DETERMINANTS OF UNDER-FIVE MALNUTRITION IN KENYA

BY

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DECLARATION

This research project is my own original work and has not been presented to this or any university for an award of a degree.

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This research project is presented for examination with our approval as University supervisors:

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Dr. Samuel Wakibi

DEDICATION

This work is dedicated to my late father George Wainaina and to my ever supportive mother, Joyce Wairimu.

ABSTRACT

The objective of the study was to establish determinants of malnutrition among children aged 0-59 months in Kenya. Specifically, the study sought to determine the effects of socio-economic factors on under-five malnutrition in Kenya, to investigate the effects of bio-demographic factors on under-five malnutrition in Kenya and to determine the effects of socio-cultural factors on under-five malnutrition in Kenya. The main source of data was 2014 Kenya Demographic and Health Survey (KDHS). The descriptive analysis and logistic regression were the main methods of data analysis. The bivariate results revealed that all socio economic, bio-demographic and social cultural factors were significantly associated with under-five malnutrition. Multivariate analysis results revealed that the independent variables had a significant influence on the odds of malnutrition among children under-five. Based on these findings the study found that lower age at child birth, longer duration of breastfeeding, low birth order and a low birth interval increased the likelihood of malnutrition among children under-five. The analysis reveals that stunting and wasting still remain a public health issue in Kenya and a contributor to under-five mortality. Key recommendation of this study are both academic and policy; a recommendation of further research that is qualitative in nature and recommendation on government policy to boost nutrition levels and nutrition programs of under-five children in Kenya.

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CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

It is estimated that under-nutrition is attributable to more than one-third of under-five mortality (Black, 2012; Liu, 2008). The World Health Organization (2013) estimates that 178 million children are suffering from wasting, stunting, underweight and obesity worldwide, of this, 20 million were suffering from the most severe form of malnutrition at any given time. Malnourished children, especially those with severe acute malnutrition, are at higher risk of death from serious infant diseases such as diarrhoea, pneumonia, and malaria. Malnutrition leads to almost 45% of deaths in children below 5 years of age (WHO, 2017).

Global disease burden study estimates that under-five malnutrition alone has triggered almost half (15.9%) of the global loss of Disability Adjusted Life Years (DALYs), which is the number of years of life suffered from years of severity-adjusted premature mortality (Faruque *et al*., 2008). Consequently, it influences children's motor, mental and cognitive development and consequently affecting their intellectual, social conduct, and general success at their future engagement including work. The most serious long-term disability associated with under-five malnutrition is the impaired mental development.

Malnutrition in children is a commonly reported using three related but different indicators based on anthropometric measures: stunting, underweight and wasting. It has been widely shown that child malnutrition status affects personal performance, health and survival, such as physical growth, morbidity, mortality and cognitive development. There are also potential adverse effects on the society and the future generations. Children under five years, as a group, are considered among the most vulnerable (Jing, 2011).

According to figures from various sources in the developing world gathered by the WHO (2011), 115 million children under the age of 5 are underweight and 178 million are stunted. Seventy percent of them live in Asia (mainly South and Central), 26% in Africa, and 4% in Latin America and the Caribbean. In developing countries, the prevalence of underweight is 18% below-5 years of age, down from 47.1% in 1980. While a decline has occurred,

development in the different regions of the world has been inconsistent and slower than expected. The number of underweight children in Africa, for example, (combining prevalence, stagnant mortality trends and high population growth) increased from 24 million in 1990 to 30 million in 2010. In 2010, Asia's figure is even higher, 71 million. Sixteen percent of children also suffer from chronic poverty in Latin America and the Caribbean. Although there is sufficient food available to meet the requirements of the entire population, due to insufficient meat and nutritional imbalances, the countries of this area have both consumption issues. The latter is represented as a deficiency of micronutrients (iron, phosphorus, zinc and vitamin A) and an excess of other nutrients such as saturated fat, sugars and sodium, which result in overweight and other chronic diseases (Molina, 2012).

Malnutrition remains a major risk to Kenya's children's survival, growth and development as outlined in the national Nutrition Action Plan 2012-2017. Poor nutrition in infancy and early childhood increases the risk of morbidity and mortality in infants, decreasing cognitive and physical development due to poor school performance. Malnutrition later in life also impacts productivity. One of the metrics used to measure progress against SDGs 2 on achieving zero hunger and SDG 3 on promoting good health and well-being for all ages is the prevalence of underweight in children under the age of 5. Child malnutrition can be due to a variety of factors, including poor nutrition policies for children and young children, poor maternal health, low access to adequate and, low access to adequate and varied diets, children's diseases and insufficient access to health and nutrition programs (Ministry of Health, 2012).

The National Nutrition Action Plan focuses on practices that will lead to leveraging the crucial' opportunity window' from conception to two years of age as supported by the 2010 UN Nutrition Summit Resolution. According to the Lancet Nutrition Series published in 2008, if the Essential Nutrition Interventions package is effectively accessed by mothers from conception and children up to two years of age and implemented on a broader scale, infant mortality would be reduced by 25% in the short term, maternal mortality by 20% and chronic malnutrition / reduction by 30% in children.

In July 2017, the Integrated Classification of the Phase of Food Security (IPC) for Acute Malnutrition reported a very critical nutritional situation in Turkana Central, North and South, and in Marsabit County, North Horr, Turkana's acute malnutrition levels are very troubling and similar to those reported in the 2011 Horn of Africa crisis with the maximum 37 percent Global Acute Malnutrition (GAM) registered in South Turkana. A serious nutrition condition was recorded in East Pokot (Baringo County), Samburu, Central Pokot, Turkana West, Garissa, Wajir, and Mandera, while Laikipia registered an extreme nutritional situation in GAM WHZ 10.0-14.9 Moyale and Saku was graded as Alert GAM WHZ 5 to 9.9 million, while GAM WHZ < 5 percent were appropriate for Narok, Kajiado, Makueni, Mbeere, Kwale and Kilifi.

The overall food situation remains of great concern relative to February 2017, despite worsening in some counties. In addition, the situation in most counties in the coming months is at risk of further deterioration due to the expected worsening of the food security situation. Currently, 420,674 children aged 6 to 59 months and 39,068 pregnant and lactating women across ASAL and urban counties require treatment for acute malnutrition (Ministry of Health, 2017).

1.2 Statement of the Problem

Malnutrition is associated with morbidity and mortality especially in children under-five in the developing world (Edward *et al.,* 2016). Deficiency in macronutrients such as protein, carbohydrates and fat provoke protein-calorie malnutrition (PCM), and when combined with micronutrient deficiencies, they are among the most important nutritional problems with hundreds of millions of pregnant women, elderly and young children particularly affected. PCM usually manifests early in children between 6 months and 2 years of age and is associated with early weaning, delayed introduction of complementary foods, a low-protein diet and severe or frequent infections (Leonor, 2011). Malnourished children, particularly those with severe acute malnutrition, have a higher risk of death from common childhood illness such as diarrhoea, pneumonia, and malaria. Nutrition-related factors contribute to about 45% of deaths in children under-5 years of age, thereby contributing to the overall pace of mortality (WHO , 2017).

Kenya has experienced a tremendous decline in infant mortality rates, according to KDHS 2014, Kenya's infant mortality rate was 39 deaths per 1,000 live births, and the under-5 mortality rate is 52 deaths per 1,000 live births. It means that about one out of every 26 Kenyan-born children dies before age 1, while one out of every 19 does not survive until age 5. Neonatal mortality during the same period is 22 deaths per 1,000 live births, whereas post-neonatal mortality is 16 deaths per 1,000 live births. These statistics have been a significant decline in the 2008/09 KDHS mortality measures. Given the commendable decline, the mortality rates of under-five remain higher than the number in developed countries.

Child malnutrition with a focus on socio-economic, bio-demographic and socio-cultural interaction on the nutrition of a child has remained a less explored subject and few studies have been done in this area in Kenya, (Masibo, 2013; Shinsugi, 2015; Singh, 2011; Olodaru, 2016). Shinsugi focused on factors associated with stunting among children according to levels of food insecurity in the household a study that was not national in nature but only focused on rural community in Southern Eastern Kenya (Shinsugi et al., 2015).

Olodaru focused his study on determinants of malnutrition among children aged 6-59 months in Trans-Mara East Sub-county therefore this study did not focus on the whole country. The study examined the determinants of malnutrition in children under-five in Kenya, it explores the extent to which the socioeconomic, bio-demographic and cultural factors have on malnutrition which is an important determinant of under-five mortality.It aimed at filling the gap of knowledge by answering the following question “What are the determinants of under-5 malnutrition in Kenya?”

1.3 Objectives of the Study

The study's overall objective was to determine the determinants of malnutrition among children between 0 and 59 months of age in Kenya. The specific objectives were:

i. To determine the effect of socio-economic factors on under-five malnutrition in Kenya;
ii. To investigate the effect of bio-demographic factors on under-five malnutrition in Kenya; and
iii. To determine the effect of cultural factors on under-five malnutrition in Kenya.

1.4 Justification of the Study

In early childhood, frequent and chronic malnutrition attacks have a potential negative impact on children's physical and mental growth (Olodaru.et al, 2013). In many ways, it affects children, predisposing them to various infectious diseases and cognitive impairments. In addition to these effects, malnutrition may expose children to chronic diseases that further exacerbate the high infant morbidity and mortality rates. (Edward *et al*, 2016).

Although the government and other health partners have initiated a variety of nutritional intervention programs to address the problem of malnutrition in the community, not all of them are focused on scientifically proven correlations, such as the Narok county survey of baseline nutrition indicators, they have not explored malnutrition-related factors (Olodaru et al., 2016). The evaluation identified development issues including poor standards of education, poor health status, inadequate clean water supply, high rates of HIV and AIDS, poor infrastructure, inadequate food security, and insecurity due to ethnic and clan conflicts.

Although risk factors for malnutrition have been identified, individual factors potentially change in specific areas over time and a current characterization of risk factors provides the basis for preventive intervention programs. This study sought to establish the determinants of under-five malnutrition in Kenya.

1.5 Scope and Limitations of the Study

This study utilized national secondary data that was collected during the 2014 Kenya Demographic Health Survey. Height and weight measurement was obtained for children born since January 2009 and data obtained was used to compute the height for age, weight for height and weight for age. Indicators of the nutritional status of children were calculated using the standards stipulated by World Health Organisation in 2006. A total of 20,093 children under the age of 5years were eligible for the measurements to be collected but only 94% were measured hence a total of 18,940 children were targeted for analysis. The finals sample was 18656 as the underweight measure and flagged cases were omitted.

The dataset used was extracted from KDHS file where the sampling errors associated with sample size and coverage error during the KDHS data collection were inherited for the study. Further, the tools used to collect information on children under five if they had errors then this study inherited them. Errors that the enumerators had during recruiting and training of enumerators could not be controlled by this study (Burgert, Colston, Roy, and Zachary, 2013).

1.6 Definition of Key Concepts

Under-five malnutrition: This refers to malnutrition of children who are aged between 0-59 months of age

Height-for-age: This index is a linear growth retardation measure. Children with height-for-age less than two standard deviations (-2SD) from the reference population median are considered short or stunted for their age. Kids who are below the reference population mean minus three standard deviations (-3SD) are seriously stunted. Stunting in children can be the result of long-term insufficient food or the consequences of persistent or chronic disease. Hence, height-for-age is a measure of the under-nutrition outcome in a population over a long period of time and does not vary significantly with the data season.

