NUTRITION KNOWLEDGE AND PRACTICES OF MOTHERS AND THE NUTRITIONAL STATUS OF CHILDREN 6-59 MONTHS IN MALAVA, KAKAMEGA COUNTY, KENYA

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DECLARATION

This thesis is my original work and has never been presented elsewhere for a degree award. All the materials used in this thesis have been acknowledged.

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SUPERVISORS' APPROVAL

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology a thesis entitled "***Nutrition knowledge and practices of mothers and the nutritional status of children 6-59 months in Malava, Kakamega County, Kenya***".

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ABSTRACT

The Kenyan government has been implementing programmes aimed at promoting good maternal nutrition practices through nutrition education programs. Despite the efforts, childhood malnutrition is still a challenge in Kenya with some counties reporting high prevalence than the others. Inadequate or lack of nutrition knowledge and poor nutrition practices may be contributing to malnutrition among children in Kenya. This study aimed at determining the relationship between the nutrition knowledge and practices of mothers and the nutritional status of children aged 6-59 months in Malava, Kakamega County. This was a cross-sectional study conducted in South Kabras, Butali-Chegulo and Chemuche wards of Malava Sub-County. A sample size of 344 mother-child pairs was calculated using Fishers formula and study respondents were recruited through simple random sampling. A semi-structured questionnaire was used to collect quantitative data on socio-demographic characteristics, nutrition knowledge, nutrition practices of mothers and the nutritional status of children aged 6-59 months. Qualitative data was collected using a Focus Group Discussion (FGD) Guide with the mothers. Quantitative data was analyzed using descriptive and inferential statistics of Statistical Package for Social Sciences (SPSS) Version 26. Chi-square, Pearson correlation and binary logistic regression were used to test the relationship between the dependent and independent variables. Child nutritional status data was analyzed using World Health Organization Anthropometric software (WHO Anthro). Content analysis by themes was used to manually analyze qualitative data from FGDs and the data reported verbatim. The socio-demographics and economic status data show that 52.9% of the mothers were aged below 25 years, 46.8% had completed primary education, 83.7% are unemployed, 77.9% earn less than Ksh. 5,000 per month and 85.5% practice farming as their major economic activity. The findings also showed that 95.9% had received information on breastfeeding and 83.4% got the information from hospital. Further, 80.8% of the mothers knew the importance of exclusive breastfeeding while 78.5% knew the correct age for introduction of complementary feeding. On the nutrition practices, 95.3% practiced exclusive breastfeeding. 40.7% were still breastfeeding at the time of this study. The prevalence of stunting, wasting and underweight among the children were 20.9%, 12.5% and 7.5% respectively. There was a positive significant association between overall nutrition knowledge and the nutritional status of children ($p=0.046$, 95% CI). The prevalence of nutrition indicators reported in this were higher compared to the 2022 Kenya Demographic Health Survey report. Significant associations were reported between knowledge on; length of exclusive breastfeeding, number of times to feed children of 6-8 month and 9-11 months and the nutritional status of children. The number of feeds given to a child also had significant association with child nutritional status. Overall nutrition knowledge of mother had a significant relationship and the predictor of child nutritional status. The Ministry of Health in Kakamega County, in collaboration with other ministries and development partners should strengthen mother's nutrition knowledge through community nutrition education.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC   :   Antenatal clinic

BF   :   Breastfeeding

CI   :   Confidence Interval

DDS   :   Dietary Diversity Score

EBF   :   Exclusive Breastfeeding

FGD   :   Focus Group Discussion

GAM   :   Global Acute Malnutrition

GDP   :   Gross Domestic Product

GNR   :   Global Nutrition Report

HAZ   :   Height for Age Z-Score

HBM   :   Health Belief Model

IEC   :   Information Education and Communication

IERC   :   Institutional Ethics and Review Committee

KAP   :   Knowledge, Attitudes and Practices

KCIDP   :   Kakamega County Integrated Development Plan

KCNAP   :   Kakamega County Nutrition Action Plan

KDHS   :   Kenya Demographic Health Survey

KHIS   :   Kenya Health Information Systems

KNAP   :   Kenya Nutrition Action Plan

KNBS   :   Kenya National Bureau of Statistics

MCH   :   Maternal and Child Health

MICS   :   Multiple Indicator Cluster Survey

MIYCN   :   Maternal, Infant and Young Child Nutrition

MMUST	:	Masinde Muliro University of Science and Technology
MOH	:	Ministry of Health
MUAC	:	Mid Upper Arm Circumference
NACOSTI	:	National Commission for Science, Technology and Innovation
NCDs	:	Non-Communicable Diseases
NCHS	:	National Centre for Health Statistics
SDGs	:	Sustainable Development Goals
SPSS	:	Statistical Package for Social Sciences
UHC	:	Universal Health Coverage
UN	:	United Nations
UNDP	:	United Nations Development Programme
UNGNA	:	United Nations Global Nutrition Agenda
UNICEF	:	United Nations International Children's Education Fund
USAID	:	United States Agency International Development
USD	:	United States Dollar
WAZ	:	Weight for Age Z-score
WHA	:	World Health Assembly
WHO	:	World Health Organization
WHZ	:	Weight for Height Z-score

OPERATIONALIZATION OF TERMS

Complementary feeding: Giving other foods in addition to breast milk after the first 6 months of life when breast milk alone is no longer sufficient to meet the nutritional requirements of infants. (WHO, 2010).

Exclusive breastfeeding: In this study, it refers to feeding a child for six complete months with breastmilk only either directly from the mothers' breast or expressed without adding any liquids or solids except mineral supplements, medications, vitamin syrups prescribed by a healthcare professional (WHO, 2010).

Children with good health: In this study, it is used to refer to the children who were sick for a period of two weeks prior to conducting the study.

Household: a group of people, often a family, who live together

Nutrition knowledge : In this study, it has been used to refer to the mothers with children 6-59 months having nutrition information on breastfeeding, exclusive breastfeeding and introduction of complementary foods

Nutrition practices   : This refers to the child feeding, dietary practices and hygiene practices of mothers with children 6-59 months.

Nutritional Status   : The result of anthropometric indices that indicates whether the child is stunted, wasted or undernourished

Overall nutrition knowledge: overall nutrition knowledge means that the different aspects used to measure nutrition knowledge of mothers (Knowledge on breastfeeding, knowledge on exclusive

breastfeeding, knowledge on complementary feeding and knowledge of continuation of breastfeeding after initiation of complementary feeding) were computed in one variable to test their relationship with nutritional status of children.

Overall Nutrition Practices: This refers to the combination of all the nutrition practices that were assessed into one variable

Stunting : A nutritional deficiency expressed by a child having a height below -2 Z-score of the expected height of a reference child of the same age. The child is defined as being short for their age and is an indicator of longitudinal nutrient deficiency.

Underweight : A nutritional deficiency expressed by anthropometric status weight- for- age whereby weight of a child is below -2 Z-score of the expected weight of a reference child (WHO) of the same age

Wasting : A nutritional deficiency expressed by anthropometric status weight- for -height, whereby weight of a child is below -2 Z-score of the expected weight of a reference child (WHO) of the same height. It is an indicator of acute nutritional deficit in the period just prior to the measurements

Z-score : This is an index and a unit of measure of nutritional status used to show how much a value deviates from the median. The weight for length, weight for age and height for age Z-scores are the key indices for measure of nutritional status in this study.

CHAPTER ONE

INTRODUCTION

This chapter provides the information on the background of the study, the statement of the problem, study objectives, research questions, hypothesis, justification and significance of the study. The chapter also discusses the theoretical and conceptual framework of the study.

1.1 Background Information of the Study

Adequate nutrition knowledge has been defined as having awareness and information on nutrition practices such as healthy dietary choices, adequate food intake and having awareness on dietary guidelines and references (Koch *et al.,* 2021). Globally, there are so many sources of nutrition information that are shared for international and local use (Quaidoo *et al.,* 2018). The information materials are designed by reputable international organizations such as the World Health Organization (WHO), United Nation (UN) bodies, Food and Agricultural Organization (FAO), World Food Programme (WFP) among others. In Kenya, dissemination of nutrition information to different target groups is the sole mandate of the Ministry of Health (MOH) who work very closely with several partners in implementation of nutrition education programmes. Specifically for mothers with children aged 6-59 months, the Ministry of Health in partnership with United Nations International Children Education Fund (UNICEF), United States Agency International Development (USAID) and other stakeholders have developed Maternal Infant and Young Child Nutrition (MIYCN) Education guidelines.

The role of nutrition education of mothers in Kenya was initially anchored at the health facility level. However, with the emergence of Community Health Strategy (CHS) the function has been devolved. In Kenya, Community Health Volunteers (CHVs) have been trained by the Ministry of Health on key nutrition messages to educate the community on good nutrition practices (Ochanda, 2017). The key focus on nutrition among children 6-59 months is to alleviate childhood illness and malnutrition through early detection and referral using the CHS systems. Despite the efforts to do sensitization of mothers on proper child nutrition practices in Kakamega County, cases of childhood malnutrition are still being reported (KNBS, 2022; KNBS, 2014).

The 2022 Kenya Demographic Health Survey (KDHS) Survey reported a reduction in national prevalence of malnutrition indicators compared to the 2014 KDHS Statistics. According to the survey, the prevalence of stunting, wasting and undernutrition in Kenya were 17.6%, 4.9% and 10.1% respectively in 2022 (KNBS, 2022). Compared to the 2014 KDHS report, the national prevalence of stunting among children 6-59 months was 26.0%, wasting was 4.0% and underweight was 11.0% (KNBS, 2014). Counties malnutrition data as per the same reports shows that, 12% of the children in Kakamega County were stunted, 6.0% wasted and 7.2% undernourished in 2022 (KNBS, 2022) compared to 28.4% stunted children, 1.9% wasted and 9.0% underweight in 2014 (KNBS, 2014). The county had recorded the highest prevalence of stunting among the Western Kenya Counties and which was higher than national prevalence. A survey by UNICEF showed Kakamega County making efforts in reducing malnutrition among children (UNICEF, 2019). The steady reduction in malnutrition can be attributed to the efforts by the county government of Kakamega to alleviate malnutrition among her children.

Inadequate food intake by children occasioned by poor nutrition practices has been documented as the most pre-dominant immediate cause of poor nutritional status among children (Sukandar *et al.,* 2015). Poor nutrition practices may be because of inadequate nutritional knowledge of the mothers. The knowledge and practices on Breastfeeding (BF) and Complementary Feeding (CF) by mothers are among the most neglected determinants of the child nutritional status. However, they play an important role in the growth of the children. Young child feeding practices by mothers are dependent on the knowledge they have acquired either from schooling or from nutrition education programs. Knowledge on other determinants of malnutrition such as hygiene, food choice, dietary practices, immunization and supplementation with the essential nutrient supplements has also been shown to influence the nutritional status of children (Tasnim & Lusida, 2018). Thus, adequate nutrition knowledge and optimal nutrition practices are important in ensuring optimal nutritional status of children 6-59 months.

1.2 Statement of the Problem

Global statistics of malnutrition indicate that, 150.8 Million (22.2%) children are stunted, 50.5 Million (7.5%) wasted and 38.3 Million (5.6%) overweight (Global Nutrition Report, 2020). Although stunting in children under-five years seems to be declining globally, the numbers in Africa show an increasing trend with significant disparities in progress at the subnational level. In Sub-Saharan Africa, the prevalence of child undernutrition increased from 181 Million in 2010 to 222 Million in 2016 while the prevalence of wasting among children was 13.8 Million children in 2017. Although the prevalence of stunted children declined between 2000 and 2017, the number of affected children increased from 50.6 to 58.7 Million due to population growth (WHO, 2018).Over 5.2 Million children under the

age of five years die from illnesses that are preventable and treatable (UNICEF, WHO, World Bank, 2019). Half of these deaths arise from poor child nutritional status (Matanda *et al.,* 2014).

Undernutrition remains a significant public health concern, particularly in low-income settings such as in Malava, Kakamega County, Kenya. Children with poor nutritional status have lowered immunity making them vulnerable to common childhood ailments such as diarrhea, pneumonia, respiratory diseases and malaria (Ibrahim *et al.,* 2017). Additionally, children who survive from malnutrition experience impaired cognitive functioning, growth faltering and recurrence of malnutrition in later years of life (Bhutta *et al.,* 2017). Although there is growing realization that good dietary practices especially in the first few years of life is important in laying the foundation for good health, they have received little support from the government and development partners (Ayieko & Anyango, 2011). Again, despite numerous interventions aimed at improving child nutrition, a substantial number of children between 6-59 months continue to suffer from undernutrition.

It is widely acknowledged that a child's nutritional status is profoundly influenced by maternal knowledge and practices related to nutrition (Forh *et al.,* 2022). However, there exists a gap in understanding the intricate relationship between maternal nutrition knowledge, practices, and the nutritional status of children in this specific region. Limited research has been conducted to comprehensively assess the nutrition knowledge and practices of mothers in Malava and how these factors impact the nutritional status of their young children. Consequently, there is an urgent need for in-depth, scientifically rigorous

investigation to identify the specific gaps in maternal nutrition knowledge and practices, and to explore their direct correlation with the nutritional status of children aged 6 to 59 months in this community. Understanding the underlying factors contributing to the persistence of malnutrition in this region is vital for developing targeted interventions and evidence-based policies. This study aims to bridge this critical knowledge gap by conducting a thorough examination of the nutrition knowledge and practices of mothers in Malava, Kakamega County, and their direct association with the nutritional status of children aged 6 to 59 months. By elucidating these relationships, the study seeks to provide actionable insights for policymakers, healthcare practitioners, and community stakeholders to develop effective interventions aimed at improving both maternal nutrition knowledge and child nutritional outcomes in this vulnerable population.

In summary, this research addresses the pressing issue of child malnutrition in Malava, Kakamega County, by investigating the nexus between maternal nutrition knowledge, practices, and the nutritional status of young children. By identifying specific areas of deficiency in maternal nutrition knowledge and practices, this study intends to inform evidence-based interventions, ultimately contributing to the overall improvement of child health and nutrition in this community.

1.3 Objectives of the Study

1.3.1 Broad Objective

To determine the relationship between the nutrition knowledge and practices of mothers and the nutritional status of children aged 6-59 months in Malava, Kakamega County, Kenya

1.3.2 Specific Objectives

i. To assess the socio-demographic and economic characteristics of households with children 6-59 months in Malava Sub-County, Kakamega County.

ii. To determine the association between nutrition knowledge of mothers and the nutritional status of children 6-59 months in Malava Sub-County, Kakamega County.

iii. To determine the association between the nutrition practices of mothers and the nutritional status of children 6-59 months in Malava Sub-County, Kakamega County.

iv. To assess the nutritional status of children 6-59 months in Malava Sub-County, Kakamega County.

v. To determine the relationship between overall nutrition knowledge and practices of mothers and the nutritional status of children in in Malava Sub-County, Kakamega County.

1.4 Research Questions

i. What are the socio-demographic and economic characteristics of households with children 6-59 months in Malava Sub-County, Kakamega County?

ii. What is the level of nutrition knowledge of mothers with children 6-59 months in Malava Sub-County, Kakamega County?

iii. What are the nutrition practices of mothers with children 6-59 months in Malava Sub-County, Kakamega County?

iv. What is the nutritional status of children 6-59 months in Malava Sub-County, Kakamega County?

1.5 Hypotheses

1.5.1 Null Hypotheses

i.   There is no significant relationship between the overall nutrition knowledge of mothers with the nutritional status of children aged 6-59 months in Malava Sub-County, Kakamega County.

ii. There is no significant relationship between the overall nutrition practices of mothers with the nutritional status of children aged 6-59 months in Malava Sub-County, Kakamega County.

1.5.2 Alternative Hypotheses

i.   There is a significant relationship between overall nutrition knowledge of mothers with the nutritional status of children aged 6-59 months in Malava Sub-County, Kakamega County.

ii. There is a significant relationship between overall nutrition practices of mothers with the nutritional status of children aged 6-59 months in Malava Sub-County, Kakamega County.

1.6 Justification of the Study

In Kakamega County, few studies have been conducted to evaluate the contribution of mothers' nutrition knowledge and practices to the nutritional status of their children. Some of these studies that have been conducted had inherent design limitations such as inadequate sample size and others were qualitative in nature (Kirichu, 2012) , making it difficult to generalize the results and draw proper conclusions. As per the 2020 Kenya

Health Information Systems data for Kakamega County, Malava Subcounty reports the poorest nutrition indicators for children aged 6-59 months with little research and documentation done from the area (MOH, 2020). The Demographic Health Surveys conducted are generalized for Kakamega County and do not give exact statistics per sub-county. Despite county interventions to salvage the situation, minimal improvement in the health demographics has been reported. The study thus sought to address the gaps in empirical evidence and contribute to new knowledge that may be used by other researchers, policy makers, stakeholders and development partners in Kakamega County in designing and implementing their nutrition programs.

1.7 Significance of the Study

The study provides crucial evidence-based information on the current nutrition knowledge and practices of mothers and the nutritional status of children in Malava Sub-county. Kakamega County. The gaps in nutrition knowledge and practices of mothers identified in this study can be addressed through dissemination of key nutrition messages. This may in turn lead to improvement in their nutritional status of children 6-59 months in Malava Sub-county. The study also contributes to the achievement of the Kakamega County Nutrition Action Plan (KCNAP) 2018-2022 strategic objectives one, three, eight and twelve. The recommendations of the study focus on improving MIYCN practices, promoting optimal access and utilization of safe, adequate and nutritious diets. Again, the study focused on strengthening capacity development for nutrition and enhancing evidence-based decision making through research.

Results from this study may be used in formulation and improvement of nutrition related

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policies in Kakamega County and strategizing on the best approaches to alleviate malnutrition and thus minimizing government expenditures on fighting malnutrition. The findings have been disseminated to the County Ministry of Health and key stakeholders implementing nutrition projects and programmes that aim at nutrition education of mothers and addressing poor nutrition practices in Kakamega County. The study provides appropriate evidence for planning proper interventions and improvement of nutrition service delivery in Malava Sub-County and Kakamega County at large.

The overall goal of the study being to advocate for good health and wellbeing of children 6-59 months through proper nutrition practices by their mothers, it is in line with the Kenyan presidential agenda on Universal Health Coverage (UHC) and the United Nations Development Programme (UNDP) Sustainable Development Goal (SDGs) number two on good health and wellbeing. The study also promotes to the achievement of the United Nations Global Nutrition Agenda (UNGNA), endorsed and owned by the UN agencies on delivering commitment to eradicate malnutrition in all its forms with a specific target to children.

