko, 2009; Elmahdi, 2008).
Control Variable		
Gender of Household head	The head of the household whether male or female Male- (1) Female (0)	Female headed household are expected to experience less child deaths as compared to male headed households (Adhikari and Podhisit, 2010).

3.6 Data Types and Sources

The study makes use of KDHS data for 2008/09 collected in Kenya. KDHS 2008/09 is a national representative survey of 8,444 women aged between 15 to 49 years and 3,465 men aged between 15-54 years selected from 400 sample points throughout Kenya. Out of the surveyed women, 11% had experienced a child death at the time of the survey. Apart from providing information on health situation, KDHS provide adequate information on non-monetary measure of poverty. Analysis was carried out using STATA statistical software (stataCorp, 2011)

<div align="center">**CHAPTER FOUR**</div>

4 RESULTS AND DISCUSSION

4.1 Introduction

In this chapter, we present the research findings for this study. First, the descriptive statistics are presented followed by the findings on linkages between poverty and child mortality rates in Kenya.

4.2 Descriptive Statistics

The descriptive statistics of the study variables are presented in tables 4.1. There were a total of 6079 mothers in the study sample. Total number of household members is the only continuous variable used in the analysis. On average there were 5 members per household with a standard deviation of 2.48. The maximum number of members in each household is 19 and the minimum is 1. The other remaining variables are categorized into dummy variables with each taking the value 1 and 0 otherwise.

Table 4. 1: Descriptive Statistics

Variable	Mean	Std Dev	Min	Max
Residence Type (Urban =1)	0.24	0.43	0	1
Mother's educational attainment No Education =1 Primary =1 Secondary+ =1	0.21 0.56 0.22	0.41 0.50 0.42	0 0 0	1 1 1
Gender of Household head (Male = 1)	0.71	0.45	0	1
Marital Status (Married =1)	0.79	0.40	0	1
Religion (With Religion= 1)	0.96	0.19	0	1
Sex of Child (Male dummy =1)	0.52	0.50	0	1
Household Wealth Index Poor =1 Middle =1 Rich =1	0.47 0.16 0.37	0.50 0.37 0.48	0 0 0	1 1 1
Source of Cooking Fuel (Biomass =1)	0.91	0.29	0	1
Type of Toilet Facility (Improved =1)	0.40	0.49	0	1
Source of Drinking Water (Protected = 1)	0.59	0.49	0	1
Mother's age at first child birth <20 = 1 20 to 29 =1 30 to 39 =1	0.62 0.37 0.01	0.49 0.48 0.10	0 0 0	1 1 1

Source: Authors computation from KDHS, 2008.

From table 4.1, the findings in terms of residence indicate that about 24 % of the mothers resided in urban areas while about 76% of the mothers resided in rural areas at the time of the survey. Distribution by education level showed that the highest level of schooling was post-secondary education but the majority of the women had primary education (56%), those who had no education were 21% while 22% had secondary education and above. Majority of the households were male headed (71%) compared to 29% female headed households. On marital status, 79% of the women were married while only 21% were unmarried (divorced, widowed or living together). Most of the women (96%) were either protestants, roman catholic or muslims while 4% of the women subscribed to no religion. In addition, nearly 52 % were male children while 48 % were female implying that male children experienced child mortality more than female children.

Findings on household wealth indicated that majority of the respondents were poor (47%) followed by rich (37%) and the least were the middle class representing 16 %. It is worth noting that almost half of the households were poor at the time of the survey. Further findings show that 91% of the households used biomass fuel for cooking (firewood, charcoal, straw/shrub/grass, agriculture crop and animal dung). The rest of the households (9%) used non- biomass (electricity, LPG/natural gas, kerosene and coal). Findings on sanitation showed that only 40% of the households used improved facilities while 60% used non-improved facilities. With respect to source of drinking water, about 59% of the households use water from protected sources. The remaining household used water from unprotected sources. This study also found out that about 62% of the mothers had their first child when they were below 20 years while 37% and 1% had their first child when they were between 20 to 29 and 30 to 39 respectively.