Weight-for-age: This is a height-for-age composite index. Children whose weight-for-height measurements are below minus two standard deviations (-2SD) from the reference population median are considered underweight for their age, while those with measurements below minus three standard deviations (-3SD) from the reference population are considered seriously underweight. Being underweight for one's age might mean a child is stunted or wasted or stunted and wasted (GSS, 2003)

Weight-for-height: This measures the mass of the body relative to the length of the body. Children whose weight-for-height ratios are below minus two standard deviations (-2SD) from the reference population average are too small for their height or wasted, whereas those calculated below minus three (-3SD) from the reference population are significantly wasted.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents literature review on determinants of under-five malnutrition in Kenya under the broad categories of socioeconomic factors, bio-demographic factors and cultural factors.

2.2 Socio-Economic Factors

Socio-economic factors are highly associated with child malnutrition and it is within this regard that literature review by various scholars in support to this evidence were explored.

2.2.1 Maternal Education

Education determines the knowledge of health and other socio-economic outcomes essential for child health. The search for the links through which maternal education influences child health has therefore been an important area of research and policy dialogue. The paths that are usually considered include nutritional knowledge, health knowledge, socio-economic status, attitude towards modern health services, autonomy and reproductive behaviour, and even the place of residence (Ambel *et al.,* 2015).

The investigation into the relationship between maternal education and its mechanisms has discussed many aspects of the issue. One of these concerns is the relationship between formal education and knowledge of nutrition and health (Webb & Block, 2004).

Advanced studies by Hung, (2015) argued that there are three possible mechanisms that influence the knowledge of maternal health through formal schooling. First, prospective mothers gained medical awareness directly through formal education. Second, school-acquired literacy and numeracy skills help future mothers diagnose and treat child health problems. Third, by formal schooling, exposure to modern society makes women more receptive to modern medical treatments. Based on data from Morocco who found that the health knowledge of mothers alone appears to be the crucial skill in increasing child health and also indicate that

health education should be taught explicitly in schools at a young age so that girls can have some information even if they leave school early (Hung, 2015)

Research shows a powerful affiliation between mother's education and the health of children. Children born to educated women are less affected by malnutrition that manifests in children as underweight, wasting and stunting. Maternal education has been associated with nutritional outcomes among children in studies in various settings including Jamaica, Bolivia, and Kenya (Abuya, 2012; Frost, 2005, and Kabubo, 2008), but the mechanisms that link the education of mothers with child health in general are still not well understood.

According to Glewwe, 1979 on the impact of maternal education on malnutrition, where he identified three ties through which schooling influenced child health. Formal mother education directly transfers health knowledge to future mothers and that women's literacy and numeracy skills at school improve their ability to recognize illness and seek modern treatment for their children. Additionally, they are able to read medical instructions on treatment of childhood illness and process of the treatment. Increased number of years in school makes women more receptive to modern medicine.

A further research found a strong link between maternal literacy, social economic status and nutritional status of children. This is because educated women are more likely to get more stable, higher-paid jobs; marry higher-educated and higher-income men; and live in better neighbourhoods that affect child health and survival. Studies have found a link between maternal education and maternal depression, whereas maternal depression was associated with poor child health outcomes, including poor nutritional outcomes (Abuya et al., 2012)

The 2014 KDHS showed that maternal education played a major role in determining the nutritional status of under-five people. Children of secondary or higher-educated mothers were less undernourished than children of mothers who never attended school and those with primary education. More educated women are more self-confident and are more involved in decision-making in the household and community. As women are usually a family's primary caregiver in many parts of the world and are responsible for allocating a higher proportion of household

assets to the well-being of children, empowerment is likely to lead to better health and nutritional status for children (KNBS and ICF Macro, 2015).

2.2.2 Wealth Index

Empowerment is an abstract construction which, depending on context, is challenging to define with different meanings. Generally, empowerment is an improvement in an individual's political, cultural, or economic strength and confidence in one's own abilities. Several studies have found a correlation between the empowerment of women and the health of children. Although empowerment is assessed differently in each sample, it is considered that improving the independence or ability of a female has a positive impact on child nutrition (Hannan, 2015).The empowerment of women is significantly linked to the underweight status and maternal nutritional status of a child, and psychological violence indirectly disempowers mothers, both of whom exacerbate malnutrition.

Women's empowerment, according to KDHS 2014, includes women feeling self-worth, accessing opportunities, accessing and managing resources, choosing and exercising them, regulating their own lives, and affecting social change direction. Economically empowered mothers are able to provide their children with highly nutritious meals and decide to seek services to supplement their diets.

According to studies in areas mainly impacted by child poverty in Asia, Sub-Saharan Africa and South America, there is an emphasis on four fields of women's empowerment names; mobility is defined as the capacity of a female to visit a health clinic alone without being accompanied. Visiting an unaccompanied health center helps a woman to expand her awareness of her own health and the health of her child (Bhagowalia, et al, 2012). A highly mobile woman is not dependent on permission from her spouse and can leave the house unescorted, allowing her to make independent decisions about her and the health of her children (Bhagowalia, et al, 2012).Women who do not have high mobility may not be exposed to new knowledge about health and childcare (Smith et al., 2003).

Decision-making is classified as the role of a woman either independently or with her husband in making household decisions. Decision-making of a woman elevates her role and household views whereas participation in decision-making increases her flexibility in determining the foods prepared for the child and the kind of treatment a child receives (Bhagowalia, et al, 2012).

Historically, a woman's view of domestic violence has had an impact on child nutrition. A research on various dimensions of women's empowerment on stunting and diet heterogeneity found a significant correlation between stunting views on abuse and child health (Bhagowalia, et al, 2012). It concluded that a woman's low status and the justification for beating shifts the power to the male and is related to the child's long-term nutritional outcome. A study by Sethuraman *et al,* (2006) found that mothers experiencing physical and psychological abuse have higher malnutrition rates between themselves and their children.

Women in organizations form social bonds and relationships that increase awareness of child care, ethics, and overall trust that can turn into empowerment feelings (Srivastava & Austin, 2012). However, many of the micro-credit organizations are specifically centred on empowering women, and in Kenya in particular, emphasis has been put on women's economic empowerment in both rural and urban settings through' Table Banking and Voluntary Savings and Loans Associations,' where women have access to cash and credit facilities (Charity, 2017). This therefore empowers women in terms of taking decisions on different household issues that have a direct impact on the health of their children and nutrition status. Membership in a community organization enables women to share information and advice on treatment for themselves and their children, local health services, and budgeting and spending money awareness.

According to KDHS 2014, the 5 years immediately preceding the 2014 KDHS infant mortality rate is 39 deaths per 1,000 live births and the under-5 mortality rate is 52 deaths per 1,000 live births. It means that about one out of every 26 Kenyan-born children dies before age 1, while one out of every 19 does not survive until age 5. Neonatal mortality during the same time is 22 deaths per 1,000 live births, while post-neonatal mortality is 16 deaths per 1,000 live births. During the first month of life, 56% of infant deaths occur in Kenya (Charity, 2017).

Many research studies assessing the relationship between the empowerment of women and the nutritional status of children find the relationship positive. Using cross-country evidence, Smith concluded that women's empowerment has a positive impact on measures of child nutrition (Smith *et al*., 2013). Using various women's bargaining steps in rural Ethiopia, Fafchamps (2009) suggests that women's bargaining power improves child nutritional status. The positive role of empowerment of women in the nutritional outcomes of children appears to be strong and therefore worthy of attention.

2.2.3 Maternal Nutrition

Maternal and child malnutrition, which includes both nutrition and underweight, are global issues with significant impacts on survival, the incidence of acute and chronic diseases, healthy development, and individuals and societies ' economic productivity. Maternal and nutritional kids, including stunting, waste and critical vitamin and mineral deficiencies, have been the subject of a series (Black *et al.*, 2008); Victora *et al.*, 2008; Bhutta *et al*., 2008; Cogill, *et al.*, 2008). Since women have reproductive biology, low social status, lack of education, and homelessness, women are more malnourished than men elsewhere. Socio-cultural traditions and inequalities in patterns of household work can also increase the chance of malnutrition for women (Jang and Manish, 2015).

According to KDHS 2014, women's sufficient intake of micronutrients has significant benefits for themselves as well as their infants. Children who breastfeed benefit from the micronutrients supplements from their mothers especially vitamin A. Women's iron supplementation during childbirth protects themselves and child from anaemia, which is deemed to be a major cause of perinatal and maternal death. It also leads to an increased risk of early delivery and low birth weight. Finally, there are adverse maternal effects linked with iodine deficiency, including foetal brain trauma, congenital malformation, and premature death (Smith *et al*., 2013).

Fifty-four percent of women received a dose of vitamin A during the postpartum period, according to KDHS 2014 findings. In urban areas (58%) the percentage of women receiving postpartum vitamin A is higher than in rural areas (51%). People in the central region are most likely to take vitamin A in the postpartum period (65%), whereas people in the North Eastern

region are less likely to take vitamin A (27%). Postpartum vitamin A supplementation prevalence increases as education increases. Women in the lowest quintile of wealth are less likely to receive a dose of postpartum vitamin A (38%) than their wealthier counterparts (54% or more). These results translate the number of malnourished children in the above mentioned regions (Fafchamps 2009).

Additional nutrient demands associated with foetal development, nutritional deficiencies like as anaemia often intensifies throughout childbirth. Iron status is improved by adding iron on women diets to prevent parasites and malaria infection. Iron supplementation on pregnant women is important because their needs are too high to be fulfilled by food intake alone. In Kenya, pregnant women are advised to take regularly from conception to delivery combination folic acid and iron tablets. Women can still use non-combined retail and health care formulations of iron supplements (Charity, 2017).

Iodine deficiency affects all classes of the population, but women of aged 15-49 years are often the most affected. As earlier indicated, the deficiency of iodine is associated with a number of adverse outcomes of pregnancy. As a result, women of reproductive age are advised on the use of iodine salt to cater for the deficiency (Cogill, *et al.*, 2008).

2.2.4 Types of Place of Residence

Recent research suggests that urban poverty is on the rise with ample evidence that urban children generally have better nutritional status than their rural counterparts do. The climate, preferences and opportunities of urban residents differ greatly from those of rural residents, ranging from conditions of employment to social and family networks to access to health care and other services. Considering these disparities, recognizing the relative importance of the different determinants of child malnutrition in urban and rural areas and, in particular, how they vary is crucial to the development of context-relevant, efficient program and policy responses to reduce malnutrition (Lisa *et al.*, 2006)

Malnutrition in children has typically been a less severe problem in urban areas than in rural areas, and the accelerated urbanization rates currently observed in the developing world raise new concerns about rising urban malnutrition rates. New evidence from developing countries shows that the locus of poverty and malnutrition is gradually shifting from rural to urban areas as the number of urban poor and undernourished is growing faster than the number of rural people (African Population & Health Research Center (APHRC, 2002). The narrowing urban-rural disparity in child poverty in most sub-Saharan African countries also highlights this phenomenon (Fosto, 2004).

One of the distinct aspects of urban poverty in Sub-Saharan Africa is the prevalence of overcrowded slums and shanty towns marked by unhygienic environmental conditions (uncollected garbage, contaminated sanitation, poor drainage and open sewers) that aggravate residents' vulnerability to various health issues (Fosto, 2006). The rates of child malnutrition, morbidity and mortality in slums and peri-urban areas are several times higher than in more affluent urban neighbourhoods because of such unhealthy conditions, as well as in the rural areas.