1.8 Scope of the Study

The study was conducted among households in three selected wards within Malava Sub County, Kakamega. The respondents were mothers with children (6-59 months) sampled from the selected households. The study endeavored to comprehensively evaluate the nutrition knowledge among mothers in Malava, Kakamega County. This assessment involved exploring their awareness of fundamental nutritional concepts, exclusive breastfeeding, complementary feeding and continuation of breastfeeding after

introduction of complementary foods. The nutrition practices that were assessed included an examination of breastfeeding initiation and duration, the introduction of complementary foods, dietary diversity, food preparation methods, and adherence to appropriate hygiene standards in child feeding. Key anthropometric indices of height-for-age, weight-for-height, and weight-for-age, which allowed for the identification of cases of stunted growth, wasting, and underweight conditions among children 6-59 months in Malava Sub-county were assessed.

1.8.1 Limitations of the Study

The study relied on self-reported data from mothers and this might have introduced response bias and inaccuracies, as individuals might overstate or understate their knowledge and practices unintentionally. The 24-hour recall that was used in capturing the feeding patterns of a child in the last 24 hours preceding to the study depended on the mothers' ability to remember what they fed their child in the last 24 hours.

1.8.2 Delimitations of the Study

Due to limited time and resources available to the researcher, the study was limited to three wards in Malava Sub-County, Kakamega County. The researcher limited the study to mothers within the selected wards who had children aged 6-59 months as this is the critical age that determines child growth depending on the nutrition care practices. The study was specifically focused on Malava Sub-county and the findings are limited to this geographic area. Extrapolation of results to other regions should be done cautiously.

1.9 Theoretical Model

Many theories have been developed to help researchers understand the behavioral patterns

of various individuals in the society. Behavior change is one of the key factors that helps in determining the success of implementing a policy or program in the community. The Health Belief Model (HBM) is a theory that was developed in 1950's to help health care providers understand the health related behavioral patterns of their patients *(*Jones *et al.,* 2015). Beliefs are individual characteristics that influence the behaviour of a person either positively or negatively. People with different health beliefs have different health behaviors and thus there is a positive association between health beliefs and health behavior (Abraham & Sheeran, 2014). The HBM is also important in monitoring the symptoms and patients' response to a certain disease or treatment offered.
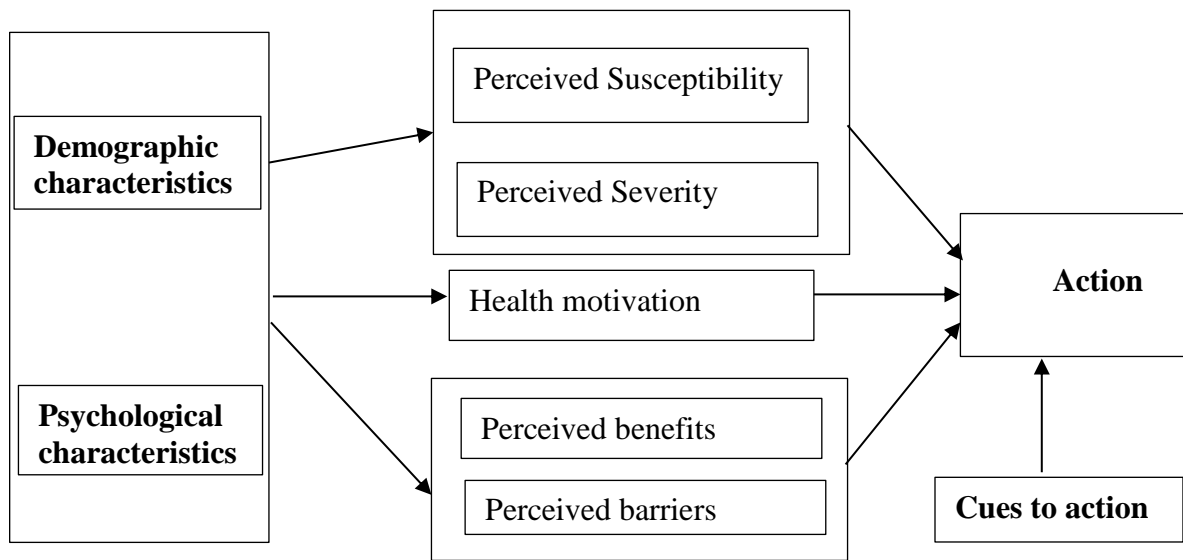
Figure 1.1: The Health Belief Model (Jones *et al.,* 2015)

The Health Belief Model consists of four constructs namely; perceived susceptibility, perceived severity, perceived benefits and perceived barriers, which briefly explains how people responds to certain diseases or treatment. These constructs depend on the demographic and psychological characteristics of an individual in determining the likelihood of engaging in a health promoting behaviour. An individual's knowledge and

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perceptions also determine the practice of certain behavior (Karmacharya *et al.,* 2017).

Some mothers may perceive that their children are at risk of developing malnutrition while others may not. This curiosity calls for action to be taken in order to prevent the condition from occurring. Mothers who believe that their children are at risk of developing malnutrition tend to engage in positive nutritional behaviour, for example proper hygiene and sanitation and adopt a health seeking behaviour such as vaccination and taking their children to hospital for checkup whether they are sick or not to reduce the vulnerability of the disease. People may be resistant about the seriousness of the disease, thus, the knowledge on the risk of developing a disease is not enough for one to take action and leads to perceived severity to the disease. Perceived severity is an assessment of the severity of the health problem in question. When people understand the severity of the disease, they tend to have behavior change that will help them reduce the consequences of the disease. Thus, when mothers learn the severe effects of malnutrition it is hypothesized that they will engage in activities that can help eradicate undernutrition and associated diseases from the community. The mothers should thus be motivated and empowered with knowledge to understand susceptibility and severity of malnutrition to their children.

The perceived benefits are the health-related behaviors that promote health and which motivates an individual to change from negative to positive health and nutrition behaviors based on their health and nutritional status. Thus, when a caregiver learns about the benefits of certain nutrition practices that improve the nutritional status of their children, they are more likely to practice that behaviour. However, there are certain constraints in

adopting health behaviour that improve the nutritional status of children including; cost implication, inadequate tools and personnel for action (Hotz *et al.,* 2016). Thus, there is need to address how to overcome these barriers in order to effectively adopt healthy nutritional behaviors that seek to improve the nutritional status of children.

1.10 Conceptual Framework

A child's nutritional status is determined by several aspects originating from the mothers' level of nutrition knowledge, nutrition care practices such as hygiene and sanitation, complementary feeding, health seeking behaviour and the attitudes of the mother towards the practices. The nutrition knowledge is dependent on the level of education the mother/caregiver has received, whether formal or informal.

INDEPENDENT VARIABLES   **DEPENDENT VARIABLE**

Mothers Socio- economic & demographic factors
- Age
- Gender
- Education level
- Religion
- Marital status
- Average monthly income
- Main source of income
- Occupation

Child Characteristics
- Age
- Gender

Nutritional status of the child

-WAZ status (for underweight)
-HAZ status (for stunting)
-WHZ status (for wasting)

Mothers' nutrition knowledge
- Knowledge on initiation of BF
- Knowledge on Exclusive Breastfeeding
-Knowledge on introduction of Complementary feeding
-Knowledge on hygiene and sanitation

Health status of the child
-Good health status
-Poor health status

Diseases and Infections
(Diarrhea, vomiting malaria)

Nutrition practices
- Breastfeeding practices
- Complementary feeding
- Growth monitoring
- Healthcare seeking behavior
- Hygiene and sanitation practices

Figure 1.2: A Conceptual Framework of Malnutrition Adapted and Modified from the UNICEF Conceptual Framework on the Determinants of Maternal and Child Nutrition, 2020

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides an in-depth review of existing literature on mothers' socio-demographic factors, the nutritional knowledge and practices of mothers, malnutrition in children and assessment of nutritional status of children. The researcher conducted this review with the aim of acknowledging the contribution of other researchers to the topic of study well as to identify gaps in knowledge and address them.

2.2 Socio-demographic Characteristics

2.2.1 Mothers' Level of Education

The education level of a mother is a key determinant of the nutritional status of a child. A mother's level of education and access to information determines whether the mother understands care practices of their children or not. These practices include introduction to complementary feeding, actions to take when the child is sick, micronutrient supplementation among others. Children born to educated mothers have a greater chance of growing healthy and receiving good nutrition care than those of uneducated mothers. Thus, education level determines the mother practices that greatly impact on the nutritional status of their young ones (Kassa *et al.,* 2016).

In Kenya, there is a positive relationship between mothers' education on the nutritional status of children reported. The 2022 Kenya Demographic Health Survey (KDHS) showed that 29.1% of children born to mothers with no formal education are stunted, 17.4% are waster and 22.1% are underweight (KNBS, 2022). This is an improvement from the 2014

KDHS report that showed children born to mothers with no formal education at all had the highest stunting level at 30.6%, wasting level at 10.2% and underweight at 20.6% (KNBS, 2014). The prevalence of the nutrition indicators in both demographic health surveys was reported to reduce with increase in education level. This indicated that the education of the mother plays a vital role in shaping the nutritional status of their children and concluded that an increase in education level indicates a better understanding of nutrition care practices and therefore a decline in cases of under nutrition among children. Contrary, several cases of educated mothers having malnourished children has been reported in Kenya and globally. Malava Sub-county has also reported a high school dropout rate and an increased prevalence of teenage mothers (KCIDP, 2018-2022.

2.2.2 Occupation and Income

In today's world, women are engaged in many economic activities to earn income. The gender disparity on the type of activities women should be engaged in does not exist anymore. Unemployed women spend most of their time performing household duties including childcare. Some studies have showed that, employed mothers due to intense work schedule, do not spend much of their time with their children and may have their children suffer from malnutrition without them noticing compared to unemployed mothers who spend most of their time with their children (Heinrich, 2014; Yeleswarapu & Nallapu, 2012).

Single and widowed mothers have to work for their children having full control of the household income, resources and decision-making on the expenditure on food. Married women with cash earnings are more likely to control use of family income compared to married women without such earnings (UN-WOMEN, 2018). The family income has a

significant contribution to the nutritional status of children and the entire household (Galgamuwa *et al.,* 2017). KDHS 2014 survey on the wealth quantile shows a significant relationship in wealth/income status and the nutritional status of children under 5 years. Families in the lowest quantile had the highest stunting levels at 35.9% compared to those in the middle level at 25.4% and 13.8% for highest wealth quantile (KNBS, 2014). The 2022 KDHS report also shows a similar trend where 27.6% of children from a family in the lowest wealth quintile were stunted as opposed to 8.7% of children from families in the highest wealth quintile.

2.3 Nutrition Knowledge and Practices of Mothers

Studies have shown that children whose mothers have better knowledge on nutrition are properly fed and are not malnourished (Mutisya *et al.,* 2015) suggesting that proper nutritional knowledge, attitude and practices can lead to sound feeding behavior (Kigaru *et al.,* 2015). Nutritional knowledge has been found to be one of the factors that affects the rate of malnutrition and was proposed to be improved to curb malnutrition (Yeganeh *et al.,* 2018). In Africa, the nutrition knowledge, attitude and perception of mothers of children were found to be important determinants of malnutrition at the household level (Neme & Olika, 2018; Fasola *et al.,* 2018). This further suggests the importance of adequate nutrition knowledge and practices in curbing malnutrition.

In Kenya, studies assessing the nutritional knowledge and practices of mothers with children below five years and effects on malnutrition are scarce. A study conducted in Western Kenya indicated that most mothers were aware of importance of breastfeeding and practiced it, but not according to the recommendations of World Health Organization (WHO) thus necessitating this study (Cherop *et al.,* 2009). The WHO and other UN

agencies recommend that children should be exclusively breastfed for a minimum of six completed months thereafter safe and nutritionally adequate foods can be introduced until they turn two years old (WHO, 2017).

In Kitui County, where a high level of stunting was reported by KDHS (2014), most mothers had little knowledge on proper child nutrition with serious gaps on their MIYCN practices. Cultural beliefs is one of the factors that contributes to non-provision of certain nutritious foods to children (Kabura, 2016). Overall, nutrition knowledge, culture, and literacy are important factors when it comes to providing nutrient security to the household in terms of utilization. It also makes it easy for family members to choose nutritious and affordable food they would want to eat and in what ration (Seyedhamzeh & Damari, 2017). There is lack of information on nutritional knowledge and practices of mothers in Malava Sub-County, Kakamega County that can affect negatively on the nutritional status of their children.

2.4 Malnutrition among Children below Five years

The World Health Organization (WHO) in 2016 defined malnutrition as deficiencies, excesses or imbalances in a person's nutrient intake. Although malnutrition in children covers both under nutrition and over nutrition, it is widely used to refer to under nutrition. Under nutrition is characterized by underweight (Low Weight for Age), wasting (Low Weight for Height), stunting (Low Height for Age) and lack of one or multiple micronutrients (micronutrient deficiencies). Over nutrition among children manifests itself in the form of overweight and obesity. (WHO, 2016). Micronutrient deficiencies (hidden hunger) is also a form of malnutrition, which has recently gained a lot of attention in Kenya. This study focused in assessing the children for undernutrition indicators.

2.4.1 Causes of Malnutrition among Children below five years

Malnutrition in children is complex and is characterized by deficiencies or excesses of energy, protein and micronutrients in the body. Inadequate nutrient intake has been broadly been presented as the major cause of malnutrition. However, the UNICEF conceptual framework of malnutrition classifies causes of malnutrition into three broad categories: basic, underlying and immediate causes (Tette *et al.,* 2016). The basic causes of malnutrition include the presence of formal and informal education structure, availability of human, economic and organizational resources, the political, economic and ideological structures. Control of these resources is a key determinant of presence or absence of malnutrition. The underlying causes of malnutrition among children include poor food choices, poor nutrition care practices and poor health service seeking behaviour (UNICEF, 2020).

Inadequate maternal care may result from the mother not receiving essential services during pregnancy such as micronutrient supplementation and default in attendance of clinics. Unhealthy child care practice such not practicing exclusive breastfeeding for six complete months is also an underlying cause of malnutrition. Poor maternal and childcare practices may lead to either inadequate dietary intake or occurrence of a disease and eventually leading to malnutrition and death. The immediate causes of malnutrition and child mortality are inadequate dietary intake of nutrients and presence of diseases. These two causes are mutually dependent as presence of diseases impairs the body's immune system, lowers appetite and leads to decreased nutrient intake leading to malnutrition. Likewise, intake of unsafe and contaminated foods leads to infections of the gastrointestinal tract causing vomiting and diarrhea and this leads to malnutrition or even death of children (UNICEF, 2013).

2.4.2 Consequences of Malnutrition in Children

Malnutrition has both short and long-term consequences on the nutrition and health status of children. Malnourished children are likely to suffer from deficiencies of micronutrient such as Vitamin A, Folic Acid and Zinc. Vitamin A deficiency may cause night blindness, folic acid deficiency may cause neural tube defects while zinc deficiency leads to congenital malformation among others, which manifest as clinical signs. Inadequate nutrition affects the child's health and cognitive development (Nurliyana *et al.,* 2016). Malnourished children have lower cognitive function, delayed motor development and reduced physical growth rate. Adults who suffer from malnutrition in childhood have been recorded to diminish work capacity and experience decreased reproductive performance (De Onis & Branca, 2016). The negative effects of malnutrition are generational, may be passed to the offspring, and may lead to death if not detected and controlled at early stages (UNICEF, 2019).

2.5 Nutritional Status of Children

The first few years of the life of children are critical to their growth and development and is greatly impacted by the availability of nutritious foods (Pushpa & Rani, 2015). The body of a child grows at a faster rate during the first year of birth then slows down. This is followed by spurts of rapid development throughout childhood to adolescence. This requires an adequate dietary intake of healthy and nutritious foods rich in both macronutrients and micronutrients to enhance optimal growth of the body and enhances body's immunity.

The assessment of a child's nutritional status is important as it helps to determine whether the child is malnourished or not. Malnutrition assessment helps to determine the type of

malnutrition and thus determine the best approaches to curb it. There are four methods of nutrition assessment: anthropometric assessment, biochemical assessment, clinical signs and symptoms assessment and assessment of dietary intake patterns. A single or combination of these methods is used in assessing nutritional status of children (Huysentruyt *et al.,* 2015). The nutritional status is determined by conducting a nutrition assessment of the body components i.e. height, weight, circumferences and skinfold thickness.

2.6 Relationship between Nutrition Knowledge, Nutrition Practices of Mothers and Nutritional status of children

Studies have shown a paradigm shift in improving maternal nutrition knowledge and health-seeking behaviors in order to address malnutrition among children under 5 years (Ekwochi et al., 2015; Karnawat et al., 2015). Nutrition knowledge is likely to influence the nutrition practices of mothers and in turn influence the nutritional status of children. Ensuring mothers have a better understanding of foods appropriate for children is crucial in improving the nutritional conditions of children (Bhutta et al., 2013; Black et al., 2013). In a study conducted in Ghana-Accra by Gyampoh et al., (2014), found infant feeding practices was positively associated with mothers having appropriate infant feeding knowledge. Sirasa et al., (2020), in their study among pre-school children in Sri-Lanka, concluded that nutritional knowledge of mothers significantly influenced the eating patterns and behavior of their children. In Ethiopia, mothers who had received adequate nutritional knowledge were 5.5 times likely to practice optimal breastfeeding to their children as opposed to those who did not receive nutritional knowledge (Awoke et al., 2020). In Kenya, much of nutrition capacity building and education of mothers in the

community is carried out by community health volunteers. There might be unaddressed gaps in the dissemination of key nutrition messages and thus leading to mothers having inadequate nutrition knowledge thus leading to poor practices.

Several studies have also shown a positive link between mothers' nutritional knowledge and child nutrition outcomes. In the findings of Angeles-Agdeppa *et al*., (2019) the nutritional status of children significantly improved with improvement in mother's/caregiver's knowledge, attitude, and practices. A study by Saaka, (2014), reported significant association between maternal knowledge of childcare and HAZ score among children between 6-36 months in the Northern region of Ghana. In the same study, mothers with low nutritional knowledge had difficulty practicing appropriate complementary feeding leading to low HAZ scores among their children. Poor transition from exclusive breastfeeding and introduction of complementary feeding has been associated with a high prevalence of stunting in children 12–35 months (Badake et al., 2014). Good maternal nutrition knowledge protects the child from events that lead to low weight-for-age z-score (WAZ) and low height-for-age z-score HAZ (Fadare et al., 2019). These studies show that, nutrition education is very critical in shaping the nutritional status of children aged 6-59 months.