4.3 Econometric analysis

This section presents the findings of the econometric analysis. To achieve the main objective of the study, instrumental variable model was employed and analysis done for the three categories of household wealth index.

4.4 Diagnostic test

4.4.1 Endogeneity

This was conducted to find out if endogeneity exist in the estimation model. Chances of endogeneity in the estimation model are due to the use of household wealth index as the explanatory variable. Following Medrano et al., (2000), this study employed the unobservable instrument's approach, where we used total number of household members as the most suitable unobservable variable for household wealth index in our estimation model. The results of the test indicated that all the variables are exogenous.

4.4.2 Instrumental variable relevance and strength

The instrumental variable used in the study is total number of household members. The instrument has to be correlated with the explanatory variable but not the error term and should not affect the dependent variable directly. We test whether the instrumental variable is strong and relevant in our estimation equation. From the estimation, F – statistics is found to be greater than 10 and R^2 is greater than 0.1. These meant that the instrumental variable is strong and relevant.

4.5 Results and Discussion

The dependent variable in this study is child mortality and is measured by the probability of a child dying between 12 months and 60 months. The first stage results for household wealth status are presented in table 4.2.

Table 4.2: Determinants of Household Wealth Index/ Socioeconomic Status

Wealth Index/Soci-oeconomic Status	Coefficient	Standard Error
Place of residence (1=urban)	0.787**	0.024
Type of toilet facility (1=improved)	0.426 **	0.019
Source of drinking water (1= protected)	0.008***	0.001
Marital Status (1= married)	0.044***	0.021
Education level (1=primary)	0.413**	0.021
Education level (1=Secondary+)	0.645**	0.027
Source of cooking fuel (1=Biomass)	-0.095**	0.034
No. of household members(1= ideal household number,2-4)	0.028**	0.004
Constant	0.650**	0.103
Sample Size	6079	

*Notes: ***, ** significant at 1% and 5% respectively*

Household poverty level status as posited in literature was expected to be endogenous to child mortality. Number of household members was used as an instrument for household poverty level. However, the test results suggest that poverty level may be exogenous.

The results from the first stage (table 4.2), however indicate that the number of household members is a key determinant of poverty level. Households with between 2-4 household members are more likely to be wealthier than households that have more than five members. In Kenya however, households on average have 5 household members and a maximum of 19 members.

Other variables that had a significant effect on wealth index were: place of residence, woman's marital status, education levels, woman's age and environmental factors (sanitation facility, access to water and source of cooking fuel).

Residence type is also a key determinant of wealth index. Households in urban areas are more likely to have higher wealth index than the rural households. This may be explained by the availability of better infrastructures and more development opportunities in urban areas.

Households living in cleaner environments with access to improved sanitation facilities and improved water sources have high chances of having higher wealth index compared to households with no access to improved toilet facilities and unprotected water sources. Clean environment lowers the incidences of infectious diseases that have cost implications on households and may impact negatively on ones active participation in productive activities thereby reducing the household wealth index.

Education level of a woman is a significant determinant of household wealth index. Women with primary and secondary education plus levels more likely to have higher wealth index than women with no education. Lastly, married women are more likely to have higher wealth index compared to those who are not married.

4.6 Effect of Poverty on Child Mortality

Two different models were estimated to determine the effect of poverty on child mortality. The first model estimated the effect of household wealth index on child mortality in the presence of demographic factors (type of place of residence, child sex, mother's age at first birth and education level) and environmental factors (access to sanitation, source of cooking fuel and access to water). In the second model, the effect of wealth index on child mortality is estimated and gender of household head is included as a control variable in the model with all other variables in the first model unchanged. Gender of the household head is used to test whether there is any significant variability on the effects of the explanatory variables on child mortality.

The results from the two models show that wealth index, residence type, mother's education level, access to sanitation, source of cooking fuel, access to water and gender of household head significantly explain the variability in child mortality.