In addition, rural women are less likely to maintain better nutritional standards due to low education on the value of better sanitation and better feeding practices. However, studies show that rural women breastfeed for longer period than urban women. In addition, most foods are produced in the rural areas unlike in urban areas. It is therefore expected that children born to rural women should be well nourished than children of women residing in urban areas. The reason for the contrary result could be that their traditional beliefs on feeding practices are not adequate to protect their children against malnutrition (Zulu *et al.*, 2011).

Most children's under-nutrition studies have overlooked the urban poor and slum communities in particular. Child undernourishment, like many other measures of child health, is projected to be low in this category as deprivation, combined with environmental hazards, is likely to produce synergistic hazardous effects on children. Therefore, it is necessary for child survival strategies to understand the dynamics of child growth in such populations. Although their environment is similar, the nature and degree of deprivation of slum populations varies (Zulu

et al., 2011). Poverty levels vary widely across various slums, between male and female-headed households, and by length of stay in slum settlements, according to Zulu's study. Poverty incidence across 14 villages ranged from 42% to 78% in two slums in Nairobi, Korogocho and Viwandani .

2.3 Bio- Demographic Factors

Bio-demography is an interdisciplinary approach to demography in which biological considerations (genetic, epidemiological, and evolutionary determinants) are emphasized: the study of the influence of biological factors on demographic patterns (fertility, mortality, health, aging, and longevity) of human populations. Changes in reproductive patterns can affect child health and survival through a number of different mechanisms, especially through changes in maternal age at birth, birth order, and/or intervals of birth. The bio-demographic factors used in this study include spacing of birth, order of birth, and at birth maternal age (Sathiya, Hamisi, and Nagarajan, 2016)

2.3.1 Birth Spacing

Studies on the outcome of child nutrition indicate that in some populations, but not all, a longer birth interval is associated with a lower risk of malnutrition. In those countries where the relationship was important, there was a 30-54 percent reduction for stunting associated with an earlier birth period of > 36 mo (compared to 24-35 mo). Some of this decrease may result from residual uncertainty such as breastfeeding and maternal height (Dewey and Cohen, 2007). Babies born less than two years after their next older siblings are more likely to be underweight and anaemic at birth than children born after two years' interval.

Kwashiorkor is a sickness associated with malnutrition among children due to lack of sufficient dietary intake. It has long been known that a child who is shortly followed by another suffers the consequences of short-spacing. This is indeed the origin of the name Kwashiorkor that originated from Ghana to mean a nutritious sickness of a sucking child when the next on is conceived. Data from most WHO collaborative studies indicate that children born of 3years of spacing had higher chances of survival (Van de Poel *et al.*, 2007).

More systematic review by Dewey and Cohen (2007) assessed the evidence on the effects of birth spacing on child nutritional status from 52 studies and noted that approximately half (25) of these studies found that a previous birth interval of at least 36 months was associated with a 10 to 50% reduction in childhood stunting (with similar findings for wasting), whereas the remaining studies either found no association or were inconclusive.

A study by Rutstein (2008) which pooled birth history data from 52. Demographic and Health Surveys (DHS) that were conducted from 2000 to 2005, observed a positive association between birth interval length and child nutritional status outcomes. Similarly, a more recent study by Fink (2014), which pooled 153 cross-sectional DHS surveys across 61 countries conducted between 1990 and 2011, found that birth intervals of less than 12 months and between 12 and 23 months were associated with higher relative risks for stunting (relative risks of 1.09 and 1.06, respectively) as compared to a 24–35 month inter-pregnancy interval (Fink et al., 2014).

Birth spacing has therefore adverse effects on the nutrition of a child, the shorter the spacing the high the risk of malnutrition and the reverse is true. This is attributed to the adverse effects of short birth cycles on the mother in terms of nutritional depletion, folate depletion, cervical insufficiency, vertical infection transmission, sub-optimal pregnancy overlap lactation, sibling rivalry, transmission of infectious diseases between siblings, incomplete cure of uterine scar from previous delivery and abnormal remodelling of endometrial blood vessel (Conde- Agudelo *et al*, 2012)

2.3.2 Birth order

Birth order has a significant impact that cannot be overlooked when determining the nutritional status of children there are negative effects of birth order on nutritional status of children. In disaggregating the explanations of birth order effects, Jayachandran and Pande (2013) in their comparison between India and Africa's height gradient, observed that birth order effects exist less due to genes and mainly due to the presence of environmental factors. They maintain the view that it is a matter of Choice, Not Genes that acts as a main contributor towards birth

order effects. Extensive studies done in India ascertain that first born Indian children are taller, among other tests of birth order effects.

Jayachandran and Pande (2013) found that the results were also not an artefact of mortality selection, because this would require higher infant survival for the later born, but was survival in fact higher for lower birth order children. Alternate possibility could be that women's innate health was driving the birth order effect, such that women who were unhealthier to begin will would deteriorate more quickly with higher birth order. However, when maternal height was added to the child height estimation, the coefficients on Birth order did not change significantly. This implies that maternal height, which is known as a summary measure of a mother's health inputs during her life, has no significant impact on birth order effects. Thus, from the results they deduce that the birth order effects are a result of concurrent choices made by households. Within family, the phenomenon seems related more to take-up of services as opposed to "access" to them, as the access rarely changes with birth order. These household and cultural factors were more pronounced in case of India, which is why despite having better economic indicators, Indian children are shorter in height than African children of second and higher birth order (Jayachandran and Pande 2013).

A study by Collin, (2008) in rural Ethiopia deems that differences in outcomes occur due to differences in environment, where resources and time are divided unequally between children. The research also shows that parents discount the future, and favour lower birth order children; hence, also favouring their health outcomes more as they occur sooner than outcomes of higher birth order children. A similar analysis was conducted by Hatton and Martin (2008) in their research on British children in the 1930s. They maintain that birth order can only affect health outcomes if inequality of resource allocation is present in the household.

Households' contemporaneous choices drive the birth order and child health patterns, therefore influencing how birth order affects child nutrition, in light of household allocation choices and preferences. One of the most important explanations for birth order effects is due to "take-up" of services. With additional children, family size increases and there is less to be spent on each additional child in terms of health and educational inputs. This resource dilution naturally

favours lower birth order children more than higher birth order children (Jayachandran & Pande, 2013).Also; there is potentially a cultural preference for sons over daughters. This gender preference may heighten the birth order effects on child nutrition and health.

These birth order effects are strongest and statistically significant in the case of stunting, which represents the long term nutritional status of children, and less obvious in the case of wasting, which only represents the current nutritional status (Leticia et al., 2013) It was further demonstrated by Gupta (1987) through a study on rural Punjab in India that birth order effects predominantly affect a child in the early years, resulting in adverse effects on long term nutritional status; thus, hampering a child's future health outcomes most. Recent contributions to literature must also be acknowledged, where targeted, nutrient specific interventions have proven to be beneficial in recuperating some of the damages generated by inadequate nutritional intake in the early years.

According to a WHO report that reviewed available evidence; nutritional supplementation has seen to be particularly effective in developing countries, helping in long-term development outcomes of undernourished children. Some of the efficacious interventions include Vitamin A, iron and zinc supplementation (Hill *et al.*, 2004). For longer term benefits, these interventions must be coupled with improvements in underlying factors of malnutrition that include empowerment of mothers, reduction of disease burden, reduced poverty and better education (Bhutta et al., 2008).

According to Hatton and Martin (2008), first-born children are naturally favoured, as for a certain time they do not have any other sibling to compete with them, so that they get undivided time and resources of their parents. As far as their health is concerned, the study also indicates that lower birth order children may be healthier than higher ones as the mother is fitter, more energetic and younger, while as she ages, having more children would also adversely affect their health.

It is evident that birth order effects exist, but literature proposes contradictory effects for first born children. There are studies that offer reasons for favouring the first born while other studies propose favouring the last born children. However, the results of most find height to decrease monotonically with increasing birth order (Savage *et al.*, 2013).

An added argument for favouring lower birth order children, especially first-born children is that parents consider them to be an old age security, where they would be responsible of taking care of old parents (Agola, 2012). Another reason, especially true in case of Pakistan is that a woman usually goes to her parents' house for her first delivery, where she is offered better care and probably a more nutritious diet as well. This may also be one of the reasons for taller and healthier first born children (Agola, 2012).

However, despite substantiation on biological, cultural, and environmental factors favouring lower birth order children, there also exists a contradictory literature positing the opposite. According to Dancer, (2008) contend that children born later in the birth order have an added advantage as parents are more experienced and aware with each additional pregnancy, making the environment more favourable for the higher birth order children. Girma and Genebo, (2002)specifically emphasize that children of lower birth order are at higher risk of stunting because of mother's lack of experience in terms of place and method of delivery, lack of awareness about importance of breast feeding, all of which are important contributors to child nutrition

2.3.3 Maternal Age at Child Birth

Although there has been a significant decrease in the number of babies born to adolescent mothers since 1990, around 16 million adolescents aged 15-19 still contribute about 11 percent of all births in the world. Among developing countries, 95 percent of teenage births occur, and child marriage is common (Gibbs et al., 2012). Across developing countries, about 90 percent of teenage births occur across marriages (Finlay, 2011). Early age at birth increases the risk of low birth weight, premature birth and maternal anaemia, but it should be noted that' many of the disparities reported among older adolescents with respect to infant outcomes may be due to

socioeconomic or behavioral differences, although these may vary from country to country (Gibbs et al., 2012).

Due to the intergenerational effects of maternal malnutrition, women's nutrition needs to be addressed very early in life. Special attention must be given to improving the nutrition of adolescent girls at the dawn of adulthood (taking on reproductive roles) (Lartey, 2008). The dietary requirements of childbirth put adolescent girls at high risk of maternal mortality, complications associated with pregnancy, and low-birth-weight delivery of babies. Addressing adolescent girls nutritional needs prepares them to move into adulthood ready to assume reproductive roles. Women must have a proper nutritional status before and during pregnancy to provide the developing foetus with a healthy intrauterine environment (Kurtz et al., 2006)

A study in Sierra Leone and other studies in different parts of the world including Asia, it has been observed worldwide that children of adolescent mothers are likely to be more malnourished, have fewer opportunities for DPT immunization, and have longer hospitalization duration. Adolescent mothers also had a greater chance of being an alphabet. For example, it has been found in Sierra Leone that teenage pregnancies have long-term effects on the mother and child's health status, as well as broader impacts on their social and economic status. It is estimated that as a result of teenage pregnancy, 40% of maternal deaths occur (UNICEF 2010).

2.3.4 Breastfeeding

Together with other national authorities, the WHO recommends exclusive breastfeeding for the first 6 months of life, followed by the introduction of complementary nutritionally adequate foods in addition to continuous breastfeeding from 6 months to 24 months. Breastfeeding is the safest way to feed babies and its health benefits have been well established (WHO, 2016).

Practices of feeding play a critical role in the development of children. Bad feeding practices can have a detrimental effect on children's health and nutritional status, leading to direct consequences for their mental and physical development. The duration and frequency of breastfeeding also influences the postpartum pregnancy cycle of a mother and hence the birth interval length and fertility rates (KNBS and ICF Macro, 2015).