Poor young child feeding practices have been linked to high levels of malnutrition. The World Health Organization (WHO) recommends Exclusive breastfeeding (EBF) for the first 6 months of life (WHO, 2021). This currently considered as one of the most effective ways to enhance children's healthy growth and development. Exclusively breastfed children months better nutritional outcomes than those not exclusively breastfed, improved early child development and reduced morbidity (Khan et al., 2017). The 2014

KDHS by KNBS reported that the mothers in Kenya initiate complementary feeds to their children before the recommended age of six months. By the age of 4-5 months, 58% of breastfeeding children are fed on semi-solid foods and less than half (41%) of children 6-23 months of age receive diets with minimum dietary diversity. The timing of the introduction of complementary feeding and complementary feeding practices are predictors of underweight and wasting among children 6-23 months (Mutuku et al., 2020). Another study by Masuke et al., (2021) reported an increased risk of stunting among children aged 6–24 months with low minimum dietary diversity and an increased risk of stunting, wasting and underweight among children with a low minimum meal frequency.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents an in-depth discussion of the materials and methods used in conducting the study. The researcher has described the study area with the available geographic and demographic information. The researcher has also described the study population, the study variables, the study design and the sampling techniques used. The procedures for data and information collection, data analysis and the ethical considerations have also been described herein.

3.2 Study Area

The study was conducted within three wards from Malava Sub-County in Kakamega County. Kakamega County is one of the 47 counties of Kenya located in the Western Region. The County has twelve sub-counties with a total population of 1,867,579 people (KNBS, 2019). The County has one Teaching and Referral Hospital, nine Sub-County hospitals, nine mission/Non-Governmental Organization hospitals, one private hospital, eight nursing homes and 27 public health centers. Furthermore, the county has one private health center, 66 public dispensaries, 31 private dispensaries and 107 private clinics (KCIDP, 2018-2022). Malava Sub-County is among the twelve sub-counties of Kakamega County, located in former Kakamega North District. The Sub-County borders Lugari Sub-County to the North, Lurambi and Shinyalu Sub-County to the South, Navakholo Sub-County to the West and Uasin Gishu and Nandi Counties to the East. The Sub-County is the largest in size (423.3 km^2) and the most populated among the twelve sub-counties of Kakamega County with a total population of 238,330 people. The sub-

county has seven administrative wards and is the second in the number of households with 51,083 households (KNBS, 2019). Majority of the people in this Sub-County grow sugarcane as a cash crop and maize as food crop and thus farming is the major economic activity in the sub-county (KCIDP, 2018-2022).

3.3 Study Population

The study population comprised of mothers with children aged 6-59 months old residing in Malava Sub-County. The children selected for this study were in good health, that is, had not been sick in the last two weeks preceding this study, as sickness would affect the health and nutritional status of the child and thus affecting the output of the study.

3.3.1 Inclusion Criteria

i.   This study included mothers who have children aged 6-59 months and who were residents of Malava Sub-County in the selected households.

ii.   The study included children who were in good health during the time of the study. This was determined by asking the mother if the child had been sick in the last two weeks prior to the study.

iii. For the mothers with twin children, the older child was included in the study. The older child among the twins was determined by the mother.

iv.   Only mothers who gave consent to participate in the study were included.

v.   For the households with more than one mother with a child aged 6-59 months, all the mothers and children were included in the study.

3.3.2 Exclusion Criteria

i.   The study excluded mothers and children who reside outside Malava Sub-County but were within the selected households in the Sub-County at the time of study.

ii. Mothers who did not give consent for themselves and assent for their children to participate in the study were excluded from the study.

iii. Children below and above the cut off age were excluded from participating in the study.

iv. The researcher also excluded children who were under care of caregivers and not the mothers.

3.4 Study Design

A cross-sectional study that involved collection of both quantitative and qualitative data was adopted in this study. Data was collected on nutritional knowledge and practices of mothers and the nutritional status of children aged 6-59 months in Malava Sub-county, Kakamega.

3.5 Study Variables

3.5.1 Dependent Variables

The dependent variable in this study was the nutritional status of children 6-59 months and was assessed as stunting, wasting and underweight among the children 6-59 months.

3.5.2 Independent variables

The independent variables were the socio-demographic and economic characteristics of the mothers, nutrition knowledge of mothers on exclusive breastfeeding, complementary feeding, hygiene and sanitation, and nutrition care practices.

3.6 Sample size determination and Sampling procedures

3.6.1 Sample Size Determination

The sample size was calculated based on the prevalence of malnutrition in Kakamega County from the 2014 KDHS data. Fisher's *et al.,* (1998) formula was used to calculate the sample size at 95% significance level as follows

$$n = \frac{Z^2 Pq}{d^2}$$

Where;

n was the desired sample size (if the targeted population is greater than 10,000)

Z was the critical value associated with level of significance at 95%

P was proportion of target population estimated to have a particular characteristic. (The prevalence estimates for stunting in children in Kakamega County according to KDHS 2014 data was at 28.4%).

q was the population lacking the feature to be measured (1-0.252 =0.748)

d was the margin of error i.e., 5%=0.05.

q=1-p

n=$1.96^2 \times$ p (1-p) $\div$ d^2 (sample size required)

n=$1.96^2 \times$ 0.284 (1-0.284) $\div$ 0.050^2

= 312 households with children 6-59 months

Considering adding 10% non-response rate, the total study population was 312+ 10% (344)

= 344 households with children 6-59 months

The sample size was proportionately divided among the three wards depending on the number of households per ward. Butali ward had 11,348 households; Chemuche had 12,426 households while South Kabras had 11,010 households. Thus, total number of households was 34,784.

Sampling Frame

The target sample size was proportionally divided among the three study sites as illustrated in Table 3.1. Proportionately, 109 households were sampled in South Kabras ward, 112 households in Butali ward and 123 households in Manda-Shivanga ward.

Table 3.1: Sampling Procedure for Households in Malava Sub-County

S/N	Study site	Targeted sample size (n) (Households)	Percentage %
1	South Kabras Ward	109	31.6
2	Butali Ward	112	32.6
3	Chemuche Ward	123	35.8
	Total	**344**	**100**

3.6.2 Sampling

A multi-stage sampling technique was used in selection of the study sites and sampling of study participants. Kakamega County and Malava Sub-County were purposively selected as the study site due to the high prevalence of malnutrition (28.4%) among children under 5 years reported in the 2014 KDHS compared to other counties in Western Kenya (Kisumu-18.0%, Busia-22.0%, Bungoma-24.4%, Vihiga-23.5% and Siaya-22.7%). Simple random sampling by lottery method was used to sample three wards out of the seven wards in Malava sub- County. This method gave all wards in Malava Sub-County an equal chance of being selected. Households with children aged 6-59 months were

sampled proportionate to the number of households in the ward. Butali-Chegulo ward had 11,348 households, Manda-Shivanga had 12,426 households while Kabras South had 11,010 households (KNBS, 2019). Mothers and children who participated in the study were selected using simple random sampling by lottery method was also used to give the mothers an equal chance of participating in the study. The overall sampling procedure for this study was summarized in Figure 3.1.

```
                    ┌─────────────────────┐
                    │  Kakamega County    │◁──  Purposive sampling
                    └─────────────────────┘
                               │
                    ┌─────────────────────┐
                    │ Malava Sub-County   │◁──  Purposive sampling
                    └─────────────────────┘
                               │
        ┌──────────────────────┼──────────────────────┐
┌──────────────┐      ┌──────────────┐        ┌──────────────┐
│ South Kabras │      │ Chemuche Ward│        │    Butali    │◁── Simple random
│    Ward      │      │              │        │    Ward      │     sampling
└──────────────┘      └──────────────┘        └──────────────┘
        │                     │                       │
┌──────────────┐      ┌──────────────┐        ┌──────────────┐
│     109      │      │     123      │        │     112      │◁── Proportionate
│  Households  │      │  Households  │        │  Households  │     sampling
└──────────────┘      └──────────────┘        └──────────────┘
        │                     │                       │
┌──────────────┐      ┌──────────────┐        ┌──────────────┐
│ 109 Mothers  │      │ 123 Mothers  │        │ 112 Mothers  │◁── Simple random
│ with children│      │ with children│        │ with children│     sampling
└──────────────┘      └──────────────┘        └──────────────┘
```
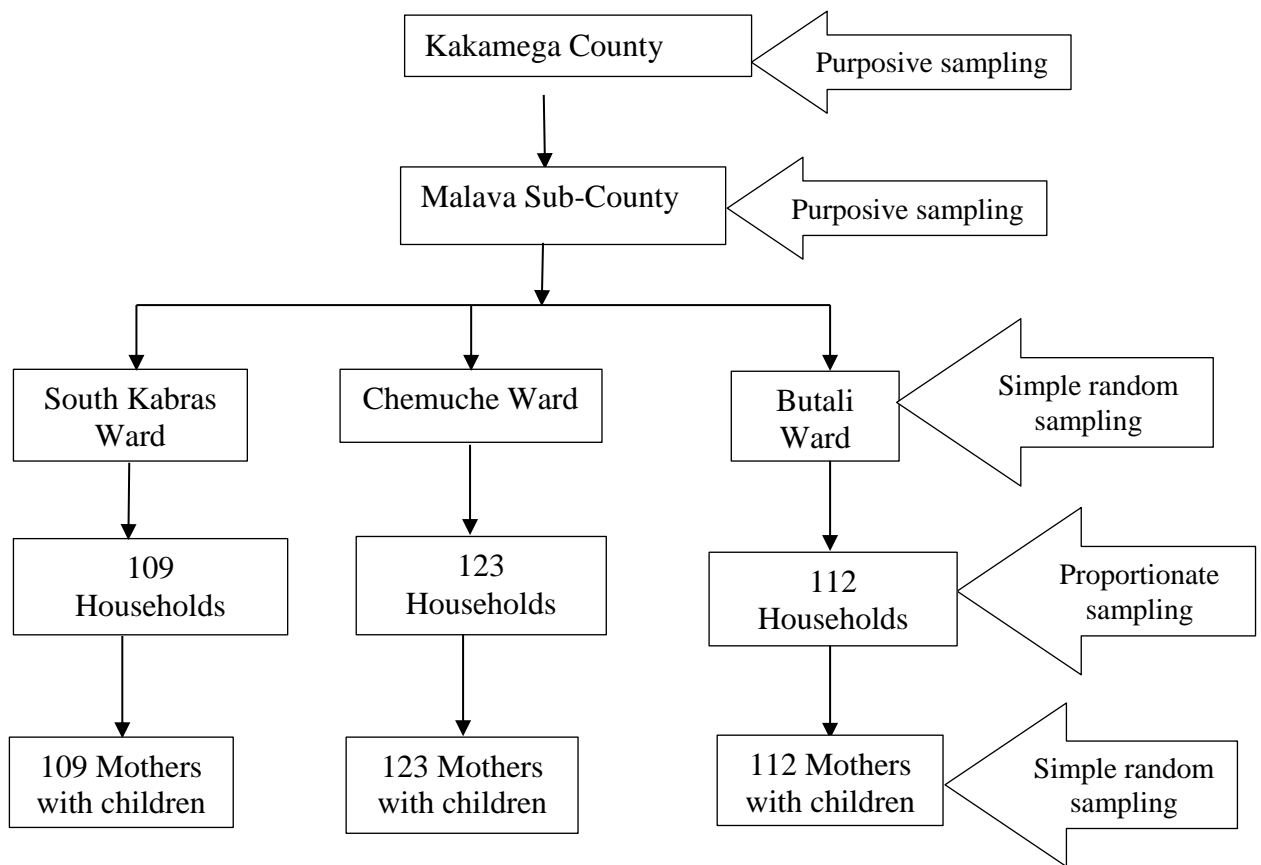
Figure 3.1: Sampling Procedure for Households in Malava Sub-County

3.7 Data and Information Collection Instruments

The researcher first collected quantitative data using a semi-structured questionnaire (Appendix II) and later collected qualitative data using FGD guides (Appendix III). The preliminary results from analysis of the quantitative data informed the data to be collected

using the qualitative methods. Triangulation was used to capture different dimensions of the same phenomenon and to assure validity of the data collected.

3.7.1 Semi-Structured Questionnaire

Quantitative data was collected using semi-structured questionnaire (Appendix II) which was divided into several sections for efficiency in data collection. Part A contained questions on the socio-demographic data and Part B on the nutrition knowledge and practices of the mothers. Part C of the questionnaire contained information on the dietary intake assessment of the children, which was done using a 24-hour recall.

3.7.2 Anthropometric Assessment Form

Information on nutritional status of children was collected in Part D of the questionnaire, which contains the anthropometric assessment.

3.7.3 Focus Group Discussion Guide

A Focus Group Discussion guide in Appendix III was used in guiding FGDs with mothers to get more details regarding the nutritional knowledge and practices of the mothers.

3.8 Data and Information Collection Procedures

The data collection process involved recruitment and training of research assistants who assisted in data collection. The researcher pre-tested the questionnaire in households with children 6-59 months in Lurambi Sub-County. analyzed the data and adjusted the tools based on the feedback obtained. The validated tool was used for data collection.

3.8.1 Training of Research Assistants

The researcher recruited three research assistants who were qualified and licensed nutritionists. The recruitment was based on their ability to communicate with the community in *Kiswahili* and English and their knowledge of the study area. They were trained for two days on the data collection process and data collections tools. The data collection tools were sent to them prior to the training for familiarization. The training programme included; introduction and objectives of the study; overview of the content and comprehension of each item on the questionnaire, Focus Group Discussion guide and observation guide; interviewing skills; research ethics and conduct. The research assistants were trained on pretesting of the data collection tools including a practical demonstration (role-play) on recruiting study participants. Administration of the questionnaires, tracking and checking for completeness was also done to enhance understanding and mastery of the exercise and process. The training was concluded with the preparation of a work plan for carrying out the data collection.

3.8.2 Collection of Data on Socio-demographic and Economic Characteristics

The researcher collected data on the gender of household head, the marital status of the mother, age of the mother, level of education completed, religion, occupation, average household income, main source of income, major economic activity and household food production.

3.8.3 Collection of Data on Nutrition Knowledge and Practices

The research assistants asked the mothers questions that yielded data on the nutrition knowledge and practices of mothers. The nutrition knowledge and practices targeted were on maternal nutrition knowledge, nutrition practices, knowledge on exclusive

breastfeeding practices, knowledge on introduction of complementary feeding, complementary feeding practices, knowledge on immunization, healthcare seeking behaviours and water and hygiene practices.

3.8.4 Collection of Data on Nutritional status

The World Health Organization, 2006 standards of anthropometric data collection was used in this study to collect data on the nutritional status. The age of the child was determined before taking any anthropometric measurement to ensure that they are within the target age. The correct age of the children was confirmed using their maternal and child health (MCH) handbook or by the response from the mother if the MCH handbook was not available. Height, weight and MUAC measurements of the children were taken and recorded in the semi-structured questionnaire. This was used to compute the indices of nutritional status of Weight for Age Z-scores (WAZ), Height for Age Z-scores (HAZ) and Weight for Age Z-scores (WAZ).

Height/length Measurement

Body length was read to the nearest 0.1 cm for children aged 6 to 23 months and those above 24 months who are unable to stand on their own using a horizontal SECA length board that were laid on a flat surface. The child's body length was taken without shoes with the child lying in a recumbent position. Height of children 24 months and above who are able to stand on their own was measured using a vertical wooden height board by placing the child on the measuring board, and child standing upright in the middle of board. The child was standing in an anatomical position with the back of the head, shoulders, buttocks, back of knees and heels touching the board. Two measurements were

taken for each child with minimal clothing and with no shoes and they were averaged to the nearest 0.1 cm.

Weight Measurement

Weight for children who were unable to stand by their own was measured using a salter scale hanged on a strong object to support the weight of the child. For children who were able to stand on their own, weight was measured using a SECA digital weighing scale. Similar to measurements for height, two weight measurements were taken for each child with minimal clothing and with no shoes and they were averaged. All weighing instruments were first calibrated before taking the first measurement by setting it to zero and subsequent calibrations done before taking weight of the next child.

Mid Upper Arm Circumference (MUAC) Measurement

The tip of the child's shoulder was located using fingers and the child's elbow bent to make the right angle. The tape was placed at zero and the number at the tip of the elbow was read to the nearest centimeter, divided by two to get the mid-point, which was marked using a pen on the arm. The child's arm was wrapped using a tape around the mid- point. The readings were recorded to the nearest 0.1 centimeters (WHO, 2006).

Classification of Nutritional status Indicators

The Nutritional status of children were classified according to the World Health Organization (2009) child growth standards. Table 3.2 provides a detailed description.

Table 3.2: Classification of Nutritional status Indicators

Nutritional status Indicator	Cut off values	Term of status
Height for Age Z-scores	< -3 Z-scores	Severe stunting
	≥-3 to <-2 Z-Scores	Moderate stunting
	≥-2 Z-Scores	Normal
Weight for Height Z-Scores	< -3 Z-scores	Severe Wasting
	≥-3 to <-2 Z-Scores	Moderate wasting
	≥-2 to < +2 Z-Scores	Normal
	≥+2 to < +3 Z-Scores	Overweight
	≥ +3 Z-Scores	Obese
Weight for Age Z-scores	< -3 Z-scores	Severe underweight
	≥-3 to <-2 Z-Scores	Moderate underweight
	≥-2 Z-Scores	Normal
MUAC Classification	< 11.5 cm	Severe Acute Malnutrition
	≥ 11.5 to < 12.5 cm	Moderate Acute Malnutrition
	≥ 12.5 cm	Normal

3.8.5 Collection of Qualitative data

The researcher, together with the research assistants conducted three Focus Group Discussions (FGDs) with at least eight mothers in each of the wards. The FGDs were conducted at Emukavakava, Kimang'eti and Shamberere dispensaries in Butali-Chegulo, Chemuche and South Kabras wards respectively. The participants for the FGDs were randomly selected from each of the wards. The purpose of the study was explained to the mothers and those who agreed to participate signed the consent form. The FGD Guide developed by the researcher guided the discussion and each discussion lasted at most sixty minutes and was moderated by the researcher. However, the researcher probed the mothers to provide more information during the discussion. One of the research assistants

took notes during the discussion while the other two recorded audios upon consenting of the participants. A free discussion and full participation was encouraged and all comments were highly appreciated. Information collected was treated as confidential and thus the recordings were neither used for any other purposes nor shared with other people. In order to maintain anonymity and respect the privacy of the respondents, the mothers were assigned unique codes as illustrated in Table 3.3

Table 3.3: Coding of Focus Group Discussion Respondents

SN	WARD		
	Chemuche Ward Respondent Code	**South Kabras Ward Respondent Code**	**Butali-Chegulo ward Respondent Code**
1.	CW_P1	SKW_P1	BCW_P1
2.	CW_P2	SKW_P2	BCW_P2
3.	CW_P3	SKW_P3	BCW_P3
4.	CW_P4	SKW_P4	BCW_P4
5.	CW_P5	SKW_P5	BCW_P5
6.	CW_P6	SKW_P6	BCW_P6
7.	CW_P7	SKW_P7	BCW_P7
8.	CW_P8	SKW_P8	BCW_P8
9.	CW_P9	SKW_P9	
10.	CW_P10	SKW_P10	
11.	CW_P11	SKW_P11	
12.	CW_P12	SKW_P12	
13.	CW_P13		
14.	CW_P14		
15.	CW_P15		
16.	CW_P16		

3.9 Pretesting

The researcher and the research assistants pretested the questionnaires in Lurambi Sub-County to check the clarity and specificity of the questionnaires and their alignment to the study objectives. A population of 10% of the study sample size (344) formed a sample size of 35 respondents for pretesting the questionnaire while eight mothers formed the

sample for the Focus Group Discussion. Subjects for pretesting were purposively selected using the inclusion and exclusion criteria described in Section 3.4.1 and 3.4.2 respectively. The objectives of the study were explained to the respondents and informed consent obtained. Each research assistant was assigned twelve questionnaires for the pretesting. The research assistants asked the mothers questions on socio-demographic characteristics, nutrition knowledge and practices as they filled the questionnaire. They also conducted the nutritional status assessment of the children. The researcher worked along with the research assistants for supervision and quality checks. At the end of the pre-test, a debriefing session for the research team was held to share the challenges encountered during data collection. They also provided feedback on their experience in collecting the data.