The study results based on poverty levels proxied by household wealth index indicates that wealth index has a positive and significant effect on child mortality rates in Kenya. Child mortality rates are found to decline as wealth index increases. A household belonging to the poor class is more likely to experience child mortality than a middle class household. Households from the rich class are less likely to experience child mortality than households from the poor class. Moreover, a one unit change in wealth status of the middle class household causes 3.1 units change in child mortality implying that a one unit increase in wealth status of the rich class results into 3.1 units decrease in child mortality.

This is because a wealthy household is able to pay and access quality healthcare during pregnancy, delivery and after delivery. The household is able to afford the right nutrition for its children, access improved sanitation facilities, access clean water and use clean sources of cooking fuel. In addition, the opportunity cost of a poor household going to a health facility may be higher as compared to a wealthy household since it has to forgo some other purchases to raise funds to pay for transport to the health facility and pay for child health care. The household also has to relocate scarce resources and time. It may also imply that poor households have to leave the work they do for a living to go to the clinic which may be more costly to them as compared to wealthy households. This therefore means leaving their homes unattended to, unlike their wealthy counterparts who can afford to hire someone to look after their homes as they seek child health services.

This result is in agreement with Kyei and Gyeke (2011), who argued that the wealth index of a woman is a significant factor in explaining child mortality. The argument by Mosley and Chen (1984) that socioeconomic factors act through a set of proxy determinants to influence child health is also affirmed by the findings. In addition, the findings conform to the results by Elmahdi (2008). Moreover, Mariara et al., (2012) found that poverty had a significant effect on child survival.

The type of residence is a significant determinant of child mortality. Analysis shows that households living in rural areas have higher risk of child mortality compared to those in urban areas. This could be best explained by poor child health seeking habits

due to longer distances to reach the nearest health facility and also due to poor transport network. The high child mortality could also be attributed to ignorance in the rural areas where some households may not know the significance of seeking health care services for their children.

Our finding is similar to the findings by Mariara et al. (2012), Anjali (2001) and Mutunga (2004). According to Suwal (2001), residence of a mother has an influential role in the survival chances of a child because lack of infrastructure such as roads to access health facilities, running water, electricity and toilets may be life threatening to children in rural areas.

Results based on access to water indicated that households that use protected water sources (piped water, public tap and rain water) were less likely to experience child mortality as compared to those who use improved water sources like open well, river water and other. This finding is similar to the findings in the second model.

Households that used non-improved toilet facilities were more likely to experience child mortality compared to those who use improved toilet facilities. This result is consistent with the findings by Klaauw and Wang (2003) and Gyimah (2002). A significant number of child deaths can therefore be prevented by providing improved sanitation facilities to households.

The type of cooking fuel used by the households in the household was found to be a significant factor affecting child mortality. Households who use non-biomass fuels were less likely to experience child mortality than households who used biomass as cooking fuel. Foloko (2009) and Wichman (2006) also found similar results which suggested that the exposure to cooking and heating smoke from dirty fuels is significantly associated with deaths of children below 59 months.

In line with our expectations, a mother's education exerts a positive effect on child mortality. The risk of experiencing child mortality for a mother with no education is higher than for a mother with primary education all other factors held constant. In addition, the risk of a mother with secondary education and higher experiencing child

mortality was lower than for a mother with no education and primary education. Thus mortality risks falls with an increase in the level of education.

More educated women are better placed to break away from traditions and utilize modern means of safeguarding their children's health and their own health. In addition, they are able to make independent decisions concerning their children's and their own health leading to reduced child mortality. Moreover, educated women are more likely to get employed and can afford the cost of health services for their children, purchase the right nutrition, afford clean cooking fuel, use improved toilet facility and use water of improved quality. The implication being that higher levels of education lower the chances of child mortality

This finding is in line with the findings by Caldwell (1997) and Mariara et al. (2012). Caldwell (1997) for instance posits that mother's education has a more direct effect on child mortality through improved health care. This is because educated women are more likely to seek child healthcare services than uneducated women. The probability of using health care services increases with the level of education. Take for instance that a woman with secondary education and higher has less probability of experiencing child mortality compared to a woman with primary education.