Breastfeeding plays an important role in preventing various forms of malnutrition in children, including wasting, stunting, overweight and underweight deficiencies and micronutrient deficiencies (WHO, 2017). Research has shown that supporting exclusive and long-term breastfeeding is one of the most successful child health and survival strategies worldwide. Global breastfeeding rates, however, remain persistently low, as currently for the first six months of life, only 38 percent of infants worldwide are breastfed (UNICEF, 2015). At the same time, it was estimated that suboptimal breastfeeding activities accounted for more than 11% of deaths and 10% of DALYs among children under- five years of age worldwide (Black *et al*, 2013)

During each feeding session, the composition of breast milk changes, because while foremilk is rich in micronutrients and watery, quenching the thirst, hind milk is rich in fat, meeting the energy demands of the fast growing infant. The hind milk hormones signal the child's satiety (Riordon, 2010). Breast milk contributes to the health, growth and development of the child because of the unique composition of macro-and micronutrients, digestive enzymes, hormones, anti-inflammatory substances, growth modulators and probiotics such as bifidus factors that enhance gastrointestinal tract maturation and stimulate bifido-bacterial growth. The bioactive compounds of human milk, which have been only partially elucidated, include specific and non-specific anti-microbial factors contributing to protection against infectious diseases (Ballard et al, 2013).

For infants up to 6 months of age, the macro-and micronutrients in breastmilk are best suited for meeting the prescribed dietary allowance (RDA). Breast milk contains relatively low levels of protein with high whey to casein ratio of about 90 percent during the first days of life as compared to infant formula. This high fraction of whey is especially beneficial in supporting antimicrobial activity. Breastmilk protein casein fraction promotes calcium, iron, and zinc absorption (Lubetzky *et al*, 2013). Micronutrients in human milk are highly bioavailable, with up to 80% of breast milk iron being absorbed relative to haem iron absorption, typically between 12-25% and of non-haem iron below 5%.

There is plenty of evidence that breastfeeding in industrialized countries is associated with a lower risk of infectious diseases (AHRQ, 2017) and particularly in low-income countries where breastfeeding can play an important role in interrupting the vicious cycle of malnutrition and infection. Acute phase responses caused by infectious diseases generally lead to concomitant anabolic and catabolic reactions which, on the one hand, help stimulate immunity and, on the other hand, may have negative effects on nutritional status (Schailble et al., 2007) as a result of loss of appetite, thus reducing dietary intake.At the same time, for immune responses, macro and micronutrients are diverted, while the basal metabolic rate, including the requirements for energy and nutrients, is generally increased. Similarly, during gastroenteritis, nutritional deficiencies are compounded by malabsorption, loss of urinary nitrogen and loss of nutrients in serious, chronic or recurrent infections with particularly high risks (Ladomenou et al., 2010).

Exclusive breastfeeding in Kenya for the first six months is 61% for children under the age of 6 months, according to KDHS. The percentage of children exclusively breastfed among subgroups drops sharply from 84% of infants aged 0-1 months to 63% of infants aged 2-3 months and 42% of infants aged 4-5 months. Continuing to breastfeed a child until the age of 2 is recommended. Kenya's breastfeeding duration is long, with at least half of kids breastfed for up to 2 years. The proportion of children currently breastfeeding decreases by 88% among children 12-17 months of age and by 61% among children 18-23 months (KNBS and ICF Macro, 2015).

2.4 Cultural Factors

2.4.1 Region of Residence

The physiological response to preferences of hunger and taste is powerful stimuli influencing food choices, but it is likely that the environment combined with the personal story of the individual has an equal influence. One set of characteristics that contributes to humanity is how food is managed whether one considers a nation's large aggregates or a nuclear family's small group. Different eating-related behaviour patterns have developed between population groups. People have been able to move from a pattern of locating food for one meal to growing plants and raising livestock for several seasons throughout the ages. At present, sophisticated

production, systems are capable of producing and storing food for years in many countries have expanded the food supply (Kouba, 2005).

Culture refers to a community's accepted beliefs, attitudes, values, customs, and habits. Cultural practices are usually exterior manifestations of everyday life. Cultural influences also affect internal values, family roles, status, and nonverbal communication decisions and behaviours. Ethnicity defines cultural affiliation that is more than a nation of origin or race. Successive generations have modified the pattern of traditional diets. In a new country where societal influences change, this "acculturation" is often the result of food availability and change in work and school routines. This often leads to the adoption of foods typifying choices in a new environment by different ethnic groups. Assimilation refers to the loss of cultural identity with the adoption of majority culture by immigrants or descendants. Other factors affecting food habits include income, occupation, geography, religious considerations, education, food production and distribution systems, and access to programs for food assistance (Kittler *et al.*, 2012).

Cultural practices in communities are vital globally and are known to influence dietary practices Children under five are the most vulnerable groups to nutrient deficiencies. Due to food insecurity, these shortcomings are even worse in arid and semi-arid lands (ASAL). Food insecurity is common in ASAL counties and in pastoral communities in Kenya. The dietary habits among the Maasai have historically been acceptable, with the exception of the custom of exclusive breastfeeding and raw food intake. The nutrients needed for a healthy living could be met by these foods. Owing to western influence and decline in animal production due to climate change, however, there have been ongoing nutritional transitions among pastoralists. Globalization results to certain traditional cultures that need to be changed in order to match these changes taking place in developing countries, cultural beliefs being an indication of what people value as important diets, less essential diets, and diets that should not be consumed (Peter *et al.*, 2015).

Cultural norms and expectation differ by ethics grouping and thus, in the analysis of variation in child malnutrition, ethnicity is considered a powerful explanatory variable. The lack of empowerment of women and a patriarchal culture further exacerbate the problem this is mainly

because women have no access to income and decision making in the family is left to their male counterparts. In countries with considerable ethnic diversity, child health and consequently malnutrition varies significantly with ethnicity especially in rural areas. Traditional or cultural ideas about food are the main obstacle in any nutritional improvement programme. Studies in South and Southeast Asia show that rice is a super food and hence is considered a symbol of life and is a must for infants. Other foods are avoided or given in small quantities, protective foods such as eggs are not given because of the cultural belief that they are too hot for the children. Fish, a major source of protein and vitamins is prohibited to young children in Malaya because it is believed to produce worms. Instead, the toddler is weaned primarily on cereals (IFRI, 2015).

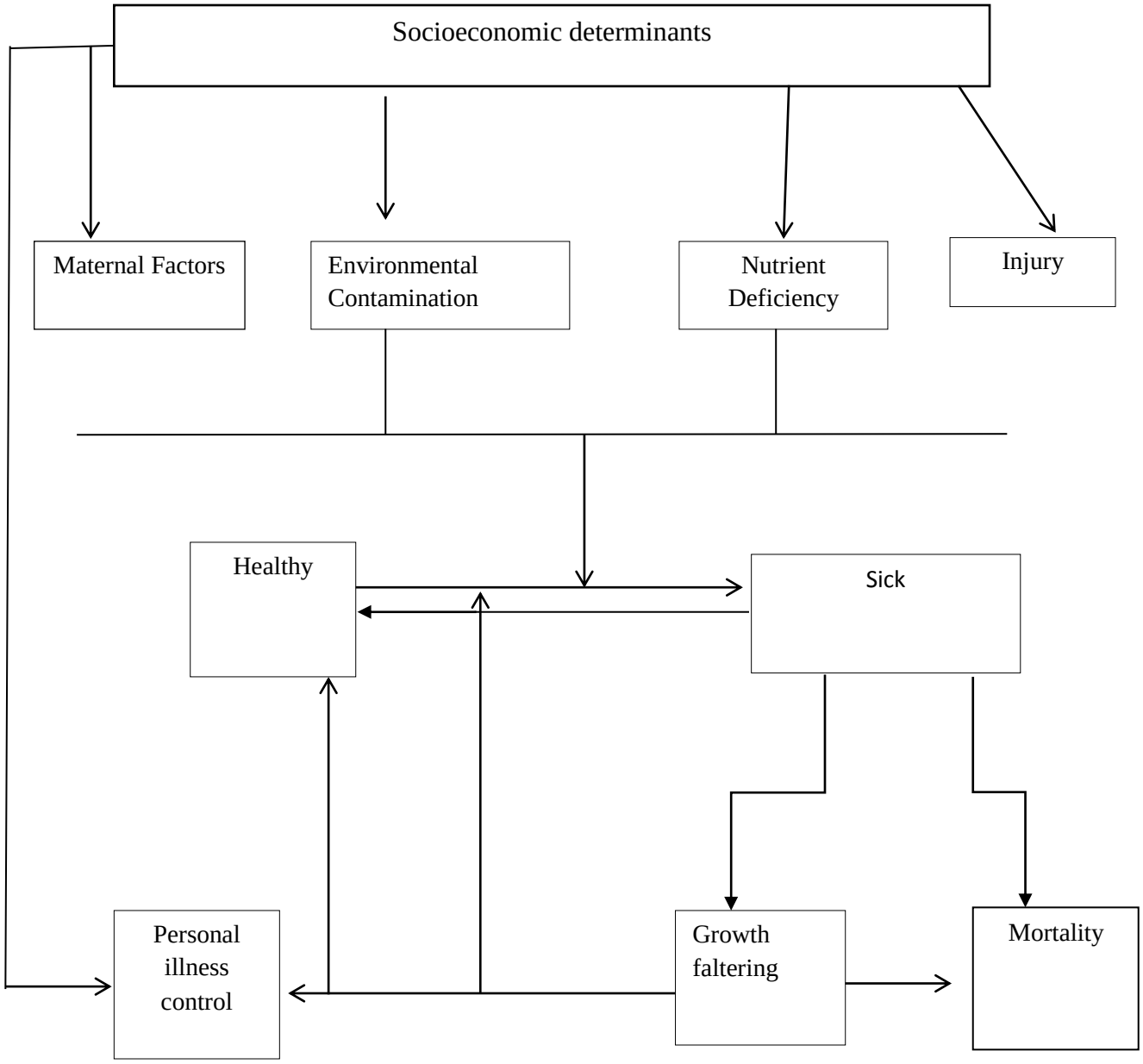
According to Yangchen, Tobgay and Melgaard, (2017), feeding habits amongst various ethnic groups and tribes there are practices that include water and sanitation that leads to spread of diseases that cause diseases among children aged under five and therefore mal-absorption of food consumed and this leads to malnutrition among the said age group, In India, for instance, Muslim children are substantially more likely to survive their first birthday than Hindu children, while Muslims have lower income, consumption, and educational attainment, and are less likely to have access to state services such as piped water and health facilities than most Hindus, (Patton, Sawyer, Santelli, Ross, Afifi, Allen, and Kakuma, 2016).