The data obtained was analyzed and informed on the modification of the data collection tools. The researcher reduced the number of questions on the data collection to minimize the amount of time required in administering one questionnaire. During the pretesting, it took averagely 45 minutes to administer one complete questionnaire. However, after the modifications, the time it took to administer one questionnaire reduced to averagely 25-30 minutes. Additionally, the flow of the questions was revised to have a proper flow of the questions in the questionnaire. It was noticed during the pretesting that some questions were not properly flowing and that was difficult to ask. The grammar of the questions was also reviewed for ease of understanding by the respondents. The pretesting also helped the researcher estimate how much time it would take to administer one questionnaire to the respondents.

3.10 Validity, Reliability and Quality Assurance

3.10.1 Validity

The data collection tools were subjected to review of nutrition and dietetics technical personnel to ascertain validity of the data collection instruments. The comments of the professionals were considered in the final tool used in the field for pre-test. Results from the pre-test were used to improve validity of the data collection tools.

3.10.2 Reliability

Reliability of the research instruments was done during pre-test. The researcher used a test re-test method to ascertain consistency of the questionnaire. Fifteen respondents were drawn from the thirty-five pre-test respondents and were interviewed on two occasions with a span of one week. The researcher checked for reliability by examining how consistent the test pre-test responses was, then calculated the reliability co-efficient. The researcher obtained a reliability co-efficient of 0.608 and 0.656 for standardized items and was considered as statistically significant and therefore the questionnaire was considered reliable (Griethuijsen *et al.,* 2015; Taber, 2018).

3.10.3 Quality Assurance

The researcher pretested the semi-structured questionnaire before the actual data collection to ensure they addressed the specific objectives of the study. The researcher assistants recruited in this study were licensed nutritionists/dieticians with at least a diploma in nutrition and dietetics. The research assistants were trained on the objectives of the study, the data collection tools and procedures, and were closely supervised by the researcher during data collection process. The researcher screened the questionnaires for

completeness on a daily basis and legibility before accepting them back from the research assistants. All data was cleaned using frequencies and missing values, invalid entries were counter-checked with the responses on the questionnaires for accuracy, and where necessary the respondents contacted for clarification.

3.11 Data Analysis Plan

Quantitative data was cleaned, coded, entered and analysis done in Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics were obtained from analysis of the Socio-demographic data. Data on nutritional status was analyzed using WHO Anthro software. Chi-square test was used to analyze associations between knowledge and practices of mothers and the nutritional status of children. Regression analysis was to test the null hypothesis and test the strength and direction of relationship between knowledge and practices of mothers and the nutritional status of children. Data from Focus Group Discussions with the mothers were manually analyzed using content analysis and were summarized in form of themes. Data was presented in form of tables, charts and bar graphs. Table 3.4 provides a summary of the data analysis and presentation plan.

Table 3.4: **Data Analysis and Presentation**

Objective	Statistical Software used	Statistical tool/ analysis	Data presentation
1	SPSS Version 26	Descriptive and Chi-square analysis (Frequencies and percentages)	Tables
2	Excel 2016 SPSS Version 26	Descriptive and Chi-square analysis (Frequencies and percentages)	Tables, charts and graphs
		Content analysis	Themes
3	Excel 2016 SPSS Version 26	Descriptive and Chi-square analysis (Frequencies and percentages)	Tables, charts and graphs
		Content analysis	Themes
4	WHO Anthro SPSS Version 26	Z-scores	Tables, charts and graphs
5	SPSS Version 26	Regression analysis	Tables

3.12 Ethical and Logistical Considerations

Logistical Consideration

A multilevel approach was used to adhere to the logistical and ethical requirements of conducting research. The Directorate of Postgraduate Studies (Appendix V) at Masinde Muliro University of Science and Technology (MMUST) first approved the study. The researcher later sought an ethical approval from MMUST Institutional Ethics and Review Committee (MMUST-IERC) with approval number MMUST/IERC/200/2021 (Appendix VI). The researcher also obtained a research license from National Commission for Science, Technology and Innovation (Appendix VII). Permission to conduct research in Malava Sub-County was obtained from the County Commissioner (Appendix VIII),

County Director of Health (Appendix IX) and Sub-County Community Health Services Coordinator, Deputy County commissioner at the Sub-County level. Permission to conduct the research at ward level was obtained from the ward administrators. Permission from Village Chiefs, sub-chiefs and local administration (*Nyumba Kumi*) was also obtained before commencing data collection. In the selected households, permission was obtained from the household head and then consent obtained from the mother

Ethical Consideration

An informed consent was obtained from the mothers to ask them questions and carry out nutrition assessment of their children. The mothers were assured of confidentiality of information obtained from them by the researcher. The questionnaires were coded and names of the study participants were not recorded. Privacy during data collection was upheld. The benefits of this study to the participants were explained to them. Participation in the study was purely voluntary and the researcher did not use any methods to induce or coerce mothers to participate. The researcher upheld the ethical principles in conducting the study as summarized in Table 3.5.

Table 3.5: Summary of Ethical Considerations

S/N	Principle	Ethical concern(s)	How it was addressed
1.	Informed consent	Participant informed consent.	The informed consent was explained to the participants. If they agreed to participate, they were requested to give assent for their children aged 6-59 months to participate. Mothers who gave verbal consent and assent signed the consent document.
2.	Voluntary participation	Justice	Selection of households and mothers to participate in the study was through simple random sampling and thus each mother had an equal chance of participating.
		Coercion to participate	Participation in this study depended on the willingness of the mother and no participant was coerced by any means to participate in the study.
3.	Privacy and confidentiality	Identity of mothers /children on questionnaires	The questionnaire did not bear any identity of the mother or the child. The researcher used unique questionnaire codes in data collection and thus did not reveal the identity of the mothers or children.
		Data collection	The study involved taking the height, weight and MUAC of children. This was done in a confidential environment at the household.
		Security of the Data	Raw data in the questionnaires was handled with confidentiality and files were labelled with serial numbers for anonymity. The files were kept in a locked cabinet by the researcher after extraction and only the researcher had access.

4.	Beneficence	Respondents Expectations	Expectations of mothers regarding benefits from the study by either receiving material benefits or other interventions were addressed. This study did not offer any
		Token for participation in the study	direct benefits to the study participants. However, the study findings are expected to contribute important information to policy makers in the county government and
		Feedback to respondents	other stakeholders interested in the provision of services in the management of acute malnutrition. This information was clearly communicated to the study participants during the consenting process.
5.	Risks	Harm to the study participants	The researcher used non-invasive tools in collecting the data. The study participants were therefore at a minimal risk of physical harm.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter summarizes the findings of the study. The results are chronologically presented as per the objectives of the study. The researcher assessed the socio-demographics and the socio-economic characteristics of the households and the demographic characteristics of the children. In addition, the nutrition knowledge and practices of mothers and the nutritional status of children aged 6-59 months in Malava sub-county were assessed and reported. Results for key associations' and relationships between socio demographic characteristics, socio-economic characteristics, mothers' nutrition knowledge, mothers' nutrition practices and child nutritional status are presented.

4.2 Socio-Demographic Characteristics of Mothers

Majority of the households, 290 (81.4%), were headed by males and most of the mothers were married 293 (85.2%). Considering the mothers' age, 88 (25.6%) were aged less than 20 years old, n=94 (27.3%) were aged between 20 to 25 years, and 22.1% (76) were aged between 26 to 30 years. The study also found that 161 (46.8%),103 (29.9%) and 30 (8.7%) respondents had completed their primary, secondary and tertiary education respectively. However, 50 (14.5%) respondents were found to have no formal education. Majority of the study respondents 340 (98.8%) were Christians. The results are detailed Table 4.1.

Table 4.1: Socio-Demographic Characteristics Mothers

Characteristics	Category	n	%
Gender of the household head	Male	290	84.3
	Female	54	15.7
Marital status of mother to child	Married	293	85.2
	Single	29	8.4
	Widowed	13	3.8
	Divorced /Separated	9	2.6
Age of the mother	Below 20 years	88	25.6
	20-25 years	94	27.3
	26-30 years	76	22.1
	31-35 years	46	13.4
	36-40 years	38	11.0
	Above 40 years	2	0.6
Level of education completed	No formal education	50	14.5
	Primary	161	46.8
	Secondary	103	29.9
	Tertiary education	30	8.7
Religion of the mother	Christian	340	98.8
	Muslim	2	0.6
	Hindu	2	0.6

4.3 Demographic Characteristics of Children

Among the 344 children who participated in this study, 189 (54.9%) were boys and 155 (45.1%) were girls. The results summarized in Table 4.2 show the distribution of age as per age groups was as follows; 41 (11.9%) were aged 6-11 months, 117 (34%) were aged 12-23 months and 186 (54.1%) were aged 24-59 months.

Table 4.2: Distribution of Age and Gender of Children

Age of the child	Gender of the child		
	Boys (n, %)	Girls (n, %)	Total (n, %)
6-11 months	18 (5.2%)	23 (6.7%)	41 (11.9%)
12-23 months	60 (17.4%)	57 (16.6%)	117 (34.0%)
24-59 months	111 (32.3%)	75 (21.8%)	186 (54.1%)
Total	189 (54.9%)	155 (45.1%)	344 (100%)

4.4 Economic Characteristics of Households and Mothers

As detailed in Table 4.3, about 288 (84%) of the mothers who participated in the study reported that they do not have any formal employment. This was also accompanied 268 (77.9%) respondents reporting a very low average monthly income of less than Ksh. 5,000. The main source of income for the households was farming reported by 269 (78.2%) and this doubled to be the main economic activity that 294 (85.5%) mothers engage in. A very small proportion, 50 (14.5%), of the respondents engaged in business as an economic activity. Half of the respondents 172 (50%) reported that they do subsistence food crop farming while 111 (32.3%) do cash crop farming. The major food crops grown by 141 (41%) of the respondents were cereal crops which include maize, millet, sorghum while 108 (31.4%) respondents grew vegetables which include *sukuma wiki*, cowpeas, amaranth among others. Sugarcane was the predominant cash crop grown by 113 (32.8%) respondents with about thirty-three percent of the responses as reported in Table 4.3.

Table 4.3: Economic Characteristics of Households and Mothers

Characteristics	Category	n	%
Occupation of the mother	Unemployed	288	83.7
	Self-employed	36	10.5
	Employed	20	5.8
Average household monthly income	Less than Ksh.5,000	268	77.9
	Ksh. 5,001-10,000	56	16.3
	Ksh. 10,001-15,000	2	0.6
	Above Ksh 15,000	18	5.2
Main source of income for the household	Farming	269	78.2
	Business	39	11.3
	Salaried employment	29	8.4
	Casual jobs	7	2
Major economic activity of the household	Farming	294	85.5
	Business	50	14.5
Type of business engaged in	Retail	33	9.6
	Hawking	10	2.9
	Wholesale	7	2.0
	Not applicable	294	85.5
Type of farming	Subsistence farming	172	50.0
	Cash crop farming	111	32.3
	Mixed farming	9	2.6
	Not applicable	52	15.1
Food crops grown	Cereal	141	41.0
	Vegetables	108	31.4
	Legumes and nuts	17	4.9
	Not applicable	78	22.7
Cash crops grown	Sugarcane	113	32.8
	Tea	2	0.6
	Not applicable	229	66.6

4.5 Nutrition Knowledge of Mothers

The researcher investigated the knowledge of the mothers on breastfeeding and complementary feeding.

4.5.1 Knowledge of Mothers on Breastfeeding

As illustrated in Figure 4.1, 330 (95.9%) of the mothers reported that they had received information on breastfeeding. The researchers investigated further to understand where the mothers get the information and 290 (84.3%) mothers reported they got the information from the hospital. This also came out during the FGD at Butali-Chegulo Ward where a mother reported that;

"Tukienda hospitali clinic ya mtoto huwa tunapewa mafunzo ya malezi bora." (BCW_P6 -Mother from Emukavakava, Butali-Chegulo Ward FGD)

Translation

"We usually have nutrition education sessions every time we visit the hospital for our antenatal and MCH clinics."

On investigating where and who gives the information to the mothers, 314 (91.3%) reported that they get information from hospitals, information and is given by healthcare workers at the hospital and 31 (9%) respondents got the information at the community from the community healthcare workers. During the FGDs, one of the mothers reported;

"Kuna wale tulijiandikisha kwa mradi ya Oparanya Care. Huwa tunatumiwa message za malezi bora kwa simu. Saa zingine wanatuma message kwa Kiswahili, saa zingine kwa Kiluhya." (CW_P13 - Mother from Kimangeti, Chemuche Ward).

Translation

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"For those of us registered with Oparanya Care, we receive messages in our phones on how to take care of our babies. The messages are mostly in Kiswahili and sometimes in Luhya"
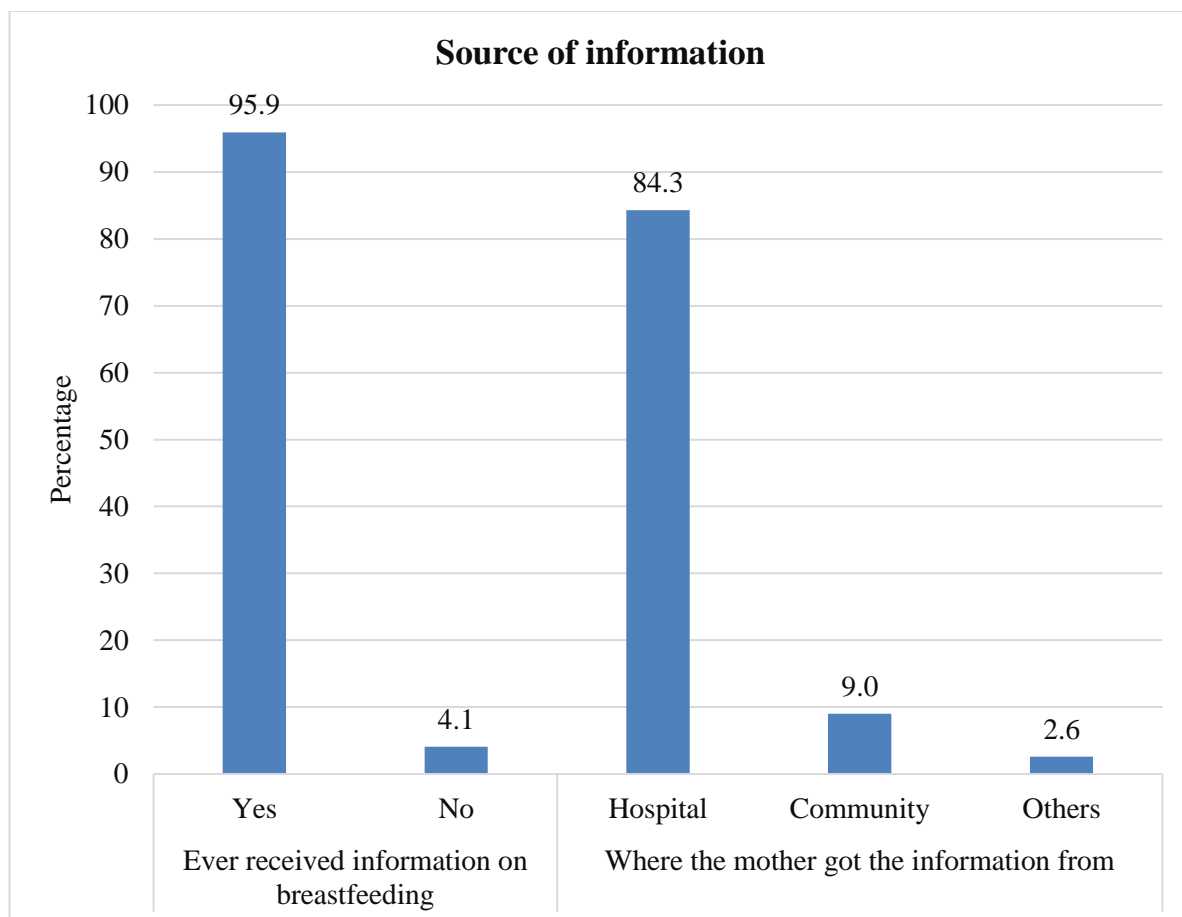
Figure 4.1: Source of Information on Breastfeeding

Majority of the mothers, 287 (83.4%), reported to receive information on breastfeeding from the hospital get it during the Antenatal Clinic (ANC) visits of the baby. Very few mothers, 5 (1.5%), get the information on breastfeeding during the non-perinatal period. These results are illustrated in Figure 4.2.

