FEEDING PATTERNS AND NUTRITIONAL STATUS OF CHILDREN IN KENYA

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X53/12635/2018

RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF ECONOMICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN HEALTH ECONOMICS AND POLICY OF THE UNIVERSITY OF NAIROBI

2021

DECLARATION

I declare that this research paper is my original work and has not been presented either in part or as a whole to any other examining body for award of any degree.

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This research project report is submitted for examination with my approval as the university supervisor.

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DEDICATION

This work is specially dedicated to my dear mother, Dr. Mercy Mwaniki, whose academic journey inspires my own, and my sweet brother, Mr. Samuel Migwi.

ACKNOWLEDGEMENT

I would like to acknowledge the Sovereign God. His abundant mercies and favour have seen me through the entirety of this project. I have been greatly blessed with optimal physical, mental, social and financial health.

My supervisor, Dr. Phyllis Machio has been a guiding light throughout this process. She has been extremely resourceful and exceptionally patient as I took time to learn the complexities of coming up with a project such as this.

My classmates were a delight and especially my discussion group members. Their invaluable inputs, resilience and high spirits made it such a worthwhile experience.

My friends who have continually set the bar very high, challenged and encouraged me throughout this journey. I am grateful for their consistent support.

Lastly, I would like to acknowledge my family both nuclear and extended. I am forever indebted to each of them for their love and prayers on whose foundation I have come this far.

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ABBREVIATIONS

KNBS- Kenya National Bureau of Statistics

KDHS- Kenya Demographic Health Survey

SDG- Sustainable Development Goal

UNICEF- United Nations Children's Fund

VIF- Variance Inflation Factor

WFP- World Food Programme

WHO- World Health Organization

ABSTRACT

There are 200 million children aged below 5 that are malnourished. Approximately 6.2 million of such children died of avoidable causes in 2018, with 45 percent of these deaths associated with under nutrition. Out of all the feeding practices, breastfeeding has been proven as the single most important practice that ensures child survival and good health. It offers immense immunological, nutritional and psychological benefits. The objective of this study is to explore the association between exclusive breastfeeding for 6 months and duration of breastfeeding and the nutritional status of children under 5 years.

This study utilized the 2014 Kenya Demographic and Household Survey. This is a representative national survey with a sample of 40,300 households. Descriptive statistics and probit regression were used to analyze and estimate the factors influencing the nutritional status of a child below five years. STATA was used a tool for analysis.

Findings indicate that the longer a child is breastfed, that the lower the likelihood of a child being stunted and wasted by 3.3% and 1.4% respectively. Gender and child's age, marital status, age and level of education of the mother, wealth index of the household and access to health information were statistically significant in determining the probability of underweight, wasting and stunting. Residence was realized to be statistically insignificant.

We recommend institutionalization of a breastfeeding policy at the workplace, provision of conditional incentives for mothers who take their children for post-natal care visits in health facilities and training of Community Health Workers (CHWs) on Nutrition module. reduced physical activity in children as a result of lifestyle changes, technology and urbanization.

CHAPTER ONE: INTRODUCTION

1.1. Background of Study

The first 5 years of life are crucial for optimum health, development and growth of children. The feeding patterns of children play an utmost critical role in this phase of life (Tessema, 2013). Feeding patterns that are ascribed value include practices like initiation of breastfeeding within the first one hour of birth, exclusive breastfeeding during the first 6months, breastfeeding up to 2years of age and introduction of complementary feeding from 6 months with food that is nutritionally safe and adequate (WHO, 2007).

The direct outcomes of under-nutrition that are realized almost immediately include compromised motor development, delayed milestones, subpar growth physically and depleted intelligence quotient (IQ) (Black, 2008). Throughout the crucial growth phase of a child's life, the occurrence of severe malnutrition results in a weak immune system thereby increasing the risk of contracting infections (Mugo, 2019). This leads to an increase in the incidence of morbidity and mortality and inferior socio-behavioral skills (UNICEF, 2013). Children are unable to reach their full capacity (UNICEF, 2009). Later in life, the nutritional deficits will manifest as diminished intellectual capacity at learning institutions and the work place, poor reproductive outcomes and poor general well-being during teenage and adulthood (Black, 2008).

1.1.1. Prevalence of malnutrition

Worldwide, 200 million children under 5 are malnourished (UNICEF, 2019). About 171 million of the surviving children are stunted, 60 million are wasted and another 100 million are underweight (de Onis, 2011). Approximately 6.2 million children under 5 died of avoidable causes in 2018, with 45 percent of these deaths associated with under nutrition (WHO, 2020b).

In Asia, close to half of the children aged below 5 are malnourished. This ranges from approximately 64% in Bangladesh to about 16% in children in China. The stunting prevalence is especially high where one out of every two children aged below 5 in South Asia is stunted (Khor, 2003). In India, there are about 2.3 million deaths in children every year and about 41% of these are due to causes related to malnutrition (Sahu, 2015).

The greatest burden of malnutrition lies in Africa. The region solely contributes 39% of the stunted, 10% of the wasted and 24% of the underweight children (Akombi, 2017). Despite a general decline in under nutrition cases in the World by 25% as a result of all the nutrition interventions put in place globally, Africa still records an increase in these cases. There was an increase by 6.5 million in West and Central Africa and by 1.4 million in Eastern and Southern Africa between the year 2000 and 2018 in the number of children who are stunted (Akombi, 2017). In Sub-Saharan Africa, malnutrition in children accounts for about 60% of mortality in under fives (Kandala, 2011). Botswana, for example, had the level of wasting, stunting and underweight as 5.5%, 38.7% and 15.6 % respectively in children under 3 years (Salah, 2006). In Somalia, the wasting and stunting prevalence in those aged between 6 months to 5 years was 21% and 31% correspondingly (Kinyoki, 2015).

1.1.2. Nutritional status trend in Kenya

In Kenya, out of a population of 7 million of children below 5 years, 26% (1.82 million) are stunted, 11% are underweight while 4% are wasted (KNBS, 2015). In assessing the trend in Kenya based on the demographic health surveys conducted from 1998-2014, there has been an advancement in children's nutritional status. There has been a decline in wasting from 7% to 4%, stunting from 38% to 26% and underweight from 18% to 11%(KNBS, 2015).

Prevalence of malnutrition is less in urban areas compared to rural areas (KNBS, 2015). Stunting in Kenya is less in urban areas i.e. 20% in comparison to 29% in rural regions. In the case of underweight, the percentage in rural regions stands at 13% compared to 7% in urban regions. It is also lower among girls (10%) compared to boys (12%). Wasting is also slightly less in urban areas (3.4%) compared to 4.4% in rural areas. While the declines in malnutrition in Kenya have been commendable, now the sustainable development goals (SDG) require that all preventable deaths in children are brought to an end. This calls for a holistic approach to addressing child malnutrition.