A typical Hindu baby, a typical Muslim baby, lives in a community where a larger proportion of his neighbours is Muslim and both Hindu and Muslim babies are more likely to survive in communities with large Muslim populations. Typical Muslim children live in a neighbourhood where a larger proportion of their neighbours are Muslim, and both Hindu and Muslim children are more likely to survive in neighbourhoods with high Muslim neighbourhoods. Neighbourhoods with a high population of Muslim households are associated with worse characteristics that predict child health along with the significant exception of sanitation in many measurable dimensions. Despite the relative economic advantage, the majority of India's Hindu population is more likely to defecate in the open, i.e. in open places such as fields, behind bushes or near roads than the Muslim minority (Geruso and Spears, 2018)

2.5 Conceptual Framework

The conceptual framework underlying this study is adapted from Mosley and Chen framework on the operation of the five proximate determinants on the health dynamics of a population. According to Mosley and Chen, all social and economic determinants of child mortality operate through a common set of proximate determinants (intermediate variables) to directly influence the risk of mortality. This framework assumes that in an optimal setting, over ninety-seven per cent of new-born infants can be expected to survive through the first five years of life, and that reduction in this survival probability in any society is due to the operation of social, economic, biological and environmental forces. It further assumes that socioeconomic determinants (independent variables) must operate through more basic proximate determinants that in turn influence the risk of disease and the outcome of disease processes (Mosley and Chen, 1984)

Figure 2.1: Conceptual framework



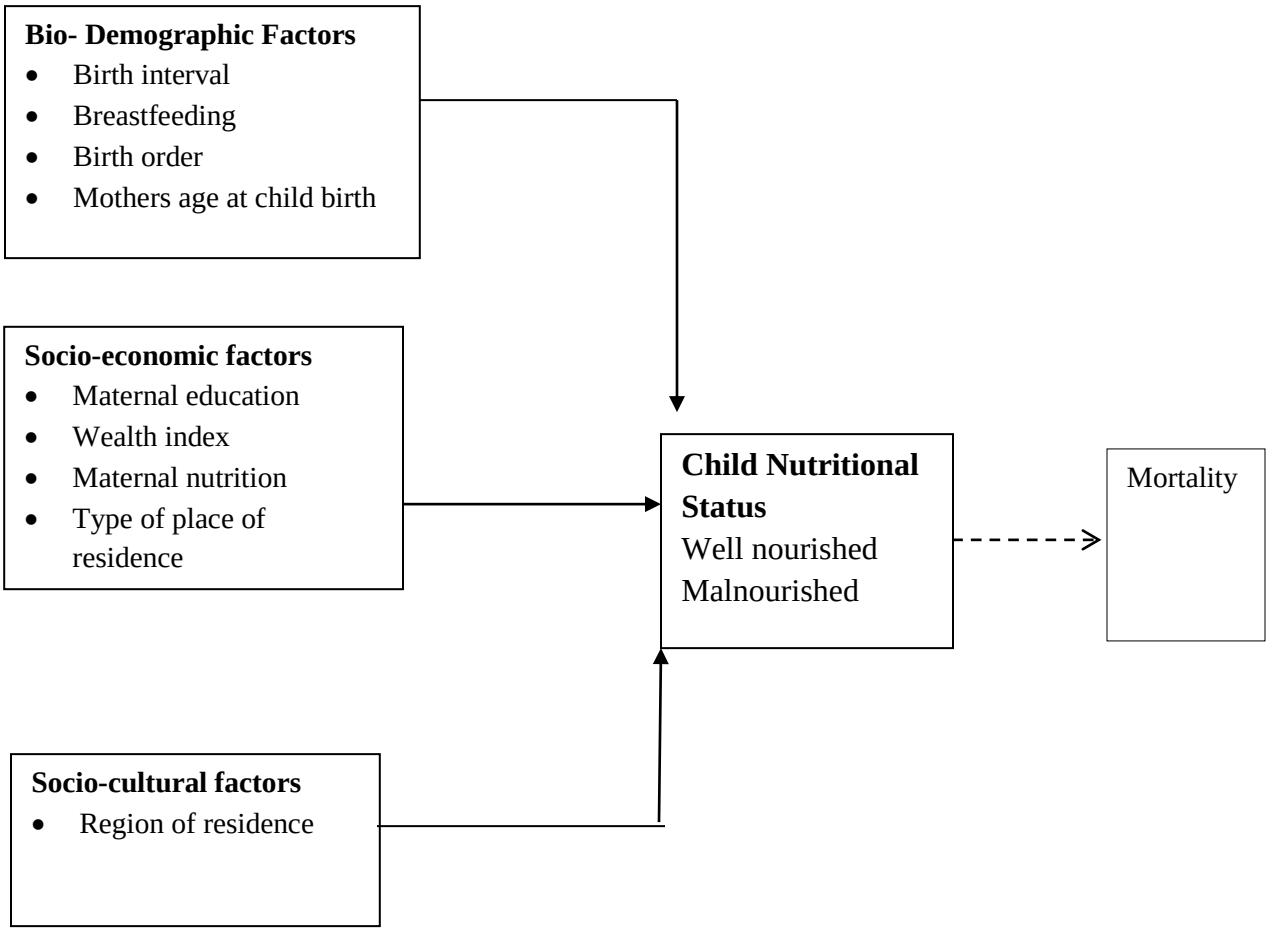
Source: Adapted from Mosley & Chen (1984)

The framework identifies a set of determinants or intermediate variables that affect morbidity and mortality risk directly. Social and economic determinants functions on impact of child safety through these variables. The four classes of determinants focus on a population's wellbeing patterns. Specific conditions of illness (infection or nutritional deficiency) are largely transitory: in the end, there is either complete recovery or lifelong results represented by increasing degrees of permanent development (or other survivor disability) and/or death.

2.6 Operational Framework

The operational model employed in this study shows the association between selected bio-demographic, socio-economic, and cultural variable, and child malnutrition. This study investigates further how these background variable influences child malnutrition status that is represented by height-for-age and weight-for-height indices. Literature indicates that factors such as the birth spacing, birth order of the child, maternal age at the child birth, maternal education, breastfeeding, type of places of residence, and ethnicity influences the child mortality.

Figure 2.2: Operational framework



Source: Modified from Mosley & Chen (1984) Framework for Child Survival in Developing Counties

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This chapter presents the sources of data and methods used for the analysis of the study. Description of the independent and dependent variable was used.

3.2 Source of Data

This study utilized national survey on Kenya Demographic and Health Survey (KDHS, 2014) with analysis based on the child file (kekr70fl). The file contains information for every child of all women who were interviewed with a total population of 20964, the number of children alive was 20,093 while the number of children measured was 18,909 as illustrated on Figure 3.1

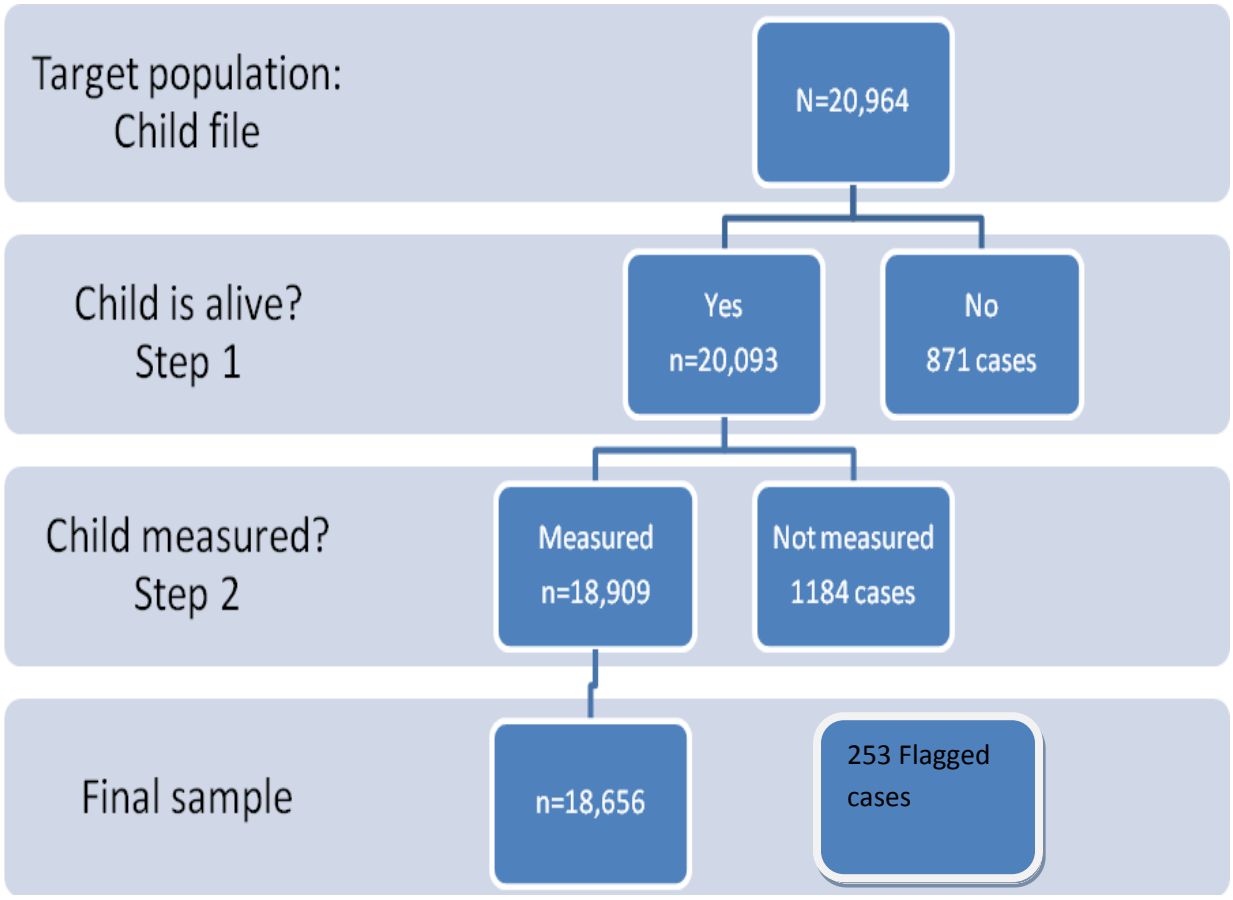
3.3 Methods of Data Analysis

3.3.1. Descriptive Statistics

Descriptive statistics was used to quantitatively analyse the summary of the study while cross tabulations was used at the bivariate level of analysis to establish the association between selected socioeconomic, bio-demographic, cultural factors and characteristics of the children and stunting and wasting indices of the child malnutrition. This method yielded percentage distribution of the child malnutrition status by each of the independent variables.

Chi-square test determined the strength of the association between the independent variable and the dependent variable to establish whether the observed relationship was statistically significant or was not significant. The test determined the degree of association between the various independent variables on the stunting and wasting variables among children under-five.

Figure 2.3: Flow Chart



Out of the children whose anthropometric indices were, measured 253 had height out of plausible limits, age in days out of plausible limits and were; identified as flagged cases hence removed from the sample size.

Table 3. 1: Operationalization of the study variables

Variable Name	Measurement/coding	Type of Variable
Child nutritional status	0=Nourished 1= Malnourished	Dependent
Wealth quintile	0=Low 1=Middle 2=High	Independent
Type of residence	0=Urban 1=Rural	Independent
Maternal education	0=No education 1=Primary 2=Secondary (plus)	Independent
Maternal Nutrition	0=Underweight (Below 18.5) 1=Normal weight (18.5–24.9) 2=Obesity (25.0 plus)	Independent
Birth order of the child	0=1-4 1=5-9 2=10 +	Independent
Maternal age at child birth	0=10-24 1=25-34 2=35+	Independent
Months of breast feeding	0=0-6 1=7-24 2=25+	Independent
Preceding birth interval	0 = <24 months 1= >=24<48 months 2=>=48 months	Independent
Region	1=Coast 2=North Eastern 3=Eastern 4=Central 5=Rift Valley 6=Western 7=Nyanza 8=Nairobi	Independent

3.3.2 Computation of the outcome variable

Child malnutrition status factor was based on two major classifications in contrast to reference community, i.e. weight-for-height and height-for-age. For anthropometric metrics in surveys, standard deviations or Z-scores are used. It is the difference between an individual's value (in this case a child) and the reference population's median value for the same age or height, divided by the reference population's standard deviation. In other terms, you can explain how far a child's weight is from a child's mean weight in the reference value at the same height by using the Z-score.