When the information on breastfeeding is received.
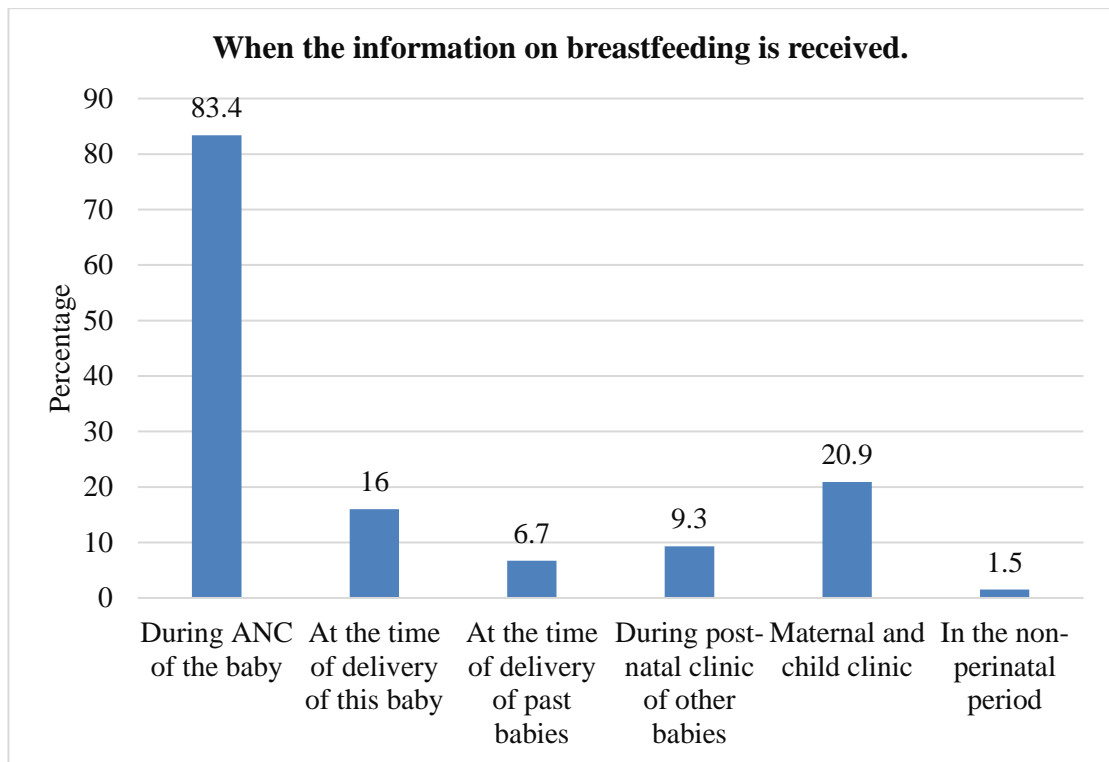
Figure 4.2: Period When Mothers Received Information on Breastfeeding

The researchers investigated the mothers' knowledge on time taken to initiate breastfeeding after a safe delivery. The results show 255 (74.1%) respondents knew that breastfeeding should be initiated within 30 minutes after safe delivery and 78 (22.7%) knew breastfeeding should be initiated in less than 24 hours but after one hour

4.5.2 Knowledge of Mothers on Exclusive Breastfeeding

The researchers found 315 (91.6%) respondents had adequate knowledge on Exclusive Breastfeeding (EBF) for six completed months. Further, investigation on the mothers' understanding of the importance of exclusive breastfeeding showed that 278 (80.8%) respondents knew breast milk is healthy and protects the baby against infections. Additionally, 162 (47.1%) respondents knew that breastmilk has all the nutrients the child requires. Among the respondents, 30 (8.7%) mothers did not know any importance of breastfeeding at all. The results are presented in Figure 4.3
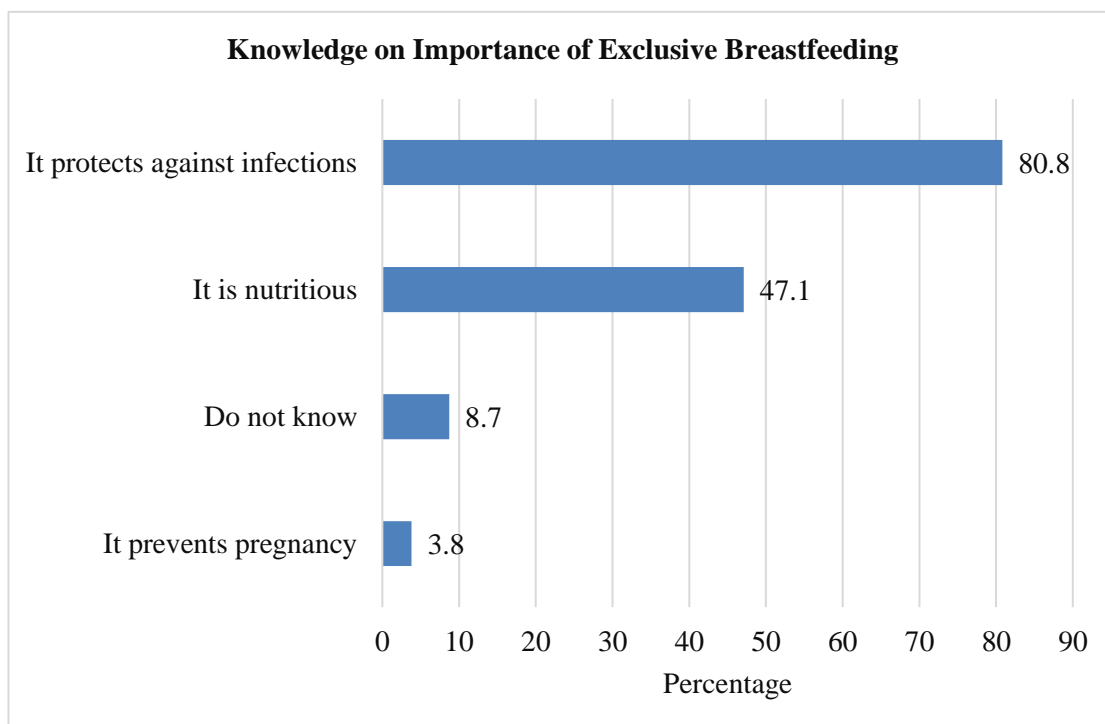
Figure 4.3: Knowledge of Mothers on Importance of Exclusive Breastfeeding

During the FGDs, one of the mothers reported;

Tuliambiwa maziwa ya mama huwa mzuri kwa mtoto. Nilikuwa nahofia nikimpea chakula zingine kabla afikishe miezi sita ataanza kuwa na mashida ama awe mgonjwa. (BCW_P3 - Mother from Emukavakava, Butali Chegulo Ward)

Translation

"I was told that the breastmilk is safe and healthy for the baby. I had fears that when I give my child other foods before six months, my child will develop complications or become sickly".

This demonstrates there is some level of understanding of the importance of breastfeeding among the mothers in Malava Sub-county.

4.5.3 Knowledge of Mothers on Complementary Feeding

As detailed in Table 4.4, 270 (78.5%) respondents knew the correct age of introduction of complementary feeding. This was also reported during the FGDs where one of the mothers said;

"Tuliambiwa tuwe tunaanzia kupea watoto chakula zingine wakifika miezi sita, lakini imekuwa ngumu kwa sababu ya mashida mingi." (CW_P9 - Mother from Kimangeti, Chemuche Ward)

Translation

"We have been told that we should begin giving other foods to our children after 6 months. However, some of us do not practice this due to a number of challenges".

However, 74 (21.5%) respondents did not have information on when they should initiate complementary feeding to their children. On investigating the knowledge of the length of continuation of breastfeeding after introduction of complementary feeding, 201 (58.4%) respondents were aware while 143 (41.6%) respondents did not know for how long breastfeeding should continue after introducing complementary feeds. The researcher asked the mothers during FGDs the challenges they encountered when introducing complementary foods. One of the mothers said;

"Mtoto wangu alianza kuhara hadi ikabidi nimpeleke hospitali." (SKW_2 - Mother from Shamberere, South Kabras Ward).

Translation

"My child experienced severe diarrhea and I had to take him to the hospital.

Another mother added;

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"Mimi mtoto wangu alikataa chakula zingine. Ilibidi nimnyime kunyonya ndio aanze kukula." (SKW_P5 - Mother from Shamberere, South Kabras Ward).

Translation

"My child refused to eat the other food, I had to deny him the breastmilk so that he starts feeding".

The researcher also investigated if the respondents knew the types of foods that should be given to children at different ages. A standardized list of foods given at different ages was obtained from the Ministry of Health Complementary Feeding guidelines and was used to compare with the responses given by the mothers. Almost all the mothers knew the foods that should be given to children at 6-8 months with 338 (98.3%) respondents, 9-11 months with 331 (96.2%) respondents and 12-59 months with 341 (99.1%) respondents. They reported to commonly feed their children with porridge, mashed potatoes, mashed *ugali* with cow milk. The researcher further investigated the knowledge of the mothers on improving the quality of the complementary foods through either mixing of ingredients from different food groups or germination of cereal products before processing. Three hundred and forty one (72%) respondents had knowledge on mixing of ingredients while only 14 (4.1%) mothers had knowledge on germination of cereal products before processing to make complementary foods for the children.

Table 4.4: Knowledge of Mothers on Complementary Feeding

Variable	Categories	n	%
Introduction of Complementary Feeding (CF)	Know	270	78.5
	Do not know	74	21.5
Length of BF after introduction of CF	Know	201	58.4
	Do not know	143	41.6
Know foods to feed 6-8 months child	Yes	338	98.3
	No	6	1.7
Know foods to feed 9-11 months child	Yes	331	96.2
	No	13	3.8
Know foods to feed 12-59 months child	Yes	341	99.1
	No	3	0.9
Mix ingredients when preparing food for your child	Yes	249	72.4
	No	95	27.6
Germinate cereal products before processing	Yes	14	4.1
	No	330	95.9

4.6 Nutrition Practices of Mothers

4.6.1 Child Feeding Practices

Table 4.5 summarizes the results for the Nutrition practices of mothers in Malava Sub-county. The results show that 328 (95.3%) mothers had exclusively breastfed their children for six months. At the time of this study, 140 (40.7%) mothers were still breastfeeding their children. The researcher investigated the practices on the length of breastfeeding of the children by the mothers. Among the respondents, 22 (6.4%), did not practice exclusive breastfeeding as they introduced other foods to their children before attaining six months. During the FGDs, the researcher investigated why some mothers did not practice EBF. One of the mothers said,

"Ingawaje tumeelimishwa kuhusu kunyonyesha watoto kwa miezi sita, imekuiwa ngumu kuzingatia kwa sababu ya matatizo kadhaa. Kwa mfano, unapata mama hana maziwa ya kutosha kwa sababu hakuli chakula ya kutosha. Sasa inabidi apee mtoto chakula ingine. (CW_P16 - Mother from Kimangeti, Chemuche Ward).

Translation

"Although we have been educated on breastfeeding our babies for six months, it is challenging for some of us. Sometimes a mother does not have adequate milk for breastfeeding the child due to inadequate food intake. They opt for introduction of other foods to their children"

Another mother added;

"Saa zingine unapata mtoto tu mwenyewe anataka kukula na huwezimkataza. Sasa inabidi napea tu chakula." (CW_P5 - Mother from Kimangeti, Chemuche Ward).

Translation

"Sometime the child wants to feed and you cannot deny them. So I just opt to give them the food"

Other mothers reported to have breastfed their children at different ranges of months as summarized in Table 4.5. Three hundred and fourteen (91.3%) respondents reported to have been breastfeeding their children from both breasts. Other nutrition practices the researcher investigated were the practice of bottle-feeding and expressing breastmilk for feeding the child later. The results show 86 (25%) mothers practiced bottle-feeding and nine (2.6%) mothers expressed breastmilk for their children. The results also show that 319 (92.7%) mothers continued breastfeeding their children even after introduction of complementary feeding.

Most of the children, 309 (89.8%) were fed by their mothers with a few being fed by their fathers, family relatives and caretakers as illustrated in Table 4.5. The researcher also investigated the hygiene practices of the mothers when preparing food and feeding their children. The results show majority of the 326 (94.8%) mothers washed their hands. Three hundred and thirty (95.9%) washed their hands with plain water while 264 (76.7%) respodnents used water and soap before preparing food and when feeding

their children. Nutrition practices that motivate the child to eat food were also investigated. A proportion 328 (95.3%) respondents watched their child eat while 262 (76.2%) encouraged the child to eat through practices such as playing with the child singing and clapping for the child.

Table 4.5: Nutrition Practices of Mothers

Characteristics	Responses	n	%
Exclusively breastfed the child	Yes	328	95.3
	No	16	4.7
Currently breastfeeding the child	Yes	140	40.7
	No	204	59.3
Length of breastfeeding	Less than 6 Months	22	6.4
	6-10 Months	20	5.8
	11-15 Months	46	13.4
	16-20 Months	60	17.4
	21-24 Months	54	15.7
	Above 24 Months	13	3.8
Breastfeed from both breasts	Yes	314	91.3
	No	30	8.7
Expressed breast milk for the child	Yes	9	2.6
	No	335	97.4
Practice bottle feeding	Yes	86	25.0
	No	258	75.0
Continued breastfeeding after introduction of complementary foods	Yes	319	92.7
	No	25	7.3
Who feeds the child	Mother	309	89.8
	Father	9	2.6
	Family relative	19	5.5
	Caretaker	7	2.1
Wash hands before feeding the child	Yes	326	94.8
	No	18	5.2
How the cleaning is done	Use plain water	330	95.9
	Use water and soap	264	76.7
	Use wet towel	7	2
	Use wet wipes	2	0.6
Watch the child eat	Yes	328	95.3
	No	16	4.7
Encourage child to finish all food	Yes	262	76.2
	No	82	23.8

4.6.2 Number of meals consumed by Children

Table 4.6 show that across the age groups, children aged 6-11 months consumed at least one meal and at most five meals in a day while those aged 12-23 and 24-59 months consumed at least 1 to 6 meals in a day. Majority of the children across all age groups consumed an average of three meals in a day.

Table 4.6: Number of meals consumed in a day

Age of the Child	Number of meals consumed in a day					
	1	**2**	**3**	**4**	**5**	**6**
6-11 months	1 (0.3%)	4 (1.2%)	21 (6.1%)	8 (2.3%)	7 (2.0%)	0 (0.0%)
12-23 months	1 (0.3%)	1 (0.3%)	55 (16.0%)	31 (9.0)	23 (6.7%)	6 (1.7%)
24-59 months	1 (0.3%)	1 (0.3%)	69 (20.1%)	53 (15.4%)	56 (16.3%)	6 (1.7%)
Total	3 (0.9%)	6 (1.8%)	145 (42.2%)	94 (27.3%)	86 (25.0%)	12 (3.5%)

As detailed in Table 4.7 majority of the children aged 6-59 months consumed foods majorly from four food groups, these were; grains, grain products and other starch staples reported by 341 (99.1%) respondents, dairy and dairy products reported by 331 (96.2%) respondents, vegetables reported by 314 (91.3%) respondents and fats and oils reported by 312 (90.7%) respondents. However, the study reported a low consumption of flesh foods such as meat, meat products, poultry, fish and *omena* as reported by 81 (23.5%) respondents, pulses such as dried beans, peas, lentils, nuts and seeds as reported by 60 (17.4%) respondents, eggs and egg products as reported by 9 (2.6%) respondents and fruits reported by 7 (2.0%) respondents. The mean calorie intake per day by age of the children was as follows; 6-11 months =733 kcal/day, 12-23 months=892 kcal/day and 24-59 months = 1078 kcal per day.

Table 4.7: Consumption of foods from different food groups by Children

Food items	Age in months			
	6-11 n, %	12-23 n, %	24-59 n, %	Total n, %
Grains, grain products and other starch staples	41 (11.9%)	116 (33.7%)	184 (53.5%)	341 (99.1%)
Dairy and dairy products	35 (10.2%)	114 (33.1%)	182 (52.9%)	331 (96.2%)
Vegetables	27 (7.8%)	107 (31.1%)	180 (52.3%)	314 (91.3%)
Fats and oils	27 (7.8%)	109 (31.7%)	176 (51.2%)	312 (90.7%)
Flesh foods (Meat, meat products, poultry, fish and omena)	6 (1.7%)	28 (8.1%)	47 (13.7%)	81 (23.5%)
Pulses (dried beans, peas, lentils, nuts and seeds)	4 (1.2%)	22 (6.4%)	34 (9.9%)	60 (17.4%)
Eggs and egg products	1 (0.3%)	0 (0.0%)	8 (2.3%)	9 (2.6%)
Fruits	0 (0.0%)	3 (0.9%)	4 (1.2%)	7 (2.0%)
Mean Calorie Intake per day	733cal/day	892kcal/day	1078kcal/day	

4.7 Nutritional status of Children

4.7.1 Nutritional status of Children by Height for Age Z-Scores

The Height for Age Z-Scores was used to establish the prevalence of stunting among children 6-59 months in Malava Sub-county. The prevalence of stunting was established based on the gender and age of the children.

4.7.1.1 Height for Age Z-Scores by Gender

The researchers found the prevalence of stunting (<-2 Z-scores) to be at 20.9% (n=72, 7.0-48.3 95% CI). Boys were more stunted [(n=47) 24.9% (8.5-54.1 95% CI)] than girls [(n=25) 16.1% (4.0-47.0 95% CI)]. The researchers observed that moderate stunting (between ≥-3 Z-scores and <-2 Z-scores) [(n=44) 12.8% (5.6-26.6 95% CI)] was more predominant than severe stunting (<-3 Z-scores) [(n=28) 8.1% (1.4-35.1 95% CI)]. The prevalence of moderately stunted boys was 14.3% (n=27. 4.2-38.7 95% CI) while 11.0% (n=17, 5.3-21.4 95% CI) girls were moderately stunted. Severe

stunting among boys was at 10.6% (n=20, 2.6-34.9 95% CI) and among girls was 5.2% (n=8, 0.4-43.7 95% CI). The results were presented in Figure 4.4
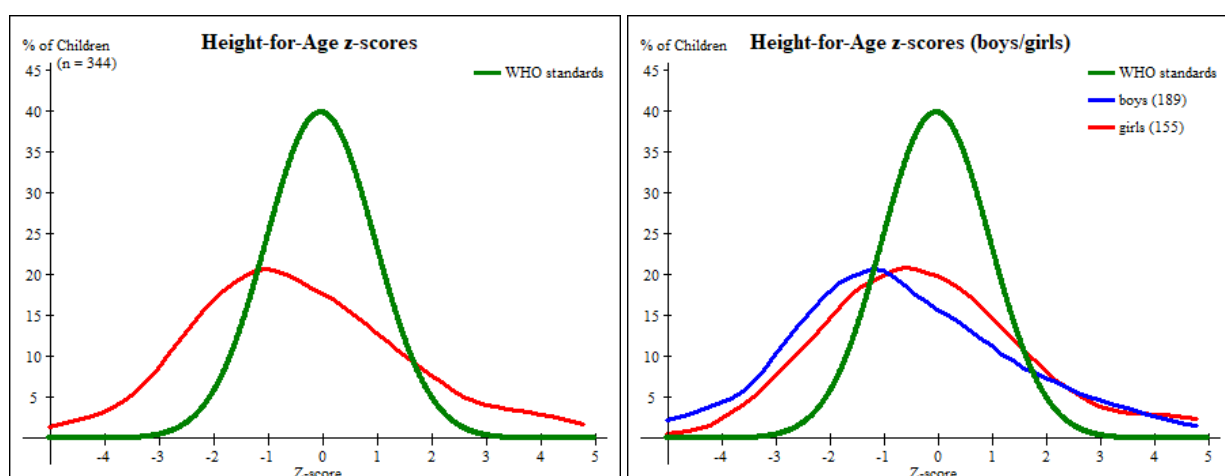
Note: The green line in both graphs is the WHO (2006) normal distribution curve for growth status of children. The red line in the first graph shows the distribution of Height for Age Z scores for both boys and girls along the normal distribution curve. In the second graph, the blue line shows the distribution of Height for Age Z scores for boys while the red line is the distribution of Height for Age Z scores for girls.