Another factor found to have significant impact on child mortality is place of residence. Households located in rural areas are more likely to experience child mortality than their counterparts from urban areas. This could be explained by lack of roads to access health facilities, poor sanitation facilities in rural areas, use of non-improved water sources and long distance to health facilities

The results from the inclusion of gender of household head as a control variable in model two indicates that gender of the household head is a significant factor in determining child mortality. Male headed households are more likely to experience child mortality compared to female headed household irrespective of the wealth index the household belongs.

This variability is however not significant. This finding is in agreement to the finding by Adhikari and Podhisit (2010) who argues that household headship significantly impact on child mortality. This finding implies that efforts to lowering child mortality should be geared more towards male headed households in Kenya. Generally, the significance of the variables do not change much in the two models.

Table 4.3: Correlates of Child Mortality

Instrumental Variable Two Stage Least Square Estimates

Variable	Model 1		Model 2	
	Coefficients	Standard Errors	Coefficients	Standard Errors
Wealth index				
Poor	4.564**	0.21	2.213**	0.11
Rich	-3.126**	0.23	-1.603**	0.11
Residence Type				
Urban	-2.046**	0.21	-2.992**	0.28
Gender of Child				
Male	-1.785	0.82	-1.674	0.77
Marital status				
Married	1.511	1.23	0.624	0.25
Type of Toilet Facility				
Improved	-1.720**	0.49	-1.489**	0.46
Access to Water				
Protected	-1.528***	0.70	1.669***	0.77
Source of Cooking Fuel				
Biomass	0.543**	0.18	2.021**	0.54
Mother's Age at first birth				
<20 years	1.196	0.33	1.038	0.30
20-29 years	-1.196	0.33	-1.038	0.31
Mother's Education Level				
Primary	-0.556**	0.10	-1.301**	0.19
Secondary +	-0.613**	0.15	-0.551**	0.16
Gender of Household Head				
Male			3.41578***	1.29
Sample size	6079		6079	

 *Notes: ***, ** significant at 1% and 5% respectively*

<div align="center">**CHAPTER FIVE**</div>

5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This section presents a summary of the findings, conclusions, policy recommendations and areas for further research.

5.2 Summary and Conclusions

The main objective of this study was to investigate the relationship between poverty and ill-health in Kenya using child mortality as the health indicator. The study was motivated by the fact that despite continuous interventions, the Kenyan government is putting in place to fight poverty and reduce child mortality, the poverty levels and child mortality rates have not improved significantly. This study contributes to the previous literature by providing insights on how poverty consequently affects child mortality and suggests policies on how the two can be fought in the country.

Poverty is proxied by household wealth index. The study used 2008 Kenya Demographic and Health Survey which is a national representative survey. Instrumental Variable Two Stage Least Square regression analysis was carried out. Number of household members is used as the instrument.

The results show that 62% of the women had their first child before they were 20 years old. The mean number of household members is 5. In addition, 47% of the households were found to be poor.

The regression results show that wealth index has a significant effect on child mortality in Kenya. Households in the higher wealth quintile are less likely to experience child mortality. Reduction in poverty levels therefore is crucial in the reduction of child mortality rates. Household living standards are best explained by household wealth index. This is in terms of ability to access improved sanitation facilities, better nutrition and ability to access and pay for quality health services among others.

The study also shows that the effects of poverty on child mortality are conditioned by the type of residence whereby rural households face higher incidence of child mortality than urban children. Rural setting lack certain social amenities such as health facilities, proper road network, electricity, water and sanitation facilities. Poverty alleviation strategies should be more focused on rural households.

Mothers with higher education levels are at lower risks of experiencing child mortality. Improvement in women education is key to reducing child mortality as it plays a key role in maternal health knowledge.