Table 3. 2: Classification of malnutrition for weight-for-height and height-for-age based on Z-scores

Classification	**Z-score values**
Adequate	-2 < Z-score < + 2
Moderately malnourished	-3 < Z-score < - 2
Severely malnourished	Z-score < - 3

Z-score = (Measured value – Median of reference population)/Standard Deviation of the reference population

However, this study classified malnutrition for weight-for-height and height-for-age based on Z-scores as follows: Well-nourished [-2 < Z-score < + 2] as '0' and Malnourished [Z-score < - 3 and Z-score > +2] as '1' where '1' was the interested outcome. Consequently, the two outcomes 0 and 1 were generated and summed up to yield a combined variable, 'child nutrition status'. The result outcome was 0 to 2 where 2=1; 1=1 and 0=0 and the variable label was 0 and 1 where 1 was malnourished (this was the desired outcome of the study) and 0 was well-nourished.

3.3.3 Logistic Regression

Logistic regression model is used in demographic, nutrition and health studies when the dependent variable is expressed as a dichotomous variable that is as the probability of the occurrence of an event. Considering child malnutrition as a dichotomous variable, logistic

regression was applied to predict the effects of a set of predictor variables on the outcome. Logistic regression is important as it can isolate the effect of the independent variables on the dependent variable. Wang (2003) viewed from a mathematical point of view that logistic regression is extremely flexible and easily used function which lends itself to a biologically meaningful interpretation.

Multivariate analysis involves two or more independent variable acting on the dependent variable, it entails inclusion of all independent variables to test their effect on the dependent variable. Based on the statistical principle of multivariate analysis that involves poly observation and analysis of more than one statistical outcome variable at a time, in design and analysis, the technique was used to perform trade studies across multiple dimensions while taking into account the effects of all variables on the responses of interest. The dependent variable was the child nutrition status. The multivariate analysis of the effects of socioeconomic, bio-demographic and cultural variables on the two indices of the child malnutrition employed logistic regression models. This was because the dependent variable was dichotomous in nature as it defined the presence or absence of malnutrition.

Logistic regression is derived from the principle of odds ratio. That is the ration of the probability that an event will occur (p) to the probability that an event will not occur (1-p). The logistic regression equation takes the multiple regression equation which is in the form of:

Logit P= In (P/1-P) = $B_0 + B_1X_1 + B_2X_2 + \ldots\ldots\ldots\ldots\ldots\ldots B_nX_n$ where

P- is the probability that an event will occur

L_n –is the natural logarithm

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

B_0 – is the intercept of the model

X_s- these are the independent variables

B_s- these are the logistic coefficients

E- is the error term.

CHAPTER FOUR
DETERMINANTS OF UNDER-FIVE MALNUTRITION

4.1. Introduction

This chapter presents results of the study. Section 4.2 presents the characteristics of the study population; section 4.3 presents results on association of independent factors with child's malnutrition status; and section 4.4 presents the results from multivariate analysis implemented through logistic regression.

4.2. Characteristics of the study population by background characteristics

Table 4.1 indicates that out of 18656 children under-five participated in the study,35 percent were malnourished and 65% of children were well nourished. In relation to the household wealth index, majority (56%) the children were from low-income households followed by children (27%) from high-income households. There was a huge disparity between rural and urban proportion of children in the study. Majority of the children (69%) were born to mothers residing in the rural areas and only 31% in urban areas.

The results show that majority of the children were born of mothers who had primary education at fifty three percent; followed by those born of mothers with secondary education plus at twenty five percent. Body mass index (BMI) of the mothers (maternal nutrition) distributed into three categories as normal weight, obesity and under weight. Majority of children in the study were born of mothers whose BMI was normal i.e. 18.5 to 24.5 at sixty two percent followed by those born of mothers with obesity at twenty six percent.

Table 4. 1: Percentage Distribution of the study population by study Variables

Variable	**Number (n=18,656)**	**Percent**
Child Nutritional Status		
Nourished	12063	64.7
Malnourished	6593	35.3
Wealth index		
Low	10394	55.7
Middle	3132	16.8
High	5130	27.5
Type of place of residence		
Rural	12794	68.6
Urban	5862	31.4
Maternal education		
No education	4058	21.8
Primary	9889	53.0
Secondary +	4709	25.2
Maternal nutrition		
Underweight (Below 18.5)	1055	11.8
Normal weight (18.5–24.9)	5543	62.2
Obesity (25+)	2317	26.0
Birth order		
1-4	13570	72.7
5-9	4737	25.4
10+	349	1.9
Age of mother at birth (years)		
10-24	17157	92.0
25-34	1462	7.8
35+	37	0.2
Months of breastfeeding		
0-6	1337	15.1
7-24	6654	75.2
25+	856	9.7
Birth interval – preceding (months)		
0-23	2671	18.4
24-47	7507	51.8
48+	4321	29.8
Region		
Coast	2339	12.5
North Eastern	1356	7.3
Eastern	2784	14.9
Central	1289	6.9
Rift Valley	6123	32.8
Western	1772	9.5
Nyanza	2559	13.7
Nairobi	434	2.3

The distribution of children at different birth order shows that majority (73%) where in the birth order of 1-4 category followed by birth order of 5-9 at 26%. Age of the mother at birth (years) indicated that majority of the children (92%) were born by mothers at adolescence aged 10-24 years. Only 37 (0.2%) children were born by mothers in age 35 year to 44 (Table 4.1). Regarding duration of breastfeeding, ninety percent of the children in study were breastfed for a period of up to 24 months from birth (2 years) and only 15% were breastfed for a period of up to six months. Children slightly above average (52%) were born with a preceding birth interval of 24 – 47 months; about 1 out 3 were born after a birth interval of 48 plus months and about 1 out of 5 were born with a preceding birth interval of 8 – 23 months. The results reveal that Rift Valley had about 1 out 3 children in the study followed by Eastern and Coast at 13% each. The least was Nairobi with only 2% of the children represented in the study.

4.3. Relationship between Background Characteristics and Child Malnutrition Status

Findings from table 4.2 indicate there is strong statistical association between child malnutrition, cultural, demographic and socio-economic factors. There was strong relationship between nutritional status of children under five and household wealth index. The proportion of malnourished children reduced with an increase in income. For instance, 41% of the malnourished children were from low-income households followed by those from middle-income households at 32% and only 16% of malnourished children from households with high wealth index. Type of place of residence was highly correlated with child malnutrition status. Rural areas had more children who were malnourished at 38% compared to urban areas (30%).

There was strong statistical association between maternal education and the status of the child's nutrition. Child's malnutrition status reduced with increase in maternal education. Majority (42%) of malnourished children was born by mothers who had no education followed by those (37%) who were born by mothers with primary education. Like maternal education, maternal nutrition is crucial in determining the status of the child's malnutrition. The results indicate that there was positive relationship between maternal nutrition and child's malnutrition status.There was higher proportion (41%) of malnourished children were given birth by mothers who were underweight. However, obese mothers gave birth to lesser proportion (29%) of malnourished children compared to those malnourished children from normal mothers at 36 percent.

Malnutrition among children increased with birth order. Results indicate that there was a strong relationship between birth order and malnutrition status of the children under-five. Forty four percent of malnourished children were born of mothers with birth order of 10 plus years compared to 33% were born of mothers with who had birth order of less than 5 years. There was strong positive relationship between the age of the mother and child's malnutrition status. Malnutrition status decreased with age of the mother; the higher the age of the mother the lower the proportion of malnourished children. For instance, the proportion of malnourished children for mothers at age 10-24 years was 36% and 35 plus years' mothers were 24 percent.

There was strong evidence that months of breastfeeding related with the malnutrition. The proportion of the malnourished children increased with months of breastfeeding. Those children who were breastfed more than 24 months were more malnourished than those breastfed in less than 25 months. This can be associated with the fact that prolonged breastfeeding is also associated with malnutrition as there is low supply of breast milk and there is poor intake of complimentary feeding.

Malnutrition among children reduced with preceding birth interval. Results indicate that there was a strong relationship between preceding birth interval and malnutrition status of the children under-five. Higher proportion (42%) of malnourished children were born with preceding birth interval of less than 24 months (0-23) while 38 % within between 24 months and less than 48 months and 31% were born after preceding birth interval of more than 4 years (48 months). There was a strong association between child nutrition with their regional residence. The results reveal that children born in city of Nairobi are less malnourished at (27.2%), Western (30.9%) and Nyanza (32.1%) compared to North Eastern (40.9%), Rift Valley (37.8%), Eastern (37.6%) and Coast (36.3%).

Table 4.2: Relationship between independent variables and child nutritional status

Variables	Child nutrition status (%)				
	Well nourished (n=12063) Number (%)	Malnourished (n=6593) Number (%)	X^2	df	p-value
Wealth index					
Low	6150 (59.2%)	4244 (40.8%)	338.73	2	0.000
Middle	2128 (67.9%)	1004 (32.1%)			
High	3785 (73.8%)	1345 (26.2%)			
Type of place of residence					
Rural	7982 (62.4%)	4812 (37.6%)	91.9	1.0	0.000
Urban	4081 (69.6%)	1781 (30.4%)			
Maternal education					
No education	2365 (58.3%)	1693 (41.7%)	241.45	2	0.000
Primary	6240 (63.1%)	3649 (36.9%)			
Secondary+	3458 (73.4%)	1251 (26.6%)			
Maternal nutrition					
Underweight (Below 18.5)	617 (58.5%)	438 (41.5%)	54.26	2	0.000
Normal weight (18.5–24.9)	3530 (63.7%)	2013 (36.3%)			
Obesity (25+)	1633 (70.5%)	684 (29.5%)			
Birth order					
1-4	9045 (66.7%)	4525 (33.3%)	88.6	2	0.000
5-9	2823 (59.6%)	1914 (40.4%)			
10+	195 (55.9%)	154 (44.1%)			
Age of mother at birth (years)					
10-24	11007 (64.2%)	6150 (35.8%)	24.3	2	0.000
25-34	1028 (70.3%)	434 (29.7%)			
35+	28 (75.7%)	9 (24.3%)			
Months of breastfeeding					
0-6	916 (68.5%)	421 (31.5%)	11.9	2	0.002
7-24	4303 (64.7%)	2351 (35.5%)			
25+	527 (61.6%)	329 (38.4%)			
Birth interval – preceding (months)					
0-23 months	1559 (58.4%)	1112 (41.6%)	89.2	2	0.000
24 - 47 months	4678 (62.3%)	2829 (37.7%)			
48+ months	2977 (68.9%)	1344 (31.1%)			
Region					
Coast	1490 (63.7%)	849 (36.3%)	124.74	7	0.000
North Eastern	802(59.1%)	554 (40.9%)			
Eastern	1737 (62.4%)	1047 (37.6%)			
Central	947 (73.5%)	342 (26.5%)			
Rift Valley	3809 (62.2%)	2314 (37.8%)			
Western	1224 (69.1%)	548 (30.9%)			
Nyanza	1738 (67.9%)	821 (32.1%)			
Nairobi	316 (72.8%)	118 (27.2%)			

4.4. Effects of Background Factors on Child's Malnutrition

This section discusses the operational regression findings. Multivariate analysis included the use of quantitative logistic regression to assess the factors that affect the malnutrition condition of children under the age of five. The use of this analytical method was to obtain the net effect of demographic, socio-economic and socio-cultural factors on the malnutrition status of under-five children. Analysis of logistic regression was performed at one stage and the results were presented as shown in table 4.3.