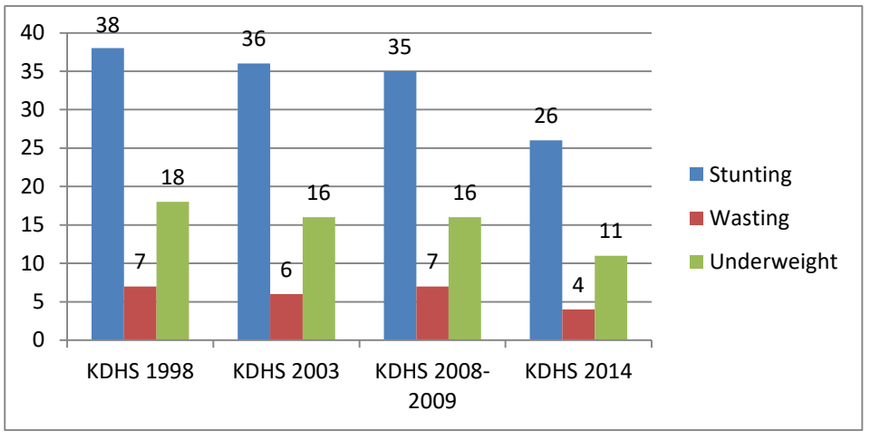

Figure 1: Trend in the nutritional status in children aged 60 months and below (KNBS 2015)

1.1.3. Relationship between breastfeeding and nutritional status

According to WHO out of all the feeding practices, breastfeeding is the single most important method that guarantees child survival and good health (WHO, 2020a). It is an important public health intervention that helps to curb infant and child morbidity and mortality (Lessen, 2015).

Approximately, 600,000 lives are lost annually world over due to discontinuation of breastfeeding and improper complementary feeding. Another 1.3 million people lose their lives as a result of inadequate exclusive breastfeeding (UNICEF, 2013). Breastfeeding therefore provides a crucial linkage between life and mortality in children especially those in low and middle income countries. Breast milk provides all the nutrients, in the right quantity that are needed by a child in the first 6 months. Breast milk directly affects the health of a child as well as its development and growth.

Breastfeeding has been found to be protective against wasting and stunting. There is a clear connection between severe malnutrition and lack of breastfeeding. Children were more likely to be stunted where there was failure to introduce breastfeeding in the first hour after child birth. Those who had discontinued from breastfeeding and were instead put on bottle feeding were almost twice as likely to be wasted (Muchina, 2010). Breastfeeding offers protection against pathologies of various natures; especially those arising from the respiratory and gastrointestinal tract. Babies who are not breastfed have a 17% greater probability of contracting pneumonia than those who have been breastfed. Allergies are less likely to occur in children who have been breastfed compared to those who have not (Issler, 2003).

According to WHO, the feeding practices of value include introduction of breastfeeding within the first one hour after birth, exclusive breastfeeding during the initial 6 months and continuation breastfeeding to 2 years of age (WHO, 2007). This is because breast milk as a biological fluid is active and living and thus cannot be replicated by human milk substitutes. It offers a mixture of proteins, carbohydrates, minerals, living cells, lipids, enzymes and vitamins. By this virtue, it offers immense immunological, nutritional and psychological benefits. Additionally, it contains the perfect proportion of nutrients for brain development (Issler, 2003). Human milk contains defense elements, this in combination with the components of this milk and its purity offers protection against child morbidity and mortality. Thus it is anti-inflammatory, anti- infectious and immuno-modulatory (WHO, 2000).

Globally, only 41% of children are breastfed exclusively during the first six months and 3 of every 5 children are not breastfed in the first hour of life. Approximately 823,000 children's lives would be spared every year if only they were breastfed optimally (WHO, 2020a). Amongst the poorest families 64% of babies are still breastfed at age 2 this is in comparison to only 41% amongst the richest families (UNICEF, 2018).

In Sub Sahara Africa, Central and West Africa have the lowest prevalence of breastfeeding which lies below the WHO's recommendation of 50%. The general prevalence of breastfeeding varies between a low of 37.84% in Central Africa to a high of 69.31% in Southern Africa, and a low of 23.70% in Central Africa to a high of 56.57% in Southern Africa respectively. Generally, the incidence of predominant breast feeding ranges between a low of 17.63% in East Africa and a high of 46.37% in West Africa (Issaka, 2016)

In Kenya, 61% of children were breastfed exclusively during the initial 6months. This rate doubled from the 2008/9 rate of 32%. Specifically, 84% of infants aged 0 to 1 month, 63% in infants from ages 2 to 3 months and 42% in infants aged 4 to 5 months were exclusively breastfed. This shows a sharp decrease in breastfeeding as the infant grows. In comparing regions, breastfeeding duration was the shortest in North Eastern region at 19 months while it was the longest in Eastern at slightly more than 2 years. The WHO recommends that children continue breastfeeding till 24 months, in Kenya however, only half of the children breastfeed until 2 years. As the child grows older, breastfeeding reduces i.e. from a proportion of 88% in children aged 12 to 17 months to 61% in children aged 18 to 23 months (KNBS, 2015).

1.2. Problem Statement

There are 200 million children aged below 5 that are malnourished (UNICEF, 2019). Approximately 6.2 million of such children died of avoidable causes in 2018, with 45 percent of these deaths associated with under nutrition(WHO, 2020b). These statistics are grim, especially considering that deaths due to under nutrition are avoidable. In Kenya, 4% of children under 5 are wasted, 26% are wasted while 11% are underweight. While there are great advancements realized in reducing malnutrition, these rates are still high given that the SDG target to end all preventable deaths in newborns and children.

Malnutrition leads to delayed milestones, subpar growth physically and depleted intelligent quotient (IQ)(Black, 2008). Occurrence of severe malnutrition also weakens the immune system thereby increasing the risk of contracting infections (Mugo, 2019). Incidence of morbidity and mortality and inferior socio-behavioral skills are also associated with malnutrition(UNICEF, 2013). Later in life, the nutritional deficits also manifest as diminished intellectual capacity at learning institutions and the work place, poor reproductive outcomes and poor general well-being during teenage and adulthood (Black, 2008).

Out of all the feeding practices, breastfeeding has been proven as the single most important practice that ensures child survival and good health. It offers immense immunological, nutritional and psychological benefits and contains the perfect proportion of nutrients for child development. Yet in Kenya those that are exclusively breastfed are only 61% of children. Similarly only 52% of children are breastfed up to 2 years(KNBS, 2015).

Many of the studies done previously have concentrated on the predictors and the prevalence of malnutrition (Wainaina, 2004), (Choramo, 2014). The few studies that focus on breastfeeding and nutritional status (Muchina, 2010), (Onyango, 1999) only do so on children under 2 years. Additionally, most of the studies focus on specific geographical areas e.g. Western (Onyango, 1999), (Wainaina, 2004) and Nairobi (Choramo, 2014), (Muchina, 2010). This study will consider the association between breastfeeding and child nutrition for children aged below 5 years and will cover all the counties in Kenya, thus give a national outlook.

1.3. Research Questions

1. What is the association between exclusive breastfeeding for 6 months and the nutritional status of children under 5 years?