Figure 4.4: Nutritional status of Children by Height for Age

4.7.1.2 Height for Age Z-Scores by Age

The prevalence of stunting by age summarized in Table 4.8 was distributed as follows; 44 (12.7%) children aged 24-59 months, 24 (7.0%) children aged 12-24 months and 4 (1.2%) of the children aged 6-11 months.

Table 4.8: Height for Age Z-Scores of Children Aged 6-59 Months Malava Sub-county by Age

| Age (months) | HAZ Status | | | |
	Severe stunting n,%	Moderate Stunting n,%	Normal n,%	Total
6-11	1 (0.3%)	3 (0.9%)	37 (10.8%)	41 (11.9%)
12-23	14 (4.1%)	10 (2.9%)	93 (27.0%)	117 (34.0%)
24-59	13 (3.7%)	31 (9.0%)	142 (41.3%)	186 (54.1%)
Total	28 (8.1%)	44 (12.8%)	272 (79.1%)	344 (100%)

4.7.2 Nutritional Status of Children by Weight for Height Z-Scores

The Weight for Height Z-Scores was used to establish the prevalence of wasting among children 6-59 months in Malava Sub-county. The prevalence of wasting was established based on the gender and age of the children.

4.7.2.1 Weight for Height Z-Scores by Gender

As illustrated in Figure 4.5, the overall prevalence of wasting (<-2 Z-scores) among the children was found to be at 12.5% (n=43, 3.4-36.8, 95% CI). The prevalence was higher in girls [(n=20) 12.9% (1.7-55.9 95% CI)] than in boys [(n=23) 12.2% (6.1-22.7 95% CI)]. There were more cases of moderate wasting (between ≥-3 Z-scores and <-2 Z-scores) [(n=28) 8.1% (1.3-38.3   95% CI)] than severe cases (<-3 Z-scores) [(n=15) 4.4% (1.6-11.4   95% CI)]. More boys [(n=16) 8.5% (4.0-17.2 95% CI)] than girls [(n=12) 7.7% (0.2-74.1 95% CI)] presented with moderate wasting while for severe wasting the girls [(n=8) 5.2% (2.0-12.6 95% CI)] were more than boys [(n=7) 3.7% (1.1-11.4 95% CI)]
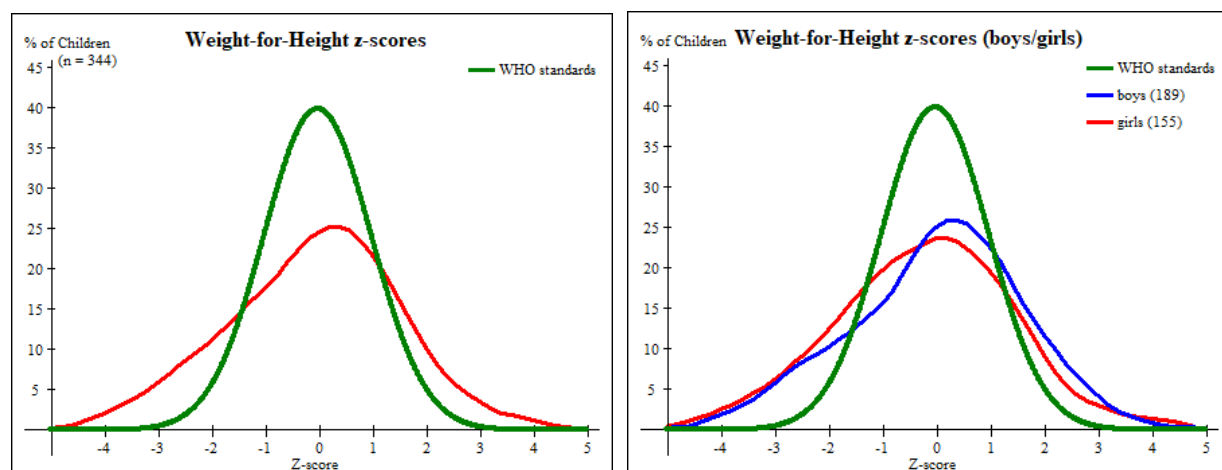
Note: The green line in both graphs is the WHO (2006) normal distribution curve for growth status of children. The red line in the first graph shows the distribution of Weight for Height Z scores for both boys and girls along the normal distribution curve. In the second graph, the blue line shows the distribution of Weight for Height Z scores for boys while the red line is the distribution of Weight for Height Z scores for girls.

Figure 4.5: Nutritional status of Children by Weight for Height

4.7.2.2 Weight for Height Z-Scores by Age

Children aged 6-11 months who were wasted were 8 (2.4%), children aged 12-23 months were 14 (4.1%) and for children aged 24-59 months were 21 (6.1%). The results are summarized in Table 4.9.

Table 4.9: Weight for Height Z-Scores of Children

| WHZ status | Age of the child in months | | | Total |
| | 6-11 | 12-23 | 24-59 | |
	n, (%)	n, (%)	n, (%)	n, (%)
Severe wasting	3 (0.9%)	3 (0.9%)	9 (2.6%)	**15 (4.4%)**
Moderate wasting	5 (1.5%)	11 (3.2%)	12 (3.5%)	**28 (8.1%)**
Normal	31 (9.0%)	90 (26.2%)	148 (43.0%)	**269 (78.2%)**
Overweight	0 (0.0%)	7 (2.0%)	12 (3.5%)	**19 (5.5%)**
Obesity	2 (0.6%)	6 (1.7%)	5 (1.5%)	**13 (3.8%)**
Total	**41 (11.9%)**	**127 (34.0%)**	**186 (54.1%)**	**344 (100.0%)**

4.7.3 Nutritional status of Children by Weight for Age Z-Scores

The Weight for Age Z-Scores was used to establish the prevalence of underweight among children 6-59 months in Malava Sub-county. The prevalence of underweight was established based on the gender and age of the children.

4.7.3.1 Weight for Age Z-Scores of Children by Gender

The results presented in Figure 4.6 show the prevalence of underweight (<-2 Z-scores) was 7.6% (n=26 2.1-23.8 95% CI); 8.5% (n=16, 3.3-20.1 95% CI) among the boys and 6.5% (n= 10, 0.8-35.7 95% CI) among girls. Moderate underweight (between ≥-3 Z-scores and <-2 Z-scores) was 5.2% (n=18, 1.0-23.0 95% CI) and severe underweight was 2.3% (n=8, 0.7- 7.0 95% CI). Moderate underweight was more in boys [(n=11) 5.8% (2.1-15.0 95% CI)] than girls [(n=7) 4.5% (0.2-48.8 95% CI)]. The same case was replicated in severe cases with 2.6% (n=5, 1.2- 5.8 95% CI) and 4.5% (n=7, 0.2-48.8 95% CI) boys and girls severely underweight respectively.
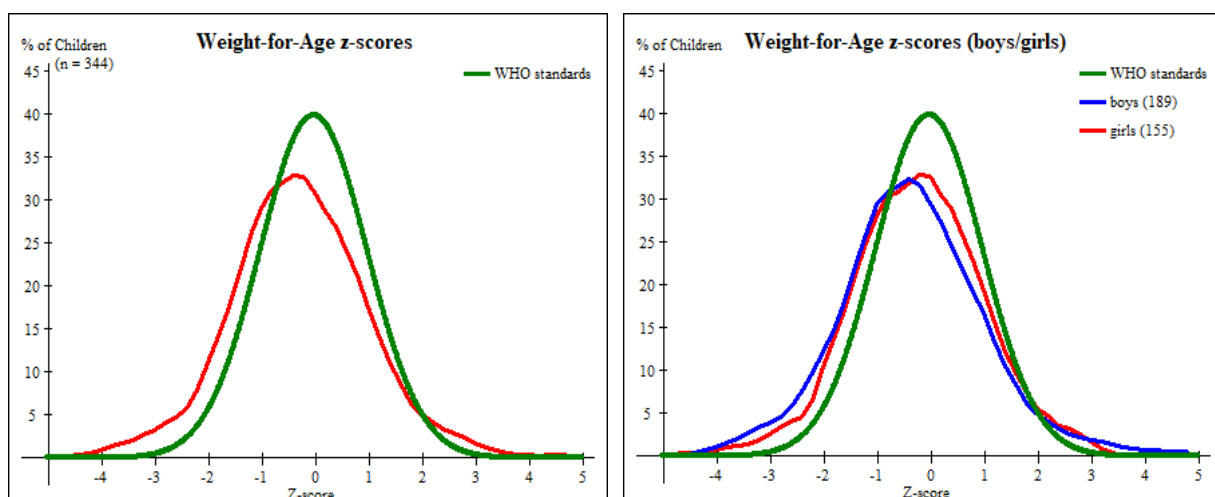
60

Note: The green line in both graphs is the WHO (2006) normal distribution curve for growth status of children. The red line in the first graph shows the distribution of Weight for Age Z scores for both boys and girls along the normal distribution curve. In the second graph, the blue line shows the distribution of Weight for Age Z scores for boys while the red line is the distribution of Weight for Age Z scores for girls.

Figure 4.6: Nutritional status of Children by Weight for Age

4.7.3.2 Weight for Age of Children by Age

Table 4.10 shows that 16 (7.5%) children were both severely and moderately underweight. There was no underweight among children aged 6-11 months

Table 4.10: Weight for Age Z-Scores of Children Aged 6-59 Months Malava Sub-county by Age

Age (Months)	Severe Underweight n, %	Moderate Underweight n, %	Normal n, %	Total n, %
		WAZ Status		
6-11	0 (0.0%)	0 (0.0%)	41 (11.9%)	41 (11.9%)
12-23	2 (0.6%)	6 (1.7%)	109 (31.7%)	117 (34.0%)
24-59	6 (1.7%)	12 (3.5%)	168 (48.8%)	186 (54.1%)
Total	8 (2.3%)	18 (5.2%)	318 (92.4%)	344 (100%)

4.7.4 Nutritional status of Children by Mid Upper Arm Circumference (MUAC) Status

Majority of the children, 334 (97.1%) in Malava Sub-county who participated in this study had a normal MUAC of as illustrated in Table 4.11.

Table 4.11: Nutritional Status of Children by MUAC Status

Age (months)	MUAC Status			Total
	Severe malnutrition n, %	Moderate malnutrition n, %	Normal n, %	n, %
6-11	1 (0.3%)	0 (0.0%)	40 (11.6%)	**41 (11.9%)**
12-23	0 (0.0%)	3 (0.9%)	114 (33.1%)	**117 (34.0%)**
24-59	1 (0.3%)	1 (0.3%)	184 (53.5%)	**186 (54.1%)**
Total	**2 (0.6%)**	**4 (1.2%)**	**334 (97.1%)**	**344 (100%)**

4.8 Association between Mothers' Household Demographic Characteristics and the Nutritional status of Children

The researcher did a cross-tabulation analysis to test the association between households' demographic characteristics and the indicators of nutritional status of children i.e. Stunting, Wasting and Underweight. The association was considered statistically to be significant at a p- value less than 0.05.

4.8.1 Association between Mothers' Household Demographic Characteristics and Stunting among Children

The results in Table 4.12 show that there was a significant association between age of the mother [χ^2 (10) = 19.347, p=0.036], level of education completed [χ^2 (6) =14.664, p=0.023] and stunting of children. This implies that as the younger the mother and the less educated the mother, the higher the chances of that mother having a stunted child.

Table 4.12: Association between Mothers' Household Demographic Characteristics and Stunting among Children

Variable	Categories	Total	HAZ categorized based on WHO standards			χ^2	df	Sig. (p-value)
		n,(%)	<-3 Z-Scores n,(%)	≥-3 to <-2 Z-Scores n,(%)	≥-2 Z-Scores n,(%)			
Gender of the household head	Male	300 (87.2)	24 (7.0)	37 (10.8)	239 (69.5)	0.545	2	0.761
	Female	44 (12.8)	4 (1.2)	7 (2.0)	33 (9.6)			
Age of the mother in years	< 20	88 (25.6)	2 (0.6)	9 (2.6)	77 (22.4)			
	20-25	94 (27.3)	14 (4.1)	10 (2.9)	70 (20.3)			
	26-30	76 (22.1)	5 (1.5)	12 (3.5)	59 (17.2)	19.347	10	**0.036**
	31-35	46 (13.4)	7 (2.0)	6 (1.7)	33 (9.6)			
	36-40	38 (11.0)	0 (0.0)	7 (2.0)	31 (9.0)			
	>40	2 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)			
Marital status of mother to child	Married	293 (85.2)	23 (6.7)	37 (10.8)	233 (67.7)			
	Single	29 (8.4)	1 (0.3)	5 (1.5)	23 (6.7)	5.689	6	0.459
	Widowed	13 (3.8)	2 (0.6)	2 (0.6)	9 (2.6)			
	Divorced	9 (2.6)	2 (0.6)	0 (0.0)	7 (2.0)			
Level of education completed	No formal education	50 (14.5)	6 (1.7)	13 (3.8)	31 (9.0)	14.664	6	**0.023**
	Primary	161 (46.8)	8 (2.3)	18 (5.2)	135 (39.2)			
	Secondary	103 (29.9)	10 (2.9)	10 (2.9)	83 (24.1)			
	Tertiary	30 (8.7)	4 (1.2)	3 (0.9)	23 (6.7)			
Occupation of the mother	Unemployed	288 (83.7)	25 (7.3)	40 (11.6)	223 (64.8)			
	Self-employed	36 (10.5)	2 (0.6)	3 (0.9)	31 (9.0)	3.047	4	0.55
	Employed	20 (5.8)	1 (0.3)	1 (0.3)	18 (5.2)			
Average household monthly income in Ksh.	< 5,000	268 (77.9)	23 (6.7)	36 (10.5)	209 (60.8)			
	5,001-10000	56 (16.3)	2 (0.6)	7 (2.0)	47 (13.7)	4.675	6	0.586
	1,0001-15,000	2 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)			
	>15,000	18 (5.2)	3 (0.9)	1 (0.3)	14 (4.1)			
Main source of income for the household	Salaried employment	29 (8.4)	3 (0.9)	2 (0.6)	24 (7.0)	7.995	6	0.238
	Casual jobs	7 (2.0)	0 (0.0)	3 (0.9)	4 (1.2)			
	Business	39 (11.3)	3 (0.9)	3 (0.9)	33 (9.6)			
	Farming	269 (78.2)	22 (6.4)	36 (10.5)	211 (61.3)			
Major economic activity for the household	Farming	294 (85.5)	24 (7.0)	39 (11.3)	231 (67.2)			
	Business	50 (14.5)	4 (1.2)	5 (1.5)	41 (11.9)	0.421	2	0.81

4.8.2 Association between Mothers' Household Demographic Characteristics and Wasting among Children

The results summarized in Table 4.13 show that majority of the household demographic factors did not have any significant relationship with wasting. Only the level of education the mother had completed [χ^2 (6) =17.242, p=0.008] was found to have a significant association with child wasting.

Table 4. 13: Association between Mothers' Household Demographic Characteristics and Wasting among Children

Variable	Categories	Total n, (%)	WHZ categorized based on WHO standards			χ^2	df	Sig. (p-value)
			<-3 Z-Scores n, (%)	≥-3 to <-2 Z-Scores n, (%)	≥-2 Z-Scores n, (%)			
Gender of the household head	Male	300 (87.2)	14 (4.1)	27 (7.8)	259 (75.3)	3.003	2	0.223
	Female	44 (12.8)	1 (0.3)	1 (0.3)	42 (12.2)			
Age of the mother in years	< 20	88 (25.6)	3 (0.9)	11 (3.2)	74 (21.5)			
	20-25	94 (27.3)	4 (1.2)	2 (0.6)	88 (25.6)			
	26-30	76 (22.1)	4 (1.2)	7 (2.0)	65 (18.9)	9.628	10	0.474
	31-35	46 (13.4)	3 (0.9)	3 (0.9)	40 (11.6)			
	36-40	38 (11.0)	1 (0.3)	5 (1.5)	32 (9.3)			
	>40	2 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)			
Marital status of mother to child	Married	293 (85.2)	11 (3.2)	26 (7.6)	256 (74.4)			
	Single	29 (8.4)	2 (0.3)	1 (0.3)	26 (7.6)	9.688	6	0.138
	Widowed	13 (3.8)	0 (0.0)	1 (0.3)	12 (3.5)			
	Divorced	9 (2.6)	2 (0.6)	0 (0.0)	7 (2.0)			
Level of education completed	No formal education	50 (14.5)	5 (1.5)	9 (2.6)	36 (10.5)	17.242	6	**0.008**
	Primary	161 (46.8)	4 (1.2)	9 (2.6)	148 (43.0)			
	Secondary	103 (29.9)	4 (1.2)	10 (2.9)	89 (25.9)			
	Tertiary	30 (8.7)	2 (0.6)	0 (0.0)	28 (8.1)			
Occupation of the mother	Unemployed	288 (83.7)	11 (3.2)	25 (7.3)	252 (73.3)			
	Self-employed	36 (10.5)	3 (1.5)	2 (0.6)	31 (9.0)	2.178	4	0.703
	Employed	20 (5.8)	1 (0.9)	1 (0.3)	18 (5.2)			
Average household monthly income in Ksh.	< 5000	268 (77.9)	10 (2.9)	23 (6.7)	235 (68.3)			
	5,001-10000	56 (16.3)	4 (1.2)	4 (1.2)	48 (14.0)	1.888	6	0.93
	10001-15000	2 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)			
	> 15000	18 (5.2)	1 (0.3)	1 (0.3)	16 (4.7)			
Main source of income for the household	Salaried employment	29 (8.4)	2 (0.6)	2 (0.6)	25 (7.3)	7.164	6	0.306
	Casual jobs	7 (2.0)	1 (0.3)	0 (0.0)	6 (1.7)			
	Business	39 (11.3)	4 (1.2)	3 (1.5)	32 (9.3)			
	Farming	269 (78.2)	8 (2.3)	23 (6.7)	238 (69.2)			
Major economic activity for the household	Farming	294 (85.5)	10 (2.9)	24 (7.0)	260 75.6()	4.471	2	0.107
	Business	50 (14.5)	5 (1.5)	4 (1.2)	41 (11.9)			

4.8.3 Association between Mothers' Household Demographic Characteristics and Underweight among Children

The results in Table 4.14 show that there were significant associations between the level of education completed [χ^2 (12) = 25.241, p=0.014], the level of average household monthly income [χ^2 (12) = 24.291, p=0.019], engagement in household

economic activity [χ^2 (4) = 13.368, p=0.01] and the prevalence of underweight in

Malava Sub-county, Kakamega County.