The results show that wealth index influenced child malnutrition; children from middle wealth index households were 1.3 times more likely to be malnourished. This could be attributed with the fact that these households have limited resources and therefore the ability to access health facilities, expansion of knowledge on access to health and nutritional practices such us ensuring children feed on balanced diet meals and what they encompass, (Bhagowalia *et al.,* 2012)

The results show that education level influenced child malnutrition; a mother with primary education or a secondary and above education is 1.4 times more likely to have a malnourished child compared to a mother with no education. A study by Ambel, (2015) that concluded that education determines health knowledge, which is essential for a child health. Webb, (2004) study confirms that women with advanced studies acquire health knowledge and practices in child health, the skills they acquire are essential in future diagnosis and treatment of child health problems and treatment seeking behaviours and more receptive to modern treatment of diseases as well as modern feeding practices that are more inclined to nutritional management and balanced meals.The association between education (primary and secondary and above) and the status of malnutrition children is highly significant.

In regard to maternal nutrition, a normal weight mother is 30% more likely to have a malnourished child than an underweight mother. Whereas an obese mother is 20% more likely to have a malnourished child compared to underweight mother. This is can be explained by the fact that those mothers who have poor nutrition status tend to give their attention to children than the mother who have good nutrition status because they assume their children are growing normal. Nutritional deficiencies such as anaemia are evident during pregnancy and lack of iron

supplementation, which is deemed to be a major cause of perinatal and maternal death leads to an increased risk of early delivery and low birth weight. There are adverse maternal effects linked with iodine deficiency, including foetal brain trauma, congenital malformation, and premature death and child malnutrition (KNBS and ICF Macro, 2015).

The duration of breast-feeding was statistical significant predicator of child's malnutrition at 5% significance level. Results further indicated that children who breastfeed for a longer period are less likely to be malnourished than those who breastfeed for shorter period. Children who breast-fed seven to twenty-four months were 30% less likely to be malnourished compared to those who breast-fed for up to 6 months. Similarly, those children who breast-fed more than 25 months were 20% less likely to be malnourished.

The results show that preceding birth interval has an influence in child's malnutrition. A child born with preceding birth interval of 24-47 months is 50% more likely to be malnourished compared to those with a birth interval of 0-23 months. Similarly, a child born to a mother with preceding birth interval of 48 months and above is 21% more likely to be malnourished compared to those with a birth interval of 0-23 months. Results indicate that children born of mothers with 5-9 children, were 30% less likely to be malnourished than those born of mothers who had 1-4 birth order. The result show that Nairobi has an influence on under-five malnutrition with children in Nairobi 50% more likely to be malnourished this is in sync with the fact that Nairobi being a city will see less most families accessing food through food markets unlike other regions that have a likelihood of households cultivating plants and raising livestock through seasons. Sophisticated manufacturing systems that can produce and store foods for longer periods are more present, but also the prevalence of slum dwelling in the city would adequately explain the highly likelihood of malnutrition for children in Nairobi (Zulu *et al.,* 2011).

Table 4.3 Logistic regression coefficients of the factors influencing Malnutrition of Under-Five Children

Variable	B	S.E.	Exp(B)
Wealth Index			
Middle	.248	.082	1.281**
High	.082	.091	1.085
Type of place of residence			
Urban	-.014	.065	.987
Maternal education			
No education			
Primary	.325	.100	1.385**
Secondary+	.344	.077	1.411**
Maternal nutrition			
Underweight (Below 18.5)			
Normal weight (18.5–24.9)	.297	.096	1.345**
Obesity (25+)	.179	.065	1.195**
Birth order			
1-4		.160	
5-9	-.375	.161	.687
10+	-.176		.839
Age of mother at birth (years)			
10-24		1.242	
25-34	.224	1.247	1.252
35+	.198		1.219
Months of breastfeeding			
0-6		.105	
7-24	-.406	.084	.666**
25+	-.199		.819**
Birth interval – preceding (months)			
0-23 months			
24 - 47 months	.434	.078	1.543**
48+ months	.193	.062	1.212**
Region			
Coast		.122	
North Eastern	.151	.098	1.163
Eastern	.088	.134	1.092
Central	-.031	.085	.969
Rift Valley	.119	.113	1.127
Western	-.149	.105	.861
Nyanza	-.081	.203	.922
Nairobi	.420		1.522**
Constant	-1.103	1.257	.332

**p<0.05

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter summarizes the study, provides the conclusion and the recommendations. The conclusion is aligned with the objectives and research questions of the study while the recommendations are based on the findings of the study.

5.2. Summary

The overall aim of this study was to improve our understanding on determinants of under-five malnutrition in Kenya is a known cause of under-five mortality. The specific objectives were to: examine the effects of socioeconomic factors in under five malnutrition, assess the effects of bio-demographic factors on under five malnutrition and assess the effects of cultural factors on under-five malnutrition. Mosley and Chen conceptual framework of 1984 was adopted for the study. Data for the study was from Kenya Demographic Health Survey of 2014. The methods of data analysis were descriptive and logistic regression.

The results showed that 35% of the children under five were malnourished and 65% were not malnourished. The highest levels of malnutrition were recorded for children who lived in low-income households at 41%, in rural areas at 37%, children whose mothers had no education at 41%, children whose mothers were underweight at 41%, those with birth order of 10 plus were malnourished and accounted for 44%. Teenage and young mother's children recorded high level of malnutrition at 36%, children with prolonged months of breastfeeding beyond 24months accounted for 38% of malnourished children whereas those who breastfed for up to 6months were 31% and those who breastfed for up to 24 months were 36%. Children with a shorter birth interval of 0-23 months accounted for 42% of malnourished children and those from North Eastern region were at 41%.

The bivariate analysis revealed that under-five nutritional status was significantly associated with maternal education, wealth index, maternal age at childbirth, maternal nutrition, preceding birth interval, birth order, type of place of residence and region. The multivariate analysis indicates that the independent variables were statistically significant.

5.3. Conclusion

From the study, it was notable that socio-economic factors that include wealth index, type of place of residence, maternal education and maternal nutrition are significant in determining the nutrition status of children under-five in Kenya. The study has revealed that low income households, residing in rural areas, lack of maternal education and poor maternal nutrition/ underweight contribute to highest levels of under-five malnutrition. Addressing this factors is more likely to lead to improvement in nutritional status of under five.

Bio-demographic factors were key determinants of under five malnutrition with a higher birth order leading to more levels of malnutrition, adolescent mothers have higher chances of malnourished children that is associated with the lack of the ability to give holistic care to the children; birth interval and duration of breastfeeding were also seen as key determinants of under five malnutrition. Socio-cultural factors are key determinants of under five malnutrition, the study results depict that arid and semi arid areas have highest number of malnutrition associated with cultural practices that affect feeding programmes of the children at household levels as well as rampant drought and floods.

The factors that determine under-five nutritional status are interrelated and there is no overall blanket programme that can solve the problem hence multi-disciplinary approach is more ideal to solve this vice in Kenya.

5.4. Recommendations of the Study

5.4.1. Recommendations for Policy and Programmes

Based on the findings of the study, the following recommendations were put forward:

i. Since maternal predictors of child malnutrition are more personal, the most effective government intervention would be civic education. The line ministries should carry out campaigns, advertisements and general advocacy, for instance, increased birth interval through family planning and the prolonged duration of breastfeeding. The government could collaborate with the private sector to ensure that nursing mothers are given slightly more weeks for their maternity leaves. In addition, there should be a national-level drive to formulate policies that make employers to implement childcare practices by creating favourable environment at the workplace such that mothers who wish to come with their children can do so.

ii. To address regional differentials in child malnutrition, the national governments should increase funding for healthcare. Specifically, they should increase allocation for dieticians and nutritionists stationed at health facilities and at the community levels. In others words, child nutrition should be integrated more with the Mother and Child Health (MCH) care, but not relegated to nurses but nutrition specialists.

5.4.2. Recommendations for Further Research

i. This study used the stunting and wasting anthropometric indices as the measure of child malnutrition, future studies should concentrate on the use of other measures of malnutrition such as the underweight measure which was not incorporated due to lack of resources.

ii. This study limited itself to the use of secondary data which was collected for other purposes other than measuring the nutritional status of a child. Therefore, information on some key variables which is known to influence the nutritional status of a child were omitted. Hence, there is need for further research which should employ primary data whereby variables that were not captured should be incorporated.

iii. In this study, maternal nutrition was based on BMI. It is proposed that future studies could base maternal nutrition on Mid-Upper Arm Circumference (MUAC) and the compare results with those obtained here.

REFERENCES

Abuya, B., Ciere, J., Murage, E., (2012). Effects of Mothers Education on Child Nutritional Status in the Slums of Nairobi. *Creative Common Atributes Licence,* 1-10.

Abuya, B., Kimani,J., Moore, D., (2011). Influence of Maternal education on Child Immunization and Stunting in Kenya . *Maternal Child Health,* 1389-1399.

African Population & Health Research Centre (2012). *Population and Health dynamics in Nairobi Informal Settlement* . Nairobi

Agency for Healthcare Research & Quality (2017). *Breastfeeding & Maternal Infant Health Outcomes in Developed Countries* . Rockville:

Agola, A. (2012). *Experinces of Childbirth by Women and their Care Providers in Narok & Isiolo Counties Kenya* . Nairobi : COVAW-K.

Ballard A. (2013). Human Milk Composition: Nutrients and Bio-active Factors . *Paediatric Clinical North America*

Bhagowalia P, M. P. (2012). What Dimemsions of Women Empowerment Matter Most for Child Nutrition . *Internatioan Food Policy Research Institute,* 345-398.

Bhutta, Z., Tahmeed,A., Black, R., Cousens,S., Dewey,K., Giugliani,E., (2008). What Works? Intervention for Maternal and Child Under Nutrition and Survival. Lancet 9610,417-440.

Black, R., Victora,G., Walker,S., Bhutta,Z., Christian,P., Enis,M,.Grantham,M., Katza,J., Martorell,R,. Uauay,R,. (2013). Maternal & Child Under-Nutrition & Overweight in Low- Income and Middle- Income Countries, Lancet 3 (9890) 427-451.

Burgert, C. R., Colston, J., Roy, T., & Zachary, B. (2013). Geographic displacement procedure and geo-referenced data release policy for the Demographic and Health Surveys. DHS Spatial Analysis. Report No. 7. Calverton, Maryland, USA: ICF International.

Charity M, (2017). Effects of Table Bankingon Growth of Women Owned Small and Medium Enterprises in Meru County, Kenya . *Current Aspects in Finance,* 14-29.

Collins,M. (2008). *Lining Up to Eat: Birth Order & Nutritional Status in Rural Ethiopia.* London : St Anthony College, 46-60.

Collins, M., (2013). *Persistence in Effects of Birth order on Child Development: Evidence from the Philipines* . London : University of Oxford, 14 -20.

Conde - Agudelo.A,. (2012). Effects of Birth Spacing on Maternal, Perinatal, Infant & Child Health. A Systematic Review of Causal Mechanisma. *Studies in Family Planning*, 93-114.

Dancer D. Smith A. (2008). Infant Mortality and Child Nutrition in Bangladesh . *Health Economics, 17(9)1015-1035*

Dewey, R. Cohen,J. (2007). Does Birth Spacing Affect Maternal and Child Nutritional Status: A Systemic Literature Review . *Materna Child Nutrition*, 243-260.

Fafchamps M, Kebede B. (2009). Intra- Household Welfare in Rural Ethiopia . *Oxford Bulletin of Economics and Statisctics*. 567-599.