2. What is the association between breastfeeding up to 2 years and the nutritional status of children under 5 years?

1.4. Research Objectives

1. To explore the association between exclusive breastfeeding for 6 months and the nutritional status of children under 5 years

2. To explore the association between breastfeeding up to 2 years and the nutritional status of children under 5 years

1.5. Hypothesis

Null hypothesis- Refers to no association between exclusive breastfeeding for 6 months, breastfeeding up to 2 years and the corresponding nutritional status of children under 5 years

Alternative hypothesis- Refers to an association between exclusive breastfeeding for 6 months, breastfeeding up to 2 years and the corresponding nutritional status of children below 5 years

1.6. Justification

This study will be paramount in advocating for optimum feeding patterns in children to curb the scourge of malnutrition and hence achieve the set SDG target to ensure that by 2030 there are no forms of malnutrition.

It will provide evidence for the Ministry of Health as well as all stakeholders involved in child nutrition including UNICEF, WFP and thus foster harnessed efforts in promoting proper child nutrition.

It will support the efforts of various non-governmental organizations whose work is focused on promoting ideal feeding patterns in children at various stages of their lives through exclusive breastfeeding, complementary feeding and supplementation. This study will also add on to literature about infant feeding practices and the corresponding outcomes in children.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

In this section, the literature on feeding patterns and corresponding nutritional status of children under-five years is reviewed. This review is divided into theoretical framework, empirical framework and the overview of literature.

2.2. Theoretical Framework

This section provides a theoretical framework for the determinants of child under nutrition according to UNICEF(2013).

The nutrition, health and physical status of a mother are critical determinants of the status of a child's nutrition. During pregnancy there is an increase in nutrient needs. Nutrient deficiencies may happen as a result of insufficient dietary intake, psychosocial stress of the mother and diseases that decrease appetite and impair absorption of nutrients (Walker, 2011).

The deficiencies in a mother's nutrition lead to poor development of the foetus, low weight at birth and subsequent wasting and stunting of the child. In this case then, there is a direct link between undernourished girls turning out to be undernourished mothers who then produce offspring that have low birth weight (Ozaltin, 2010).

Thereafter, poor feeding practices such as failure to introduce breastfeeding within the first one hour after birth, not breastfeeding exclusively, initiating complementary feeding before six months, giving food that are not nutritionally adequate safe and occurrence of infectious illness like malaria, diarrhea worm infestation will result to very poor nutritional status of the child (UNICEF, 2013). According to the (UNICEF, 2013) conceptual framework in figure 2, direct causes of malnutrition include inadequate care and feeding practices, inadequate dietary intake and diseases. In the short to medium term, malnutrition results to heightened chances of mortality and morbidity in children, compromised motor development, delayed milestones, subpar growth physically and depleted intelligent quotient (IQ). Later in life, the nutritional deficits will manifest as diminished intellectual capacity at learning institutions and the work place, poor reproductive outcomes and general well-being during teenage and adulthood, reduced earning and productivity.

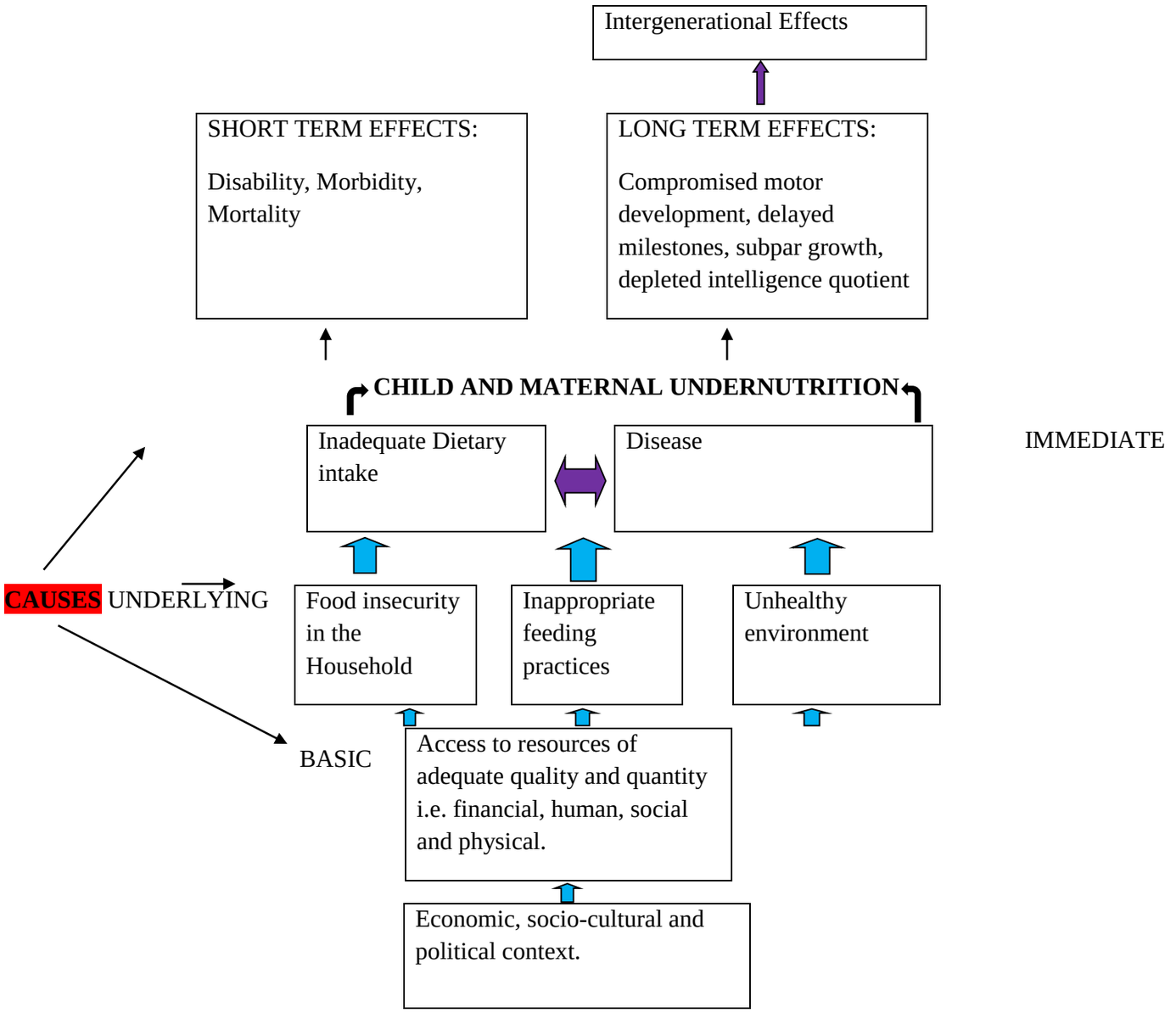

Figure 2: UNICEF determinants of child under nutrition

2.3. Empirical Literature

Lestari (2018) carried out a case-control study with an aim to establish the link between low birth weight and not breastfeeding exclusively breastfeeding in children in Indonesia. Those that had standard nutritional status were in the control category while those with stunting were in the case group. Parents were then questioned on birth weight and history of breastfeeding practices. Following a multivariate analysis there was a statistically significant correlation between low

birth weight and non-exclusive breastfeeding as well as stunting. They concluded that exclusive breastfeeding is important for reduction of the stunting prevalence in children under 5.