Table 4.14: Association between Mothers' Household Demographic Characteristics

and Underweight among Children

Variable	Categories	Total	WAZ categorized based on WHO standards			χ^2	df	Sig. (p-value)
		n, (%)	(<-3 Z-Scores n, (%)	≥-3 to <-2 Z-Scores n, (%)	≥-2 Z-Scores n, (%)			
Gender of the household head	Male	292 (84.9)	7 (2.0)	18 (5.2)	267 (77.6)	2.966	4	0.564
	Female	43 (12.5)	1 (0.3)	0 (0.0)	42 (12.2)			
Age of the mother in years	20 years	84 (24.4)	1 (0.3)	3 (0.9)	80 (23.3)	24.258	20	0.231
	20-25	94 (27.3)	1 (0.3)	10 (2.9)	83 (24.1)			
	26-30	71 (20.6)	3 (0.9)	1 (0.3)	67 (19.5)			
	31-35	46 (13.4)	1 (0.3)	2 (0.6)	43 (12.5)			
	36-40	38 (11.0)	2 (0.6)	2 (0.6)	34 (9.9)			
	>40	2 (0.6)	0 (0.0)	0 (0.3)	2 (0.6)			
Marital status of mother to child	Married	285 (82.8)	7 (2.0)	16 (4.7)	262 (76.2)	12.888	12	0.377
	Single	29 (8.4)	0 (0.0)	0 (0.0)	29 (8.4)			
	Widowed	12 (3.5)	1 (0.3)	0 (0.0)	11 (3.2)			
	Divorced	9 (2.6)	0 (0.0)	2 (0.6)	7 (2.0)			
Level of education completed	No formal education	49 (14.2)	2 (0.6)	3 (0.9)	44 (12.8)	25.241	12	**0.014**
	Primary	160 (46.5)	2 (0.6)	5 (1.5)	153 (44.5)			
	Secondary	98 (28.5)	3 (0.9)	10 (2.9)	85 (24.7)			
	Tertiary education	28 (8.1)	1 (0.3)	0 (0.0)	27 (7.8)			
Occupation of the mother	Unemployed	281 (81.7)	6 (1.7)	15 (4.4)	260 (75.6)	3.138	8	0.925
	Self-employed	35 (10.2)	2 (0.6)	2 (0.6)	31 (9.0)			
	Employed	19 (5.5)	0 (0.0)	1 (0.3)	18 (5.2)			
Average household monthly income in Ksh.	<. 5000	261 (75.9)	5 (1.5)	12 (3.5)	244 (7.09)	24.291	12	**0.019**
	5,001-10000	55 (16.0)	2 (0.6)	4 (1.2)	49 (14.2)			
	10001-15000	1 (0.3)	0 (0.0)	0 (0.0)	1 (0.3)			
	>15000	18 (5.2)	1 (0.3)	2 (0.6)	15 (4.4)			
Main source of income for the household	Salaried employment	28 (8.1)	1 (0.3)	2 (0.6)	25 (7.3)	13.600	12	0.327
	Casual jobs	7 (2.0)	0 (0.0)	1 (0.3)	6 (1.7)			
	Business	36 (10.5)	2 (0.6)	1 (0.3)	33 (9.6)			
	Farming	264 (76.7)	5 (1.5)	14 (4.1)	245 (71.2)			
Major economic activity for the household	Farming	289 (84.0)	5 (1.5)	15 (4.4)	269 (78.2)	13.368	4	**0.01**
	Business	46 (13.4)	3 (0.9)	3 (0.9)	40 (11.6)			

4.9 Association between Mothers' Nutritional Knowledge, Nutrition Practices and the Nutritional status of their Children

The researcher also performed a correlation analysis to test the association between the mothers' nutrition knowledge, nutrition practices and the nutritional status. The responses for nutrition knowledge were computed to be dichotomous of either high level or low level of nutrition knowledge. Nutrition practices was also classified as either good or poor practices. The nutritional status of children was classified as either malnourished or not malnourished based on comparison of the status of the three indicators of nutritional status in children i.e. Stunting, Wasting and Underweight. Statistical significance of the association between the variables was determined at p<0.05.

4.9.1 Association between Mothers' Nutritional Knowledge and the Nutritional status of Children

The researcher used the factors for assessing the knowledge of mothers on different aspects of breastfeeding, introduction to complementary feeding and continuation of breastfeeding after introduction of complementary feeding. High levels of nutrition knowledge were reported for the knowledge on the type of foods for children 12-59 months (99.2%), knowledge on type of foods for children 6-8 months (98.3%) and knowledge on type of foods for children 9-11 months (96.2%). Low nutrition knowledge of the mothers was reported on the knowledge on number of times to feed 6-8 months (41.0%) and knowledge on germination of cereal product (4.1%). The results summarized in Table 4.15 summarizes the test of associations between mother's nutrition knowledge and the nutritional status of their children. The results show that knowledge on how long to exclusively breastfeed their [χ^2 (1) =5.15, p=0.023] had 2.397 odds of contributing to malnutrition among children (95%

CI=1.106-5.196). Knowledge on the number of times to feed a child of 6-8 months [χ^2 (1) =4.16, p=0.041] and 9-11 months [χ^2 (1) =3.45, p=0.043] were also associated with malnutrition among the children aged 6-59 months in Malava Sub-county, Kakamega. The results also show that there were higher odds of having malnourished children among the mothers with nutrition knowledge on type of foods to feed their children 6-8 months [OR=2.37; 95%CI=0.391-14.375], knowledge on type of foods for children 9-11 months [OR=1.586; 95%CI=0.45-5.586] and knowledge on germination of cereal product [OR=2.414; 95% CI= 0.661-8.817]

Table 4.15: Association between Mothers' Nutrition Knowledge and the Nutritional

Status of Children

Variables	Category	Total n, (%)	Nutritional Status		χ²	sig	OR	95% CI
			Malnourished n, (%)	Not malnourished n, (%)				
Received information on breastfeeding	Yes	330 (95.9)	129 (37.5)	201 (58.4)	.064	0.8	0.866	0.284-2.641
	No	14 (4.1)	5 (1.5)	9 (2.6)				
Knowledge on importance of breastfeeding	Yes	300 (87.2)	116 (33.7)	184 (53.5)	.081	0.776	1.098	0.577-2.092
	No	44 (12.8)	18 (5.2)	26 (7.6)				
Knowledge on length of exclusive breastfeed	Yes	315 (91.6)	117 (34)	198 (57.6)	5.15	**0.023**	**2.397**	1.106-5.196
	No	29 (8.4)	17 (4.9)	12 (3.5)				
Knowledge on what should be given to a baby after delivery	Yes	311 (90.4)	122 (35.5)	189 (54.9)	.103	0.748	0.885	0.42-1.865
	No	33 (9.6)	12 (3.5)	21 (6.1)				
Knowledge on how long should be taken to initiate breastfeeding	Yes	255 (74.1)	103 (29.9)	152 (44.2)	.858	0.354	0.789	0.477-1.304
	No	89 (25.9)	31 (9.0)	58 (16.9)				
Knowledge on feeding a child colostrum	Yes	329 (95.6)	127 (36.9)	202 (58.7)	.392	0.531	1.392	0.493-3.931
	No	15 (4.4)	7 (2.0)	8 (2.3)				
Knowledge on the correct age for introduction of CF	Yes	270 (78.5)	105 (30.5)	165 (48.0)	.002	0.963	1.013	0.598-1.715
	No	74 (21.5)	29 (8.4)	45 (13.1)				
Knowledge on continuation of BF after CF	Yes	201 (58.4)	77 (22.4)	124 (36)	.023	0.879	1.035	0.664-1.615
	No	138 (40.1)	54 (15.7)	84 (24.4)				
Knowledge on type of foods fed to children of 6-8 months	Yes	338 (98.3)	131 (38.1)	207 (60.2)	.934	0.334	**2.37**	0.391-14.375
	No	5 (1.5)	3 (0.9)	2 (0.6)				
Knowledge on type of foods fed to children of 9-11 months	Yes	331 (96.2)	128 (37.2)	203 (59.0)	.524	0.469	**1.586**	0.45-5.586
	No	10 (2.9)	5 (1.5)	5 (1.5)				
Knowledge on type of foods fed to children of 12-59 months	Yes	341 (99.1)	133 (38.7)	208 (60.5)	-	-	**-**	-
	No	2 (0.6)	0 (0)	2 (0.6)				
Knowledge on number of times fed to children of 6-8 months	Yes	141 (41.0)	64 (18.6)	77 (22.4)	4.16	**0.041**	0.633	0.408-0.983
	No	203 (59.0)	70 (20.3)	133 (38.7)				
Knowledge on number of times fed to children of 9-11 months	Yes	284 (82.6)	117 (34.0)	167 (48.5)	3.45	**0.043**	0.564	0.307-1.038
	No	60 (17.4)	17 (4.9)	43 (12.5)				
Knowledge on number of times fed to children of 12-59 months	Yes	229 (66.6)	93 (27.0)	136 (39.5)	.792	0.374	0.81	0.51-1.288
	No	115 (33.4)	41 (11.9)	74 (21.5)				
Knowledge on mixing ingredients	Yes	249 (72.4)	93 (27.0)	156 (45.3)	.976	0.323	1.274	0.788-2.059
	No	95 (27.6)	41 (11.9)	54 (15.7)				
Knowledge on germination of cereal products	Yes	14 (4.1)	3 (0.9)	11 (3.2)	1.89	0.17	**2.414**	0.661-8.817
	No	330 (95.9)	131 (38.1)	199 (57.8)				

4.9.2 Association between Mothers' Nutritional Practices and the Nutritional

status of Children

The results presented in Table 4.16 show that there was a significant association

between attaining the recommended number of feeds given to a child per day

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compared to their age χ^2 (1) = 4.027, p=0.045 with malnutrition among the children. Other nutrition practices factors investigated did not have significant contributions to the nutritional status of children aged 6-59 months. However, the poor practice of not expressing breastmilk for feeding the child later (OR=1.926; 95%CI=0.383-9.689) higher odds of contributing to malnutrition among the children

Table 4.16: Association between Mothers' Nutrition Practices and the Nutritional status of Children

Variables	Category	Total n, (%)	Nutritional Status		χ^2	sig	OR	95% CI
			Malnourished n, (%)	Not malnourished n, (%)				
Breastfed the child	Yes	328 (95.3)	128 (37.2)	200 (58.1)	0.015	0.903	0.938	0.333-2.642
	No	16 (4.7)	6 (1.7)	10 (2.9)				
Practiced exclusive breast feeding (EBF)	Yes	219 (63.7)	79 (23.0)	140 (40.7)	1.888a	0.169	1.375	0.872-2.168
	No	119 (34.6)	52 (15.1)	67 (19.5)				
Breastfed from both breasts	Yes	314 (91.3)	120 (34.9)	194 (56.4)	.822a	0.365	1.415	0.667-3.002
	No	30 (8.7)	14 (4.1)	16 (4.7)				
Expressed breastmilk	Yes	8 (2.3)	2 (0.6)	6 (1.7)	.655a	0.418	**1.926**	0.383-9.689
	No	335 (97.4)	131 (38.1)	204 (59.3)				
Practiced bottle feeding	Yes	258 (75.0)	98 (28.5)	160 (46.5)	.407a	0.523	1.176	0.715-1.932
	No	86 (25.0)	36 (10.5)	50 (14.5)				
Continued BF after initiation of complementary foods	Yes	319 (92.7)	127 (36.9)	192 (55.8)	1.360a	0.244	0.588	0.239-1.448
	No	25 (7.3)	7 (2.0)	18 (5.2)				
Recommended no. of feeds per day	Yes	257 (74.7)	108 (31.4)	149 (43.3)	4.027a	**0.045**	0.588	0.349-0.991
	No	87 (25.3)	26 (7.6)	61 (17.7)				
Hygiene practices	Yes	326 (94.8)	126 (36.6)	200 (58.1)	.241a	0.624	1.27	0.488-3.303
	No	18 (5.2)	8 (2.3)	10 (2.9)				
Watch the child eat	Yes	328 (95.3)	125 36.3 ()	203 (59.0)	2.111a	0.146	2.088	0.759-5.747
	No	16 (4.7)	9 (2.6)	7 (2.0)				
Encourage the child finish food	Yes	262 (76.2)	98 (28.5)	164 (47.7)	1.109a	0.292	1.31	0.792-2.165
	No	82 (23.8)	36 (10.5)	46 (13.4)				
Feed the child earlier prepared food	Yes	11 (3.2)	5 (1.5)	6 (1.7)	.202a	0.653	0.759	0.227-2.537
	No	333 (96.8)	129 (37.5)	204 (59.3)				

4.9.3 Association between Overall Nutrition Knowledge and Practices of Mothers and the Nutritional status of Children

Table 4.17 summarizes the relationship between overall nutrition knowledge and practices of the mothers and nutritional status of the children. The results show that,

the overall nutrition knowledge of the mothers [$\chi^2(1) = 5.451$, p=0.02] was associated with malnutrition among children 6-59 months in Malava Sub-County (OR=4.381, 95% CI =1.141 16.819). Overall nutrition practices did not have any influence on the nutritional status of the children.

Table 4.17: Association between Overall Nutrition Knowledge and Practices of the Mothers and Nutritional status of their Children

Variables	Category	Total n, (%)	Nutritional status		χ^2	sig	OR	95% CI
			Malnourished n, (%)	Not malnourished n, (%)				
Overall nutrition knowledge	High	333 (96.8)	126 (36.6)	207 (60.2)	5.451	**0.02**	**4.381**	1.141
	Low	11 (31.2)	8 (2.3)	3 (0.9)				16.819
overall nutrition practices	Good	180 (52.3)	63 (18.3)	117 (34)	2.482	0.115	1.418	0.918
	Poor	164 (47.7)	71 (20.6)	93 (27)				2.19

4.10 Relationship between Mothers' Nutritional Knowledge, Nutrition Practices and the Nutritional status of Children

The researcher performed a binary logistic regression analysis to ascertain how well the mothers overall nutrition knowledge and practices predicts the child nutritional status in a goodness-of-fit regression model. Hosmer-Lemeshow test for null hypothesis of how well the predictions made by the model fit perfectly with observed group memberships was done. The null hypothesis for this study was; there is no significant relationship between the nutrition knowledge and practices of mothers and the nutritional status of children aged 6-59 months in Malava Sub-County, Kakamega County. The test compared the observed frequencies with those expected under the linear model and had a non-significant chi-square statistic (p=0.884; >0.005). Any non-significant chi-square value in Hosmer-Lemeshow test for null hypothesis indicates that the data fits the model well and thus, the researchers' data qualified for regression analysis. The overall test of the model was statistically significant ($\chi^2(2) = 7.03$, p =0.03). The variation in the dependent variable based on this model varied

between 2.0-2.7% as explained by the Cox & Snell R Square and the Nagelkerke R Square. The results for Omnibus Tests of Model Coefficients summarized in Table 4.18 showed that the Nagelkerke R^2 of the model explained 2.7% of the variance in nutritional status of children and correctly classified 62.5% of malnutrition cases.

Table 4.18: Omnibus Tests of Model Coefficients and model summary.

		Chi-square	df	Sig.	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
Step 1	Step	7.03	2	0.03	452.926a	0.02	0.027
	Block	7.03	2	0.03			
	Model	7.03	2	0.03			

The classification Table 4.19 showed that 6.0% of the children who were malnourished were correctly predicted by the model to be malnourished and 98.6% of the children who were not malnourished were correctly predicted by the model not to be malnourished.

Table 4.19: Classification Table of the Prediction Model

Observed		Predicted		Percentage Correct
		Nutritional status of the children		
		Malnourished	Not Malnourished	
Nutritional status	Malnourished	8	126	6.0
of the children	Not Malnourished	3	207	98.6
Overall Percentage				62.5

The binary logistic regression analysis summary in Table 4.20 showed that the overall nutrition knowledge of mothers had a significant relationship with the nutritional status of the children (p=0.046, 95% CI). Mothers whose overall nutritional knowledge was low 7.5 times more likely to have children with poor nutritional status. Increasing level of nutrition knowledge among the mothers was associated with reduction in the number of malnourished children. However, the overall nutrition practices of the mothers did not have any significant relationship with the nutritional status of the children. The researcher thus rejected the null hypothesis (There is no significant relationship between the overall nutrition knowledge of mothers with the nutritional

status of children) and concluded the alternative hypothesis (There is a significant relationship between overall nutrition knowledge of mothers with the nutritional status of children). The researcher also failed to reject the null hypothesis that there is no significant relationship between the overall nutrition practices of mothers with the nutritional status of children aged 6-59 months in Malava Sub-County, Kakamega County.

Table 4.20: Regression Analysis Summary

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.	
							Lower	Upper
Overall nutrition knowledge	-1.379	0.691	3.985	1	0.046	0.252	0.065	0.975
Overall nutrition practices	-0.293	0.225	1.698	1	0.193	0.746	0.48	1.159
Constant	0.635	0.157	16.40	1	0	1.888		
a Variable(s) entered on step 1: overall nutrition knowledge, overall nutrition practices								

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CHAPTER FIVE

DISCUSSION

5.1 Introduction

This chapter presents an in depth discussion of the study findings as per each objective of the study. The discussion provides a comparison of the findings of the current with the findings of similar studies. The researcher has provided a critique to the findings of other studies and also appraised their findings.

5.2 Socio-demographic Characteristics of Mothers

There was a high number of mothers (52.9%) aged below 25 years, with 25.6% below 20 years and 27.3% between 20-25 years. The 2022 KDHS reported a teenage pregnancy prevalence 15.1% among girls aged 15-19 years in Kakamega County. Most of these girls who get pregnant end up getting married due to responsibilities accompanied with the pregnancy. Relating to the Health Belief Model, Pregnancy and marriage at a young age has been reported to increase the susceptibility and perceived threat of poor nutrition outcomes among children due to inadequacy in development of the maternal stores (Nguyen *et al.,* 2017). Children born to teenage mothers compared to those of adult mothers are at a higher risk of stunting, wasting and underweight (Wemakor *et al.,* (018). Additionally, children born with a low birth weight are highly vulnerable to developing diseases and death and/or remain undernourished (Abbas *et al.,* 2021). Early marriages also contribute to discontinuation of education and thus increasing the illiteracy levels in the community. In a qualitative study by Raj *et al.,* (2019), girls who received intervention programs and were married prior to age reported post-marriage education to be difficult, subsequent to childbirth.

The study also reported low level of formal education among mothers in Malava Sub-county with 46.8% having completed primary school level only and 14.3% having attained no formal education at all. These findings are supported by the findings of the 2014 Kakamega County Multiple Indicator Cluster Survey (KNBS, 2014) which reported the dropout rate in primary schools was at 15%. The school dropout is triggered by a myriad of challenges experienced in Malava Sub county and Kakamega County at large. A high poverty rate was reported by the 2017 economic survey (KNBS, 2017) leaving majority of the households unable to cater for the needs of school going children and thus opt to drop out. In effort to seek for economic livelihoods, some of the school-going children engage in sexual activities with older men. The major economic activity in Malava Sub County, which is sugarcane farming, highly encourages this behaviour as majority of the truck and tractor drivers lure the school-going children into sex. In Uganda, sugarcane farming was found to contribute to 5% of school dropouts among school going children in Jinja District, Kakira Sub-county (Byaruhanga, 2019).