Fink G, Sudfield R, Dananei G Ezzati M. (2014). *Scalling Up Access to Family Planning may Improve Linear Growth and Child Development in Low & Middle Level Income Countries*, 77-115.

Finlay J., Ozaltin E. (2011). The Association of Maternal Age with Infant Mortality , Child Anthropometric Failure, Diarrhea & Anaemia for First Births: Evidence for 55 Low-& Midlle Income Countries . *BMJ Open e00226*

Fosto, J. (2004). *Urban- Rural Differentials in Child Malnutrition: Trends & Socio-Economic Correlates in Sub-Saharan Africa* . Nairobi : APHRC.

Fosto, J. (2006). Child Health Inequalities in Developing Countries: Difference Across Rural & Urban Areas . *Internatioanl Journal for Equity in Helath*, 189-213.

Geruso, M. Spears, D., (2018). Neighbourhood Sanitation & Mortality . *American Economic Journal Applied Economics 10(2)*.

Gibbs C, Wendt A, Peter S, Hague C. (2012). The Impact of Early Age at First Child Birth on Maternal & Infant Health . *Paediatric Perinat Epidemiol, 26 Suppl,* 259-284.

Girma, W. (2002). *Determinants of Nutritional Status of Women & Children in Ethiopia.* Maryland : ORC Macro, 56 -80.

Gupta, M. (1987). Selective Discrimination against Female Children in Rural Punjab India. *Population & Development Reviews, 127 -143*

Hannan, A. (2015). *The Association Between Women Empowerment and Child Nutrition in Bangladesh* . North Carolina: University of Northern Carolina Chapel Hill.

Hatton,R.Martin.T(2008). *The Effects on Stature of Poverty, Family Size & birth Order: British Children in the 1930.* Bonn Germany : Institute of Study of Labour (IZA), 1-24.

Hill, Z. Kirkwood B, Edmond K. (2004). *Family & Community Practices that Promote Child Survival Growth & Development: A Review of Evidence* . Geneva: WHO.

Hung, A. (2015). Maternal Education Linkages and Child Nutrition in the Long and Short- Run: Evidence from Ethiopia DHS . *International Journal of African Development*, 123-133.

IFRI. (2015). *Global Nutrition Report: Action and Accountability to Advance Nutrition & Sustainable Development.* Washington D.C: International Food Research Institute, 44-65.

Jayachandran,R. Pande,S (2013). *Why are Indian Children Shorter than African Children,* 56-76

Jang B. Mukesh K, Manish S, (2015). Status of Maternal Nutrition and Its Association with Nutritional Status of Under Three Children in EAG States and Assam , India. *Internatioanl Journal of Humanities and Social Science Intervention,* 30-38.

Jing, Z. Jungxen,S. Senbei,Y. (2011). Undernutrition status of children under 5 years in Chinese Rural Areas . *Asia Pacific Journal in Clinical Nutrition,* 584-592.

Kabubo, M. Ndege, G. Mwambu, G. (2008). Determinants of Children Nutritional Status in Kenya: Evidence of KDHS. *African Journal of Economics,* 374 -402.

Kenya National Bureau of Statistics (KNBS) and ICF Macro, (2015). Kenya Demographic and Health Survey 2008-09. Calverton, Maryland: KNBS and ICF Macro.

Kitler, P. Sucher, P. & Nelms, M. (2012). *Food and Culture.* Belmont : Cengage learning.

Klaus,D. Monto,G. Subbarao,K. (2003). AIDS Induced Orphanhood as a Systematic Shock: Magnitude, Impact amd Program Interventions in Africa . *World Development,* 1201-1220.

Kouba, J. (2005). Impact of Environment, Ethnicity and Culture on Nutrition and Health . *Nutrition & Oral Medicine,* 46-49.

Kurtz,K. Barua,A. Khate,B. Prasad,J. (2006). Delaying Age of Marriage and Meeting Reproductive Health Needs of Married Adolescent Women, SCN News 31, 24-29.

Ladomenous,F. Moschandreas,J. Kafatos,A.Tselentis,M. Galanakis,E. (2010). Protective Effects of Ecxlusive Breastfeeding against Infections During Infancy: A Prospective Study. *Arch Dis Child 95 (12),* 1004-1008.

Lartey, A. (2008). Maternbal & Child Nutrition in Sub-Sahara Africa Challenges & Interventions . *Proceedings of the Nutritional Society 67 (1),* 105-108.

Leticia,J. Laeticia, R. (2013). The Implications of Family Size for Adolescents Education and Work in Brazil; Gender and Birth Order Difference . *Social Forces 92 (1),* 275-302.

Lisa,C. Rule,M. Alda,N. (2006). Why is Child Malnutrition Lower in Urban than Rural Areas? Evidence from 36 Developing Countries. *International Food Policy Research, 234-302.*

Liu,L., Johnson, H,. Caousens, S., Perin,J,. Scott, S,. Laum, J,. Ruden, I,. Campbell, H,. Cilbuskis, R,. Li, M., Mathers, C,. Black Re,. (2012). Global, Regional and National Causes of Child Mortality; An Updated Analysis for 2010 with Time Trends Since 2000. *Levels and Trends in Child Malnutrition*, 243-260.

Liu, L. Johnson, H. Campbell, H. (2008). Maternal and Child Under Nutrition; Global and Regional Exposures and Health Awareness . *Levels and Trends in Child Malnutrition,* 143-154.

Lubetzky, R. Mandel, D. Mimouni, F. (2013). Vitamin & Mineral Supplementation of Term-Infants are they necessary. *World Rev Nutritional Diet,* 108, 79-85.

Masibo, P. (2013). *Trends and Determinants of Malnutrition Among Children Aged 0-59 Months in Kenya* . New York : USAID.

Ministry of Health. (2012). *National Nutrition Action Plan 2012- 2017* . Nairobi: GoK.

Ministry of Health, (2006). *Kenya Natioanl Guidelines on Nutrition & HIV/ AIDS* Nairobi National AIDS-STI Control Programme.

Ministry of Health (2014). *Kenya Strategic Framework 2014- 2019* . Nairobi : Ministry of Health.

Ministry of Health. Nutritional & Diatetics Unit (2017). *Kenya Food and Nutritional Security Seasonal Assessment* . Nairobi .

Molina, D. (2012). *Review of Health & Nutrition Indicators in Early Childhood.* Paris: UNESCO.

Mosley, H., Chen,L., (1984). An Analytical Framework for the Study of Child Survival in Developing Countries. *Population and Development* , 24-45.

Olofin, I. McDonald,C. Ezzati, M. Flaxman,S. Black,R. Fawdi,W. (2013). A Pooled Analysis of Ten Prospective Studies . *Association of Suboptimal Growth with all Cause and Cause Specific Mortality in Children Under Five years*, 64-88.

Olodaru, E., Amolo, S., Adoka, S., (2016). Determinants of Malnutrition Among Children Aged 6-59 months in Trans-Mara East Sub-County, Narok County, Kenya. *International Journal of Public Health and Safety*, 116-126.

Onis, M., & Braca, F. (2016). Childhoof Stunting: A Global Perspective . *Maternal and Child Nutrition,* 12-26.

Peter, M. Judith, O, Zipoporah,W. (2015). Influence of Culture on Dietary Pracrices of Children Under Five Years among Maasai Pastoralists in Kajiado Kenya . *International Journal of Behavioural Nutrition and Physical Activity,* 131-145.

Riordan J. (2010). The Biological Specifity of BreastMilk in Breast Milk . *Breastfeeding & Human Lactation,* 22-34.

Patton, G. C., Sawyer, S. M., Santelli, J. S., Ross, D. A., Afifi, R., Allen, N. B., ... & Kakuma, R. (2016). Our future: a Lancet commission on adolescent health and wellbeing. *The Lancet*, *387* (10036), 2423-2478.

Rustein, S. (2008). *Further evidence of the Effects of Preceding Birth Intervals on Neo-natal, Infant and Under-5years Mortality and Nutritional Status in developing Countries.* Washington D.C: DHS.

Savage, T. Derraik, J. Miles, H. Mouati, F. Cutfiled,W. Hofman, P (2013). *Birth Order Progressively Affects Childhood Height*. *Clinical Endocrinology (79)*.

Semali, A. Innocent, M. (2000). *HIV Prevention Policies in the Socio-Economic Determinants of Infection* . Brussels : European Commission, (EU).

Sethuraman, K. Landsdown, R. Sullivan, R. (2006). W*omen Empowerment andDomestic Violence. The Role of Socio-Cultural Determinant in Maternal & Child Nutrition in Tribal and Rural Communities in South India . Food and Nutritional Bulletin,* 128-143.

Schailable, H. Kaufman,E. (2007). Malnutrition & Infection: Complex Mechanism and global Impacts, 54-67.

Shinsugi, C,. Matsumura,m., Kaneko,S,. (2015). Factors Associated with Stunting Among Children According to the Level of Food Insecurity in the Household: A Cross-sectional Study in a Rural Community of South Eastern Kenya. *BMC Public Health*, 441- 502.

Smith, L. Haddad,L. Ramakrishnana,U. Ndiage,A.Motorell,R. (2003). *The Importance of Women Status for Child Nutrition in Developing Countrys*. *Internatioanl Food Research Series*, 438-502.

Srivasta, M. Austin,M. (2012). Women and Non-Governmental Organisations in developing countries . *Social development*, 13-25.

Sathiya Susuman, A., Hamisi, H.F. & Nagarajan, R. Genus (2016) 72: 10. https://doi.org/10.1186/s41118-016-0013-z

Thangata,P. Hilderbrand,F. Kwesiga,F. (2007). Predicted Impact on HIV/AIDS on Improved Fallow Adoption and Rural Household Food Security in Malawi . *Sustainable Development,* 204-215.

UNICEF. (2010). *A Glimpse into the World of Teenage Pregnancies in Sierra Leone* . Freetown: UNICEF.

UNICEF. (2015). *Adopting Optimal Feeding Practices is the Fundamental to a Child Survival: Growth & Development but too few Children Benefit.* NewYork: UNICEF.

UNICEF. (2016). *Emergency Appeal for Nutrition Crisis in Kenya* . Nairobi: UNICEF.

Van de Poel,E. Hosseinpoor,R. Jehu-Aplah,C.Vega,J., Speybroeck, N. (2007). Malnutrition and the Disporopotional Burden of the poor: The case of Ghana. *International Journal of Equity Health*, 6-21.

Victora,C. Adain,L. Fall,C. Matorell,R. Ritcher,L. Sachdev,H. (2008). Maternal and Child Undernutrition Consequences for Adults Health and Human Capital . *Lancet,* 317-340.

Webb,P. Block,S. (2004). Nutrition Information and Formal Schooling as Inputs to Child Nutrition . *Economic Development and Cultural Change*, 801-820.

World Health Organisation. (2016). *Report for the Expert Consultation on the Optimal Duration of Exclusive Breastfeeding* . Geneva : WHO.

World Health Organisation. (2017). *Report from the Expert Consultation on the Optimal Duration of Exclusive Breastfeeding* . Geneva: WHO.

Yangchen, S., Tobgay, T., & Melgaard, B. (2017). Bhutanese health and the health care system: past, present, and future. *The Druk Journal*, 1-10.

Zulu, E. Beguy,D. Ezeh, A. Bocquire,P. Mandise,N. Cleland,Y. Falkinglam,J. (2011). Overview of Migration Poverty & Health Dynamic in Nairobi Citys Slum Settlement . *Journal of Urban Helath*, 185-199.