Onyango (1999) carried out a longitudinal study to establish the connection between breastfeeding and growth of children between 9-18 months. A total of 264 babies in the western parts of Kenya were followed up for half a year. They were put in three categories as follows; Children that were breastfed from 0 to 49% of the survey duration were considered as breastfed for a short duration, medium duration for those breastfed from 50 to 99% and long duration for those breastfed all through the survey period. The findings were that children that were breastfed for the longest-duration gained 0.6 centimetres and 230 grams more than the ones in the intermediate group and 3·4 centimetres and 370 grams more than the ones in the shortest duration category. This study concluded that it was optimum for breastfeeding continuation until 2 years, more so in those areas that have scarce water supply and poor sanitation.

Muchina (2010) carried out a study to determine the breast feeding methods put in place by mothers and the corresponding status of nutrition of their children. Four health centers in Nairobi city council were selected and a descriptive study was done. The target was a pair of a mother and her child of below 2 years. 418 pairs in total were selected. Out of 99% of the mothers that had breastfed, only 12.6% breastfed their children exclusively. Anthropometric assessments were done on these children; 10.6 % of them were stunted, 2.1% wasted and 6.2% underweight. The study found discontinued breastfeeding and weaning less than 6 months to have a considerable effect on underweight.

Bahl et al. (2005) analyzed patterns of feeding infants and their risk of hospitalization and death in Ghana, Peru and India. They found that infants that are non-breastfed or partially breastfed were at a greater risk of mortality in comparison to infants who had been breastfed predominantly. Non-breastfed infants were at a considerably greater risk of all-cause hospitalization and diarrhea-specific morbidity in comparison to infants who had been predominantly breastfed. The risk of acute lower respiratory infection-specific hospitalization was also higher in this case.

Swar (2016) carried out a study on the prevalence of severe malnutrition in children aged five years and below in Sudan. Out of the number of children affected by severe malnutrition aged 5 years and below 51.4% were male therefore resulting

to female: male ratio of 0.9:1. The average age of children admitted with acute severe malnutrition was 22 months, while those between 3-5 years were least likely to be affected.

Tessema (2013) conducted a study to establish incidence of stunting resulting from feeding patterns in early childhood at the rural region of Sidama, South Ethiopia. It was a cross-sectional study involving 575 participants. Multivariate logistic regression was carried out to evaluate diet practices that result to stunting. 14 percent of mothers were found to feed their babies to the WHO recommended standard. The stunting prevalence was lower in infants aged between 0 and 5 months compared to those aged between 6 and 8 months. Stunting was also higher in children who were started on complementary feeding prior to 6 months of age. Mothers that failed to attend antenatal care had a higher chance to give their babies less than the requisite frequency and dietary diversity. Mothers that were younger than 18 years when their firstborn was born were 86 percent more likely to feed their child less frequently than the older ones. This research concluded that mothers with no access to information on feeding had 3 times more likelihood to not feed their infants according to the recommended practice compared to those who did receive information. The conclusion was that the feeding practices of majority of the mothers were not up to WHO recommended standards, contributing to higher incidence of stunting.

Wainaina (2004) examined the predictors and prevalence of underweight, wasting and stunting in children below 5 years in Western Kenya. They established that while 47% were stunted, 30% were underweight and 7% were wasted. Analysis was conducted using logistic regression. They found that children introduced to complementary feeding very early were more likely to be underweight. They also found that disease especially upper respiratory tract infections within the previous month were mostly among those underweight and also that vaccinations were protective against stunting. Lastly, they found that living with one's own biological parents reduced chances of stunting.

Choramo (2014) carried out a study on the prevalence of malnutrition in children from ages 6 to 59 months in Kangemi and Gichagi areas in Nairobi. They found that the prevalence of chronic malnutrition (stunting) was 27%, acute malnutrition (wasting) was 4.9% and underweight was 12.1%. The study indicated that after 2 years of age, stunting will increase with

age showing that once breastfeeding is halted, the children's nutrition status is affected because the supplementary feeding that is put in practice is inadequate.

In a study carried out by Mahgoub, (2006) it was found that malnutrition was significantly ($p < 0.01$) less in girls compared to boys. The level of stunting, wasting and underweight in children less than three years was found to be 38.7 %, 5.5 % and 15.6 % respectively. Children belonging to single-parent households had a greater possibility to be underweight compared to children living with both parents. As the household's wealth index increased, the likelihood for a child to be underweight decreased significantly ($p < 0.01$). The greater the mother's education level, the decreased incidence of underweight. Ultimately, the underweight occurrence among children reduced significantly as a result of breastfeeding.

Uwiringiyimana (2019) carried out a study to review stunting in Rwanda by analyzing the feeding practices. He collected socio-demographic information and anthropometric measurements on the 138 children aged between 5 and 30 months. The prevalence of stunting was 42 per cent while that of exclusive and continued breastfeeding was 50 and 92 per cent respectively. Stunting was greater in those children older than 12 months. Existence of deworming and breastfeeding exclusively in the 6 months preceding the study substantially reduced the chances of stunted growth.

Suman (2007) carried out a cross-sectional study to determine the link between breastfeeding practices and under nutrition in children in India. Anthropometric assessments were done on 101 children; 58 males and 43 females. Results showed that 50% of the children were breastfed within 24 hours of birth while only 49% were exclusively breastfed for 6 months. As a result, 50% were underweight while 36% were undernourished. It was found that the prevalence of underweight increased with age i.e. 71.4% of the cases of underweight were found in the children between 4 and 5 years. The higher prevalence of underweight i.e. 57.9% was found among rural preschool children compared to urban children.

In a recent study carried out by Mazariegos, (2020) in Guatemala, the prevalence of stunting among children was 2.8 times lower in the richest tertile compared to the poorest tertile and 2.9 times lower in the highest education level compared to the lowest; and 1.7 times lower in the non-indigenous populace compared to the indigenous one.

2.4. Overview of the Literature

Theoretical and empirical reviews have indicated that a child's well-being is influenced by a constellation of interacting factors. For example, exclusive breastfeeding has been found to be important in the reduction of the stunting prevalence in those aged five and below. Continued breastfeeding up to 2 years has helped children gain considerable weight compared to those not breastfed for a similar duration. Stunting and underweight were found to increase with age (Suman, 2007), (Choramo (2014). It was also found that the risks that are linked with not being breastfed in comparison to being exclusively or predominantly breastfed are significantly higher. Infants that are not breastfed or partially breastfed are found to have greater mortality risk in comparison to infants who had been breastfed predominantly (Bahl, 2005). Most of the studies reviewed focus on the predictors and the prevalence of malnutrition (Wainaina, 2004), (Choramo, 2014). The few studies that focus on breastfeeding and nutritional status (Muchina, 2010), (Onyango, 1999) only do so on children under 2 years. All the reviewed studies focus on specific geographical areas e.g. Western Kenya (Onyango, 1999), (Wainaina, 2004) and Nairobi (Choramo, 2014), (Muchina, 2010). Therefore, this study will consider the association between breastfeeding and child nutrition for children aged below 5 years and will cover all the counties in Kenya, thus give a national outlook.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Introduction

This section presents the research methodology on feeding patterns and the corresponding status of nutrition in children under 5 years. This chapter is structured into: (a) theoretical framework, (b) model specification, (c) description of values and measurement, (d) data sources and (e) diagnostic tests.