Access to improved sanitation facilities is an important determinant of child mortality. The significance of access to sanitation facilities may explain why diseases such as diarrhea and cholera are still a major cause of child mortality in poor rural areas. Provision of improved sanitation facilities would be a positive initiative towards improving child health and specifically child mortality. In addition, access to water was also found to be an important factor in child mortality. Increased provision of improved water sources would be a big step forward to reducing child mortality rates. Many child deaths could therefore be prevented by establishing more improved sanitation facilities especially in rural areas.

In addition, access to water is an important factor on child mortality. Therefore, increased provision of improved water sources and intensified campaigns on water quality improvement would be a positive step towards lowering child mortality rates.

Source of cooking fuel too influenced child mortality significantly. Use of biomass fuels (firewood, animal dung, shrubs/grass, agriculture crop and charcoal) show that exposure to these dirty fuels through emitted smoke has advance effects on child survival. Promoting the use of cleaner fuels such as biogas that are relatively cheap and accessible to most rural residence would reduce child mortality.

Finally, gender of household head had a significant effect on child mortality. However, this variable was used as a control variable. Male headed households experience higher child mortality than female headed households. This could be best

explained by the fact that women are best child care takers that men. Child mortality reduction initiatives should be more focused on male headed households.

5.3 Policy Recommendations

The results of this study show that poverty has a strong influence on the risk of child mortality among mothers in Kenya. Policies and programmes aimed at alleviating and reducing poverty levels especially in rural areas need to be advocated for and encouraged. From this study, 47% of the respondents were classified as poor and majority lived in the rural areas. This being the case, the study recommends that advocators of poverty alleviation design and implement programs that economically empower households especially in the rural areas.

Education is a significant factor on child mortality, there is therefore need to design and implement educational policies and programmes that improve maternal educational attainment beyond primary level specifically for those who fail to join secondary schools due to various reasons. The government should increase its allocation of resources to free secondary education to provide for more than just tuition fees but also cater for boarding fees. This would encourage more females to further their education beyond primary level which may in the long run result in decline in child mortality. Improving women education would result in two fold effects by improving women socio-economic status and maternal health knowledge. The government should provide maternal health care education especially in rural areas. In addition, the government should intensify the promotion of basic health education in learning institutions from primary level to ensure improvement in health knowledge.

Sanitation facility is an important factor and hence there is need to increase public campaign and awareness about the importance of sanitation. Improving access to sanitation has significant social benefit but entails a private cost of construction of sanitation facilities. The government should therefore work more closely with both the private sector and civil society to ensure more households have access to improved sanitation facilities since this will lead to a significant level reduction child mortality rates. The government should also make it compulsory that before any

housing unit is put up there has to be a sanitation facility. Moreover, there is need for various public health actors and the government to allocate additional resources to sanitation and related initiatives to carry out public awareness on the importance of sanitation.

The government should provide a framework that would promote more Public Private Partnership geared towards increasing access to sanitation facilities. This can be done through promoting social enterprise in sanitation provision in slums and rural areas. Most important, the government and other development agencies should develop rural areas through increased provision of health services, primary education and increased supply of clean water.

The government energy policy should be more focused on promoting the use of low polluting fuels and discourage the use of firewood. Incentives should therefore be provided by the government to promote the use of cleaner fuels such as solar and biogas. This would also generate employment opportunities which would translate into increased earnings and reduce poverty.

5.4 Areas for Further Research.

The study employed quantitative data to investigate the relationship between poverty and child mortality. It should be noted however that no qualitative data was used in the study to support the results of quantitative analysis yet quantitative data does not give answers as to why people behave in certain ways. There is need for qualitative research on possible correlates of child mortality. A qualitative research would be useful as it would provide much required information to policy/programme designers and implementers hence assist in reducing both poverty and child mortality rates.

With the counties in existence, there is need to carry out a study that investigates the disparities in poverty and child mortality among women in various counties given that the available data was up to the now dysfunctional provinces.

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41

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