3.2. Theoretical Framework

This study will use the framework described by Mwabu (2008) and that was initially proposed by Rosenzweig (1983)

A woman's investment in her own health during pregnancy and thereafter acts as an investment in her infant's health (Rosenzweig, 1983). Thus, child health production in utero and the first years of life is entrenched in the mother's utility maximizing behaviour.

The woman maximizes the function of utility as follows;

$$U = U(X, Y, H) \quad \text{.....3.1}$$

X is a commodity that is health neutral, i.e. it yields utility, U, however it has no influence on the foetus/child's health, e.g. the mother's clothing. Y is a behaviour or good that is related to health, it gives the mother utility while affecting the health of the foetus/child e.g. alcohol consumption and smoking. H is the status of health of a child in-utero.

The health production function of the child is as follows;

$$H = F(Y, Z, \mu) \quad \text{.....3.2}$$

Z is a health input that affect child health directly such as investments in child feeding practices e.g. breastfeeding.

μis that part of child health resulting from environmental or genetic conditions that is uninfluenced by parental preferences and actions i.e. the child has no control over.

The mother maximizes 3.1 given 3.2

$$I = XP_x + YP_y + ZP_z \quad \text{.....3.3}$$

I is extra income while Px, Py and Pz are, the price of the health good X that is neutral in nature, consumer good Y that is health related, and investments in child-feeding practices, Z.

Equations 3.1 to 3.3 are further maneuvered to give rise to the health input demand function;

$X = Dx\ (Px, Py, I, \mu)$ ……..……...……..3.4

$Y = Dy\ (Px, Py, I, \mu)$……..……...……..…….3.5

$Z = Dz\ (Px, Py, I, \mu)$…….……..…….3.6.

From equations 3.4-3.6, we can derive the effect of changes in price. Child's health status will therefore depend on price of the three goods.

3.3. Model Specification

The dependent variable in this study is binary and it takes value 1 if a child is underweight and 0 otherwise. This study will estimate a probit model.

We assume there exists an underlying latent variable (propensity for a child to be malnourished)y^*that is related to the explanatory variables (X_i) (Wooldridge, 2010).

It is represented as follows:

$y^* = X_i\beta + \varepsilon$…….…….…….3.7

Where y^* is unobserved latent variable ranging from$-\infty to \infty$

$X_i$is a vector of explanatory variables

β is a vector of estimated parametres

ε is the error term

This latent variable is linked to nutritional status of child as follows:

$y = 1$ when $y^* > 0$

The probability of a child being malnourished as a function of independent variables is as follows:

$P(y=1|x) = P(y *> 0|x) = P(e > -x\beta|x) = 1 - G(-x\beta) = G(x\beta)$……..3.8

Where:

$$G(z) \equiv \Phi(z) \equiv \int_{-\infty}^{z} \emptyset(v)dv$$

Where $\phi(z)$is the standard normal density$\phi(z) = (2\pi)^{-1/2}\exp(-z^2/2)$

The model that is anticipated is;

$y = \alpha_0 + \alpha_1 X1 + \alpha_2 X2 + \alpha_3 X3 + \alpha_4 X4 + \alpha_5 X5 + \alpha_6 X6 + \alpha_7 X7 + \alpha_8 X8 + \varepsilon$……..……..…….3.9

With iyi being the dummy variable for malnutrition i.e. stunting, wasting or underweight

X_1= Exclusive breastfeeding,

X_2= Breastfeeding up to 2 years,

X_3= Age of the mother,

X_4= Child age

X_5=Level of Education,

X_6= Sex of Child

X_7= Marital Status,

X_8= Place of Residence,

X_9= Wealth Index,

X_{10}= Exposure to health information

3.4. Description of Variables and Measurement

Table 1: Variable Definitions, Measurement and Expected Signs

Variables i	**Measurement**	**Expected sign**
Dependent variables		
Stunting	Dummy variable taking value of 1 if a child is stunted, 0 if otherwise	
Wasted	Dummy variable taking value of 1 if a child is wasted, 0 if otherwise	
Underweight	Dummy variable taking value of 1 if a child is underweight, 0 if otherwise	
Independent variables		
Breastfeeding	Dummy variable taking value of 1 if a child was exclusively breastfed and 0 if otherwise. Duration of breastfeeding was measured in months.	Negative (Muchina, 2010)
Age of the mother	Measured in years	Negative (Tessema, 2013)
Level of education	0- No formal education 1- Primary level 2- Secondary level 3- Tertiary level A dummy variable will be created for each category	Negative (Bahl et al., 2005)
Sex of Child	Dummy variable taking value of 1 if the child is female, 0 if male	Negative (Swar, 2016)
Child age	Measured in months	Negative (Suman, 2007), and (Gobane

		Choramo, 2014)
Marital status	Measured as a dummy variable 0 if not married, 1 if married, 2 if widowed and 3 if divorced & separated	Negative (Wainaina, 2004)
Place of residence	Dummy variable taking value of 1 if urban and 0 if rural.	Negative (Suman, 2007)
Wealth index	Dummy variable taking the values 1 if poor, 2 if Middle and if Rich	Negative
Exposure to health information	Measured as a dummy variable equal to 1, if has access to radio/tv 0 if otherwise.	Negative (Tessema, 2013)

3.5. Data Source

This study will use the KDHS dataset from KNBS (2014). This is a nationally representative survey. It had a sample of 40,300 households. At the initial stage, 1,612 clusters were obtained from the master sampling frame. Thereafter, independent selection of samples was done in each stratum, resulting to 25 households per stratum that were interviewed. The target is children under 5 years i.e. those whose birth date is from January 2009 to the study period, that were listed in the household questionnaire. The survey had a total of 21, 435 children aged between 0 and 60 months. 1 per cent of these children were not included as their weight or height data was out of range based on their age, while 3 per cent did not have values for weight or height. Hence, only 96 per cent of the 21,435 children were considered. This study will focus on these children.

3.6. Diagnostic Tests

Multicollinearity is a scenario where all or most of the study variables correlate with one another. Therefore, the Variance Inflation Factors (VIF) and the correlation matrices will be comprehensively explored. The variance inflation factors will be used to tell whether any pair of independent variables are highly correlated giving the magnitude and foci of the collinearity of the pairs of variables shown by the correlation matrix. The null hypothesis is that the correlation coefficient

of a variable is zero. If VIF is greater than 10, it will imply that the null hypothesis of absence of multicollinearity is rejected and vice versa.

Endogeneity is a scenario where a variable that is explanatory correlates with the error term. It arises where a variable that is not observed or omitted confounds both dependent and independent variables in this case the association between not breastfeeding exclusively and stunting may be as a result of selection bias resulting from confounding factors that affect both patterns of breastfeeding and outcomes in child health e.g. genetics. Techniques of instrumental variable (IV) estimation use an exogenous variable which is correlated with the explanatory variable i.e. breastfeeding but not correlated with the dependent variable i.e. stunting to thus remove endogeneity. It will be tested in this study by comparison of the IV estimates and the ordinary least squares (OLS) estimates through their respective regression. This comparison of the models will thus test for endogeneity presence.

Lastly, lack of constant variance will be tested by the use of residual plots i.e. to test for Heteroscedasticity. It arises when the error term's variance varies across observations, resulting to heterogeneity of the variance, thus it is difficult to make a statistical inference. It is normally due to misspecification, and thus robust standard errors are used as an alternative (Wooldridge, 2009). Its existence is eradicated through the use of heteroscedasticity probit regression models or use of standard errors that are robust via software known as STATA.

CHAPTER FOUR: DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS

4.1. Introduction

This chapter contains results obtained from analysis of data. This chapter is structured into: (a) descriptive statistics, (b)pre- and post-estimation analysis, (c) probit analysis, and (d) marginal effects.

4.2. Descriptive Analysis

This section summarizes the descriptive analysis of the various variables used in this research. The total number of observations recorded for all variables ranges from 6598-6806 observations.

12% of the children were underweight, 5% were wasted and 25% were stunted. 13% of the children were exclusively breastfed while the average duration for breastfeeding was found to be 34 months. Average age of the child was 24 months while that of the mother was 29 years. 50.4% of the children were male while 49.6% were female. The mean birth order of the child was 3.5. 83% of the households in the study belonged to married individuals, 7% belonged to unmarried individuals while 7% and 3% belonged to divorced and widowed respectively. 66.1% of the households were in rural areas.

53% of the households had primary education level as the highest level of education attained while secondary and higher level of education was 21% and 7% respectively. 19% of the households had no education. 51.4% of the households were classified as belonging to poor wealth index, 18% middle and 31% rich wealth index. Lastly, 61% of households had access to information.

The highest mean value was duration of breastfeeding (34.33) and the least was the widowed (0.026). Standard deviation can be defined as a measure of dispersion of variables from their mean. The lower the standard deviation, the closer the observations are to the mean. The lowest standard deviation was by the widowed marital status at 0.158, while age of child had the highest standard deviation at 15.856. Most of the variables were categorical variables and therefore, had a maximum value of 1 and a minimum value of 0. Mother's age had a maximum value of 59 months and a minimum value of 0.

Table 2: Descriptive statistics summary

Variable	Observations	Mean	Std. dev.	Min	Max
A. DEPENDENT VARIABLES					

Underweight	6,598	0.115	0.320	0	1
Wasting	6,598	0.049	0.216	0	1
Stunted	6,598	0.253	0.434	0	1
B. INDEPENDENT VARIABLES					
i. MAJOR VARIABLES					
Exclusive Breastfeeding	6,806	0.131	0.337	0	1
Duration of breastfeeding	6,806	34.326	15.176	0	48
ii. CHILD CHARACTERISTICS					
Sex of the child	6,806	1.496	0.500	1	2
Age of the child (in months)	6,806	23.896	15.856	0	59
Birth order of the child	6,806	3.546	2.340	1	15
iii. MOTHER CHARACTERISTICS					
Mothers age (in years)	6,806	29.021	6.761	15	49
Marital status					
Not married	6,806	0.070	0.256	0	1
Married	6,806	0.838	0.368	0	1
Widowed	6,806	0.026	0.158	0	1
Divorced	6,806	0.066	0.248	0	1
iv. HOUSEHOLD CHARACTERISTICS					
Residence	6,806	0.339	0.473	0	1
Education level					
No education	6,806	0.191	0.393	0	1
Primary	6,806	0.528	0.499	0	1
Secondary	6,806	0.211	0.408	0	1
Higher	6,806	0.070	0.255	0	1

Wealth index					
Poor	6,806	0.514	0.500	0	1
Middle	6,806	0.176	0.381	0	1
Rich	6,806	0.310	0.463	0	1
Access to information	6,679	0.610	0.488	0	1

4.3 Pre/Post Estimation Analysis

4.3.1 Multicollinearity Test

Multicollinearity occurs when there is a linear dependence among the independent variables. It causes inflation of the size of the confidence interval as well as the estimated coefficients. This is a violation of the Gauss Markov assumptions. The multicollinearity test is a pre-estimation test and was conducted by obtaining the correlation matrix. The results are presented below.

Table 3: Matrix of correlation

	Stunted	Under weight	Wasting	Exclusive breast feeding	Breast feeding duration	Sex of child	Child age	Mothers age	Marital status	Residence	Education level	Wealth Index	Access to info
Stunted	1												
Underweight	0.4248	1											
Wasting	0.0244	0.3918	1										
Exclusive breastfeeding	-0.0109	-0.0027	0.0025	1									
Breastfeeding duration	0.0262	0.0147	-0.0366	-0.1916	1								
Sex of child	-0.0757	-0.0393	-0.0386	0.0023	0.0179	1							
Child age	0.0929	0.0567	-0.0313	-0.2696	-0.3642	0.0085	1						
Mothers age	0.0123	0.0343	0.0173	-0.0463	-0.046	0.0242	0.2882	1					
Marital status	0.0273	0.024	0.0324	-0.0157	-0.0416	0.023	0.081	0.1278	1				
Residence	-0.0694	-0.0733	-0.0333	-0.0132	-0.0622	-0.0018	0.0485	-0.0553	0.017	1			
Education level	-0.1003	-0.1504	-0.1257	-0.0335	-0.0648	-0.0259	0.0717	-0.0687	-0.0748	0.2586	1		
Wealth index	-0.1323	-0.1372	-0.081	-0.0364	-0.0611	-0.02	0.1034	-0.0054	-0.0217	0.4593	0.4896	1	
Access to info	-0.0698	-0.0997	-0.0865	-0.0207	-0.0343	-0.0049	0.0629	-0.036	-0.0772	0.13	0.3356	0.3813	1

Source: Author's Computation

From the table above we can conclude that there is weak correlation amongst the variables. The highest correlation is recorded at 0.4896 between wealth index and education level.

4.3.2 Variance Inflation Factor (VIF)

As mentioned earlier VIF is post estimation test conducted to test for the presence of multicollinearity. A mean VIF that is greater than 10 is proof of multicollinearity. The table below presents the results of the VIF

Table 4: Variance Inflation Factor

Variable	**VIF**	**1/VIF**
Wealth index	1.69	0.592124
Education level	1.38	0.724414
Child age	1.58	0.632193
Residence	1.28	0.779168
Access to info	1.22	0.817752
Breastfeeding duration	1.43	0.700556
Mothers age	1.12	0.892569
Exclusive breastfeeding	1.08	0.923036
Marital status	1.03	0.970720
Sex of child	1	0.997840
Mean VIF	1.28	

Source: Author's Computation

The mean VIF is 1.28. This is below the recommended mean value of 10. We can infer that multicollinearity is not present in the model.

4.4 Heteroskedasticity

Homoskedasticity is the constant variance of a standard error term. Heteroskedasticity is the opposite of homoskedasticity. It implies standard errors that do not have a constant variance, therefore making them unreliable. The Breusch-Pagan/Cook-Weisberg test was performed as a heteroscedasticity test. It was conducted under a null hypothesis of constant variance. The results have been presented in the table below.

Table 5: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

	Stunted		**Underweight**		**Wasting**	
	Calculated Chi2	Prob>Chi2	Calculated Chi2	Prob>Chi2	Calculated Chi2	Prob>Chi2
	167.66	0.0001	633.99	0.0001	1140.12	0.0001
Hypothesis	H_0: $Constant\ Variance$ H_a: $Unequal\ Variance$					

Source: Author's Computation

The p-value of the chi-squared is 0.001 which is less than the significance level at 1%, 5% and 10%. We reject the null hypothesis and conclude that there is indeed presence of heteroskedasticity in the model. To correct this, we use robust standard errors.

4.5 Probit Analysis

Probit regression was conducted to determine which factors affect the nutritional status of a child. Stunted, Underweight and Wasted were each used as indicators of nutritional status. The regression converged at a log likelihood ratio of -3524.2085 for stunted, -2201.4809 for underweight and -1189.741 for wasted. Each of the models had a p-value of 0.0001 which was significant at the 1% level. Therefore, the model is significant, and the independent variables jointly explain the nutrition status of a child. The pseudo R^2 was at 0.0377, 0.0552 and 0.0687 for the stunted, underweight and wasted model respectively.

Table 6: Probit Regression results

Variable	Stunted	Underweight	Wasting
Exclusive Breastfeeding *(ref: not exclusive breastfeeding)*	0.0404 (0.0543)	0.0259 (0.0662)	-0.0700 (0.0849)
Breastfeeding duration *(ref: less than 2 years)*	-0.1040**(0.0502)	-0.0737** (0.0611)	-0.1586** (0.0891)
Sex_of_child *(ref: male)*	-0.2260*** (0.0345)	-0.1472*** (0.0421)	-0.1785*** (0.0554)
Child_age (in months)	0.01*** (0.0014)	0.0093*** (0.0017)	-0.0021 (0.0022)
Mothers_age (in years)	-0.0048* (0.0027)	-0.0009 (0.0033)	0.0021 (0.0043)
Marital Status *(ref: not married)*			
1. married	0.0246 (0.0714)	0.1958** (0.0984)	0.4067** (0.1587)
2. widowed	0.0043 (0.1272)	0.1611 (0.1576)	0.5627** (0.2177)
3. divorced	0.0972 (0.0964)	0.1815 (0.1266)	0.4971** (0.1880)
Residence *(ref: rural)*	-0.0414 (0.0421)	-0.0379 (0.0529)	0.0479 (0.0694)
Education Level *(ref: no education)*			
1. primary	0.0671 (0.0483)	-0.2710*** (0.0541)	-0.5415*** (0.0681)

2. secondary	-0.1289**(0.0626)	-0.4875*** (0.0762)	-0.4763*** (0.0940)
3. higher	-0.2688*** (0.0931)	-0.6659*** (0.1297)	-1.0125*** (0.2046)
Wealth Index *(ref: poor)*			
2. Middle	-0.2064*** (0.0504)	-0.1079* (0.0617)	0.0560 (0.0828)
3. Rich	-0.3356*** (0.0517)	-0.3421*** (0.0670)	-0.1649* (0.0905)
Access_to_info *(ref: no access)*	-0.0641* (0.0393)	-0.1099** (0.0473)	-0.1277** (0.0626)
Cons	-0.3093** (0.1144)	-0.9093*** (0.1442)	-1.2865*** (0.2073)

Note: Robust standard errors in brackets

* p< 0.1, ** p < 0.05, *** p < 0.01

4.5.1 Discussion of results

Exclusive breastfeeding has a positive correlation to both stunted and underweight but a negative correlation to wasting. But the effects are not statistically significant.

Breastfeeding duration has a negative correlation with stunted, underweight and wasting. The longer the breastfeeding duration, the lower the likelihood of a child being stunted, underweight and wasted.

Sex of child was negatively correlated with all dependent variables and was significant at 1% level. Holding all factors constant, a female child had less probability to be underweight, wasted or stunted compared to a male child.

Age of the child was positively correlated with the stunting and underweight variables at 1% significance. The older the child the more likely they were to be stunted and underweight, holding all factors constant.

Mother's age was negatively correlated with the stunting and underweight dependent variables. It was significant at 10% for the stunted variable. Holding all factors constant, the older the mother the less likely that their child was going to be stunted.

Marital status had a positive correlation with all the dependent variables. The wasted dependent variable was significant at the 5% level for all the marital status dummies as well as the underweight variable for the married dummy. All the rest

were insignificant. Therefore, holding all other factors constant, children belonging to married, widowed or divorced households had greater probability to be wasted compared to children from unmarried households. Additionally, children belonging to married households had greater probability to have underweight children compared to individuals from unmarried households at 5% significance level.

All the nutritional status variables had negative correlation with all the levels of education, except for stunted variable for mothers who had reached primary level of education. All the levels of education were significant at the 1% and 5% level. Holding all other factors constant, mothers who had primary, secondary or higher education were less likely to have children who were underweight or wasted as compared to mothers with no education. Mothers who had higher and secondary school education had less likelihood to have children with stunting compared to those with no education at 1% and 5% significance level.

All the levels of wealth index have a negative correlation with the dependent variables. This is because they have negative coefficients, except for middle index households which were positively correlated with wasting, but not significant. For the rest of the households, children who come from rich and middle wealth index families had less likelihood to be underweight, stunted as compared to those children from poor families at 1% and 5% significance level, holding all other factors constant.

Access to health information has a negative correlation to all the dependent variables. It was significant at the 5% level for underweight and wasting and significant at 10% level for stunting. This means that families have access to information had less likelihood to have underweight, wasted or stunted children as compared to those who did not have access to information, holding all other factors constant.

Residence variable was found to be insignificant at all the levels.

4.6 Marginal Effects

Probability of a child being underweight, wasted or stunted, or not cannot be interpreted directly from our probit model. To be able to do this, marginal effects are computed. The p-value for the marginal effects is 0.000 making it significant at the 1%, 5%, and the 10% level. This leads us to the conclusion that the model is significant by rejecting the null hypothesis. The results have been presented in the table below.

Table 7: Marginal Effects

Variable	**Stunted**	**Underweight**	**Wasted**
Exclusive Breastfeeding *(ref: not exclusive breastfeeding)*	0.0127 (0.0170)	0.0047(0.0119)	-0.0060 (0.0073)
Breastfeeding duration *(ref: less than 2 years)*	-0.0326** (0.0157)	-0.0133** (0.0110)	-0.0136* (0.0076)
Sex_of_child *(ref: male)*	-0.0708***(0.0108)	-0.0266*** (0.0076)	-0.0152*** (0.0047)
Child_age (in months)	0.0037*** (0.0004)	0.0016*** (0.0003)	-0.0002 (0.0004)
Mothers_age (in years)	-0.0015* (0.0009)	-0.0002(0.0006)	0.0002 (0.0004)
Marital Status *(ref: not married)*			
1. married	0.0076 (0.0220)	0.0316** (0.0142)	0.0252*** (0.0069)
2. widowed	0.0013 (0.0392)	0.0254 (0.0257)	0.0409** (0.0183)
3. divorced	0.0309 (0.0307)	0.0290 (0.0202)	0.0338*** (0.0126)
Residence *(ref: rural)*	-0.0130 (0.0132)	-0.0068 (0.0095)	0.0041 (0.0059)
Education Level *(ref: no education)*			
1. primary	0.0217 (0.0154)	-0.0587*** (0.0127)	-0.0642*** (0.0100)
2. secondary	-0.0389** (0.0189)	-0.0939*** (0.0147)	-0.0591*** (0.0119)
3. higher	-0.0766*** (0.0251)	-0.1151*** (0.0177)	-0.0867*** (0.0115)
Wealth Index *(ref: poor)*			
2. Middle	-0.0662*** (0.0157)	-0.0214* (0.0108)	0.0054 (0.0081)
3. Rich	-0.1029*** (0.0153)	-0.0581*** (0.0107)	-0.0132* (0.0069)

Access_to_info *(ref: no access)*	-0.0205* (0.0123)	-0.0197** (0.0085)	-0.0109** (0.0053)

Note: dy/dx for factor levels is the discrete change from the base level.
Robust standard errors in brackets

* p< 0.1, ** p < 0.05, *** p < 0.01

Notes: (1) The dependent variables are stunted, underweight and wasted for children under 5 years.

4.6.1 Discussion of results

The longer the breastfeeding duration the lower the probability of a child being stunted, underweight and wasted by 3.3%, 1.3% and 1.4% respectively, all factors held constant. This corresponds to the study by Onyango, (1999) that children breastfed for 2 years gained considerable height and weight compared to those breastfed for less than 2 years.

A female child had less probability to be stunted, underweight or wasted by 7.1%, 2.7% and 1.6% respectively as compared to a male child, all factors held constant. This is in accordance with the study by Swar (2016) and Mahgoub, (2006).

The older the child, the greater probability for them to be stunted or underweight by 0.4% and 0.2% respectively. This is in accordance with the study by Tessema, (2013), Choramo (2014) as well as by Suman (2007) that malnutrition increases with age because once a child stops breastfeeding their nutrition status is adversely affected due to supplementary feeding that is inadequate.

Mother's age was negatively correlated with the stunted and underweight variables. Holding all factors constant, there is a reduction in probability by 0.2% that an older mother will have a stunted child compared to a younger mother. This corresponds to the study by Tessema, (2013).

The probability of being wasted was higher by 2.5%, 4.1% and 3.4% for children belonging to married, widowed and divorced households respectively compared to children belonging to unmarried households, holding all factors constant. Children belonging to married households had a higher probability of having underweight children by 3.2% compared to children belonging to unmarried households, holding all factors constant. This is unlike the study by Mahgoub, (2006).

All other factors held constant, compared to no education, having primary, secondary or higher education decreases the likelihood of having a child who is underweight by 5.9%, 9.4% and 11.5% respectively. It also decreases the probability of

a child being wasted by 6.4%, 5.9% and 8.7% respectively and lastly having a secondary and higher education decreases the likelihood of having a stunted child by 3.9% and 7.7% respectively. Thus, the higher the level of education, the less likely it is for an individual to have an malnourished child, just as found in the study by Mahgoub, (2006) and Mazariegos, (2020)

The likelihood of a child being stunted reduces by 6.6% and 10.3% in middle and rich households respectively compared to poor households. The likelihood of a child being underweight decreases by 2% and 5.9% in middle and rich houses respectively as compared to poor households. There was a reduction in the probability of being wasted by 1.3% in rich households compared to poor households holding all factors constant. All these are consistent with the findings by Mazariegos, (2020)

Access to health information reduces the probability for stunting, underweight and wasting by 2.1%, 2% and 1.1% respectively. It was also negatively correlated with each of this variables, all factors held constant. This is in accordance with the study by Tessema, (2013).

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter presents summary and conclusion of the study as well as policy recommendations and areas for further research.

5.2. Summary and conclusion

The objectives of this study were to explore the association between exclusive breastfeeding for 6 months and duration of breastfeeding and nutritional status of children under 5 years.

A probit model was used for analysis.

The study finds that breastfeeding duration, gender of the child, child's age, mother's age, level of education of the mother, marital status, wealth index of the household and access to health information are important determinants of a child's nutritional status.

Breastfeeding duration, gender of the child i.e. female, mother's age, level of education of the mother, wealth index of the household and access to health information were significant in reducing the probability of stunting, underweight and wasting. On the other hand, an older child has a greater probability to be underweight and stunted as compared to a younger child; and a child belonging to married, divorced or widowed household has a significantly higher probability of being stunted, underweight or wasted as compared to a child belonging to an unmarried household.

5.3. Policy Recommendations

Given that longer breastfeeding duration was found to reduce the probability of stunting and wasting of a child, all barriers to breastfeeding should therefore be removed. This is by instituting a breastfeeding policy at the workplace that will make provisions for mothers to breastfeed their children or express milk at a room dedicated for this purpose. Employers should also commit to allowing flexible working arrangements for breastfeeding mothers e.g. working from home, job-sharing, flexi-time like working half day for a pre-defined period of time. The Ministry of Health already has formulated a 'Workplace Breastfeeding Policy'. There should now be emphasis on its implementation across places of employment.

Additionally, there should be provision of conditional incentives for mothers who take their children for post-natal care visits in health facilities. This is especially useful to track the growth of a child and take timely corrective action where necessary so as to prevent the occurrence of stunting, wasting or underweight. This has previously been practiced in Siaya County and should be rolled out particularly in those counties with high incidence of malnutrition.

Community Health Workers (CHWs) should be trained on Nutrition module. This will enhance their practice within communities as the first point of contact to mothers with children. They will make information on optimal breastfeeding practices, importance of proper nutrition readily accessible to mothers as this has been found to significantly reduce the probability of stunting, underweight and wasting. CHWs are also in a position to identify children who are malnourished e.g. in households of very young mothers or poor wealth index, as these two were found to significantly increase the probability of stunting, underweight and wasting and thus refer them to health facilities for intervention.

5.4. Area for Further Research

There is need to study the other areas that depict the nutritional status of children beyond stunting, wasting and underweight. These are overweight and obesity especially in light of reduced physical activity in children as a result of lifestyle changes, technology and urbanization. In addition to this, it would be interesting to explore the prevalence of overweight and obesity in children and establish the association of these factors and the incidence of non-communicable diseases like diabetes and asthma in children.

Furthermore, there is need to study the impact of initiation of breastfeeding within the first hour of birth, as is also recommended by WHO and its association with the nutritional status of children under 5 years. Other areas of further research include the nature of complementary and supplementary feeding that is given to children in Kenya and whether its sufficient to meet the nutritional needs these children.

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