Consequently, some of the *boda boda* riders who transport children to school and back home are a threat since they coerce some of the teenage girls to offer sex as a form of payment for the service. The result of this is getting pregnant and getting married as earlier discussed and dropping out of school to avoid stigmatization by their friends and teachers. The effects of school dropouts have been widely documented by several researchers. Cases of early marriages have also been reported because of girls' school dropout (Birchall, 2018). Incompletion of formal education levels reduces chances of getting formal employment and thus contributes to an increased poverty index in the community.

Young mothers who do not have a formal employment lack the economic power to provide for some of the basic needs of the newborn child.

5.3 Economic Characteristics of Mothers

Econometric analysis of the study found a high unemployment rate (83.7%) among the study participants resulting to low household head income level of less than Ksh. 5,000 per month (77.9%) and little engagement in business and income generating activities (14.5%) in Malava sub-county, Kakamega County. According to the Kenya Economic Survey 2021, formal employment is considered as the major source of income for most households (KNBS, 2021). Based on the findings in this study, the unemployment rate and low income were perceived barriers to accessing quality education. A study by Wanjiku (2017) reported that households with more educated household heads are more likely to have more chances of securing formal employment and have higher income earning potential that those with lower education levels.

The impact of unemployment and reduced income of household heads on the nutritional status of children aged below five years cannot be underrated. In Ethiopia, the prevalence of wasting, stunting, and underweight was higher among children aged 2-5 years of unemployed mothers than that of employed mothers (Zewdu & Handiso, 2020). Several studies have also associated households with employed household heads with a higher wealth index and thus able to meet the minimum acceptable diets for the children (Belay *et al.,* 2022; Worku *et al.,* 2022; Molla *et al.,* 2021). Household head unemployment and low household income is a barrier to accessing quality healthcare for children (Lazar & Davenport, 2018). Majority of the households in Malava Sub-county cannot afford health insurance covers for themselves and for their children as they live on less than Ksh. 200

per day and his increases the risks of child morbidity and mortality (Flores *et al.,* 2017; Mitra *et al.,* 2017).

The results show a decrease in production of food crops in Malava Sub-county. This can be explained by the pre-dominance in cultivation of sugarcane due to the proximity of the study area to West Kenya and Butali Sugar Companies located in Malava Sub-county and Nzoia Sugar Company in neighboring Bungoma County. The findings can also be attributed to the increased population in Malava sub-county and Kakamega County in general that has led to increased land division and thus limited lands to practice large scale mixed farming methods. The KCIDP 2018-2022 reports maize, sorghum, finger millet, rice, beans, peas, grams, cassava, sweet potato, arrow roots as the major food crops grown in Kakamega County. The production of cereals in Kakamega County gradually increased from 1.9 to 2.9 Million bags between the years 2013-2017. However, the production of some pulses has declined due to some factors such as crop diseases (KCIDP, 2018). There is lack of diversification in cultivation of food crops in Malava Sub-county, leading to inability to meet the minimum acceptable diets by some households.

5.4 Nutrition Knowledge of Mothers

Majority of the mothers (95.9%) reported that they had received information on breastfeeding from healthcare workers at the hospital (84.3%) during ANC visits of the baby (83.4%). The Government of Kenya, through the Ministry of Health and other partners/stakeholders, has invested in nutrition education as a health promotion and motivation strategy among mothers at hospital level in an effort to alleviate maternal mortality and improve nutrition outcomes (KNAP 2018-2022). The Ministry has

developed nutrition education toolkits, Information, Education and Communication materials and capacity build healthcare workers with nutrition knowledge to educate mothers. However, the results for where, when and who gives nutrition knowledge to the mothers in Malava Sub-County indicates a gap in community based nutrition approach in providing nutrition education. Majority of the mothers receive information about breastfeeding from healthcare workers in the hospital only when they visit the hospital during the specialized clinics for pregnant and lactating mothers.

Despite majority of the mothers in Malava Sub-county (91.6%), having adequate knowledge on EBF, there was a gap on its importance. They are only aware of providing adequate nutrients and immunity for the child (80.8%) as the only benefits associated with EBF. This calls for collaborative efforts to educate the mothers in Malava Sub-county on more health and nutrition benefits of EBF. A study by Thakur et al., (2012) proved that giving mother's nutrition education on the importance of breastfeeding is a strong tool to reduce the high risk of malnutrition and mortality among Low Birth Weight babies (Buckner *et al.,* 2021).

The World Health Organization (WHO) recommends continuation of breastfeeding for up to two years upon introduction of nutritionally adequate complementary foods (WHO, 2021). However, 41.6% of the mothers in Malava Sub-county do not know for how long breastfeeding should continue after initiation of complementary foods. Therefore, they end up terminating breastfeeding before the child attains the recommended age. Early cessation of breastfeeding has been associated with poor nutrition outcomes and an increased risk of morbidity and mortality (Nigatu *et al.,* 2019). Studies have established significant associations between longer breastfeeding periods and improved general

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ability cognitive functions of children. (Lopez *et al.,* 2021; Kim & Choi, 2020; Boucher *et al.,* 2017).

5.5 Nutrition Practices of Mothers

Majority of the mothers (95.3%) in this study practiced Exclusive Breast Feeding (EBF) due to its perceived benefits as evidenced by the knowledge they had on benefits of exclusive breast-feeding. Several studies have associated EBF practice with multiple benefits to the child ranging from physical to cognitive development over the life course of the infant (Rochat *et al.,* 2016; Bar *et al.,* 2016; Holloway, 2017). The World Health Organization and UNICEF recommends that all children should be exclusively breastfed for the first six months of their life and thereafter continue to breastfeed for as long as the mother and child desire, with appropriate and sufficient weaning food included after six months (WHO, 2017). Results from this study showed a good adherence to the practice of EBF in Malava Sub-County, Kakamega County. However, measures need to be implemented to ensure that all mothers adhere to EBF recommendations to avoid the dangers associated with early initiation of complementary feeding.

The study found that very few mothers practiced bottle-feeding (25%, n=86) and expressed breastmilk for their children (2.6%, n=9). This finding could be attributed to the nature of the study setting. The study area being a rural set up, majority of the mothers are the caregivers and spend most of the time with their children at home. They found it difficult to express the milk for feeding the children later yet they can breastfeed on demand. Some of the mothers cited that they rarely use bottle-feeding since they have been educated at the hospital about the dangers associated with use of bottles for feeding. Others said they do not have adequate milk to breastfeed and thus are unable to express

their milk for bottle-feeding. In March 2022, there was a move by the Ministry of Health, Kenya to regulate the use of bottle-feeding with effect from May 28, 2022. The aim of the move was to promote and support breast-feeding to give children good immunity and solid nutrition. The regulation is enshrined in the Kenyan law in the Breast Milk Supplements Regulation and Control Act 2012, which listed bottles used for feeding infants as designated products and are within the scope of regulation by the law.

The hygiene practices of mothers during breastfeeding and complementary feeding are crucial in the protection of vulnerable infants and children from childhood illnesses such as diarrhea and other communicable diseases. The study investigated the hygiene practices that may affect the nutritional status of the children. Majority of the mothers (94.8%) clean their hands before preparation of food and when feeding the children. However, a 13.8% of the mothers did not use soap as recommended when washing their hands. United Nations International Children's Education Fund reports that more than 1,300 children under the age of five years die every day because of diseases caused by poor sanitation and hygiene practices. A study by Rothstein *et al.,* (2019) associated poor hygiene practices with household contamination of baby feeding bottles in Peri-Urban Lima, Peru. This could be replicated in Malava Sub-county if the mothers practiced bottle-feeding since it is a resource limited setting with poor access to water and sanitation facilities.

Western Kenya is known for producing maize, millet, sorghum among other grains (KCIDP, 2018). The most consumed foods by children in Malava sub-county belong to the grain and grain products group as reported by 341 (99.1%) respondents. This may be justified by the fact that most of the households in the Western Kenya, the staple food universally consumed by most of the household members is stiff porridge *(Ugali)* made

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from either of cereals with maize being the most common (Merchant *et al.,* 2023). However, children under the age of five years, also consume the cereals in the form of porridge. Regular consumption of cereal-based foods among children under 5 years has been associated with mane health and nutritional benefits since they are an important source of carbohydrates, proteins, fibers, minerals, vitamins, and phytochemicals (Garutti *et al.,* 2022).

Consumption of dairy and dairy products reported by 331 (96.2%) respondents, vegetables reported by 314 (91.2%) respondents, fats and oils reported by 312 (90.7%) respondents was also high. A study by Boedecker *et al.,* (2019) attributed increased consumption of dairy products and vegetables to participatory farm diversification in household production. Liu *et al.,* (2022) also reported similar findings of high consumption of dark green leafy vegetables. Contrary to this study, Hamner *et al.,* (2023) reported that many children aged 1–5 years, do not consume vegetables daily and regularly drink sugar-sweetened beverages. The consumption of fats in this study may be associated to the consumption of vegetables that require to be fried during cooking.

Mothers in Malava Sub-county rarely fed their children with animal source protein foods with the consumption of flesh foods (meat, meat products, poultry, fish and *omena*) at 23.5% and eggs and egg products at 2.6%. Additionally, the consumption of pulses (dried beans, peas, lentils, nuts and seeds) was also found to be low (17.4%) due to challenges with household production and seasonality. This raises a concern of reduced consumption of proteins from both plant and animal sources thus increasing the risk of protein malnutrition among the children. Several studies have associated the consumption of animal source protein foods with reduced stunting prevalence in several countries as

opposed to plant-based diets (Kaimira *et al.,* 2019; Dasi *et al.,* 2019; Darapheak *et al.,* 2013). However, a controversy exists that animal source proteins, although in high demand, are considered less environmentally sustainable and more costly (Langyan *et al.,* 2022). The choice of the protein source to rely on by the households in Malava thus remains in dilemma.

The children in Malava Sub-county hardly consumed fruits with only 2 out 100 of the mothers reporting to feed their children with fruits. Adequate fruits and vegetables consumption is crucial for children's health. In Malava Sub County, reduced intake of fruits is associated with less production of fruits at household level and dependancy on market supplies. The households reported the cost of purchasing fruits is high and, with the high unemployment rate and low household incomes, they are unable to meet the costs. Children therefore end up missing vital nutrients from fruits and increase the risk of micronutrient deficiencies and other form of malnutrition.

5.6 Nutritional Status of Children

The prevalence of stunting, underweight and wasting in Malava Sub-county were found to be at 20.9%, 7.5% and 2.1% respectively. Kakamega County is one of the counties that has reported a tremendous improvement in child nutritional status from the recently released demographic health survey. The county recorded a drop of stunting by more than half from 28.4% in 2014 to 12% in 2022 and underweight from 9.0% to 7.2%. The prevalence of wasting increased from 1.9% to 6.0% over the same period (KNBS, 2022). Compared to this study, the statistics show the prevalence stunting and underweight in Malava Sub-county to be higher compared to that of the entire Kakamega County as reported by the 2022 KDHS. The findings also show the wasting indices were lower when

compared to the 2022 KDHS. This may indicate that, due to the complex nature of Kakamega county, different sub-counties may be affected by different forms of malnutrition and thus nutrition interventions should be evidence based per sub-county and not only considering the prevalence at county level. This may also indicate that nutrition interventions aimed at upscaling nutrition service may not reach all the sub-counties and thus some sub-counties report improvement in nutrition indicators while others report the vice versa.

The UNICEF reports a global steady reduction in the number of stunted children since 2000s with an alarming increase in wasting cases (UNICEF, 2021). The same case is replicated in this study with 12.5% of the children in Malava Sub-county wasted in 2021 as opposed to 1.9% of children who were wasted in Kakamega County by 2014 and 6.0% reported in 2022. A reversal trajectory is required to avert this situation for the achievement of the Global nutrition targets and the global nutrition agenda. Kenya has already rolled out the development of County specific Nutrition Action Plans in an effort to address malnutrition, enhance multi-sectoral approach and streamline provision of customized nutrition services.

In this study, more boys than girls presented with higher prevalence's of all the three indicators of malnutrition. This finding is closely supported by a systematic review by Thurstans *et al.,* (2020) who found out that in 32 out of 38 studies selected for review, boys had higher odds of being stunted or wasted than girls did. The studies demystify the myths of majority of the mothers who believe girls have a better nutrition status than boys. Differences in nutritional status of children between the two sexes in Malava Sub County

may be explained by individual physiological differences that are independent of infant feeding practices.

5.7 Association between Mothers' Household Demographic Characteristics and the Nutritional Status of Children

In this study, the researcher reported a significant association between the age of the mother and stunting among children in Malava Sub-county. This means that as the youfer the mother the higher the chances of having a stunted child and vice versa. This finding is similar to the findings of Wemakor *et al.,* (2018) who reported that children of teenage mothers were 8 times more likely to be stunted compared to those of adult mothers. A review of data demographic health surveys from 18 countries by Yu *et al.,* (2016) also found significant associations between maternal age and prevalence of stunting among children. Although the age of the mother may not directly affect the nutritional status of the child, other factors related to the age have been show to influence. Teenage mothers may experience mental stress from having a premature pregnancy and dropping out of school (Govender *et al.,* 2020). Again, they may not be psychologically prepared to breastfeed their children after delivery (Mangeli *et al.,* 2017). This may in turn affect the growth of the child, resulting to stunting.

The study also found significant association between stunting, wasting and underweight among children the level of education completed by the mothers and in Malava Sub-county. This finding was similar to the findings of previous studies (Khan *et al.,* 2019; Chowdhury *et al.,* 2016; Mishra *et al.,* 2014). Amaha *et al.,* (2021) also reported that mothers of children who had achieved lower education levels to have higher odds of stunting ($p = 0.028$) than those born to mothers with higher education in Ethiopia.

Generally, formal education improves an individual's capacity to process and understand information (Raghupathi & Raghupathi, 2020). Similarly, educated mothers are able to read, interpret and apply nutrition messages from Information Education and Communication (IEC) materials provided at the hospital (Kajjura *et al.,* 2019). They are more likely to understand the health and nutritional status of their children and implement the dietary recommendations provided by healthcare workers thus contributing to improved health of their children (Hahn & Truman, 2015).

The average household monthly income and engagement in household economic activity were found to have significant associations with the prevalence of underweight among children in Malava Sub-county. In measuring child growth, weight gain is the predominant dependable indicator of improvement in nutritional status (UNICEF, 2020). However, weight gain in children is dependent on the dietary intake. Rahman (2016) reported that children from low-income households were more likely to be underweight than those from high-income households. The scenario in Malava Sub-county can as well be associated with the high poverty index in the entire Kakamega County. According to the 2017 Kenya National Bureau of Statistics baseline census survey 49.2% of the households in Kakamega County are poor (KNBS, 2017). The current study reported 77.9% of the households in Malava Sub-County earn less than Ksh. 5,000 per month. This can be interpreted that most of these households live on less than Ksh. 170 per day, which is below the recommended international standards of Ksh 250 ($1.90) for developing countries and considered to be living in extreme poverty (United Nations, 2015). This implies that, these households do not have adequate financial resources to purchase adequate and nutritious food for the children and for the entire family. Coupled with lack

of engagement in household economic activity to boost the household income, the situation is highly exacerbated and more cases of underweight may be expected in Malava Sub-county.

5.8 Relationship between Overall Mothers' Nutritional Knowledge, Practices and the Nutritional Status of Children

The study found a significant positive relationship between the overall nutrition knowledge of the mothers and the nutritional status of their children (r=0.126, p=0.020). This implies that, as the knowledge of the mother increases, the nutritional status of the child improves and vice versa. Fadare *et al.,* (2019) and Motebejana *et al.,* (2022) reported similar findings in their study where mothers' having high nutrition-related knowledge was associated with improved WAZ, HAZ and WHZ scores among children in Nigeria. Mothers having adequate knowledge on various nutrition aspects are more likely to practice it as hypothesized by the Health Belief Model. Lack of adequate nutrition knowledge may influence mothers not to breastfeed for the recommended period and initiate complementary feeding at an early age (Bimpong *et al.,* 2020). Consequently, inadequate nutrition knowledge of the mother may affect the choice of complementary foods and nutrition practices, resulting to poor nutritional status of children (Nankumbi & Muliira 2015). However, this finding is contrary to the findings of Umwali, (2020) who reported that maternal nutrition knowledge does not have any significant influence on the nutritional status of children.

There was no significant relationship between the overall nutrition practices of the mothers and the nutritional status of their children in this study. The findings concur with

Permatasari & Waluyanti (2019) who also reported non-significant relationship between

feeding practices of working mothers and the nutritional status of their children.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The chapter comprises of the conclusions drawn from the study findings and the discussion. The researcher has also made recommendations for action and for further researcher in this section.

6.2 Conclusions

There is a high number of young mothers in Malava Sub-county as evidenced by 25.6% of them aged below 20 years and 27.3% aged between 20-25 years. This situation has been orchestrated by the increased rate of school dropouts reported in the area and led to increased prevalence of teenage pregnancies. The situation has also contributed to lack of completion of school resulting to low academic achievement. Majority of the mothers had only achieved primary education with about 15% having no formal education at all and very few had attained tertiary education. Lack of formal education has far-reaching consequences to any population. Malava Sub-county has a high rate of unemployment with 83.7% of the mothers being unemployed.

Consequently, the households of these mothers have a low household monthly income with 77.9% having income less than Ksh. 5,000. This implies that majority of these households live below the international poverty line set by the United Nations in 2015. There is little engagement in economic activities to boost the household income despite the households engaging in farming, majority of what they produce is for subsistence

consumption and is not enough for the household due to reduced size of farming lands. Sugarcane is the most predominant cash crop grown in Malava Sub-county and over time has become less profitable to the households due to increase in price of farm inputs as reported by the respondents.

Majority of the mothers had received information on breastfeeding and complementary feeding from healthcare workers at the hospital. However, there was a gap on nutrition education at community level bearing in mind not all mothers visit the hospital. Knowledge on complementary feeding show gaps in the correct age for introduction of complementary feeding and length of continuation of breastfeeding after initiation of complementary foods. The mothers had satisfactory knowledge on the complementary foods for giving children at different ages. Generally, the mothers had good nutrition practices. However, the consumption of animal source flesh foods, pulses, fruits, eggs and egg products was poor despite the children meeting the minimum dietary diversity. Although the MUAC status showed few children were malnourished, the prevalence of stunting and wasting in Malava Sub-County was high as demonstrated by Low Height for age and Weight for Height Z scores respectively.

The level of education completed by the mothers was significantly associated with all the three indicators of malnutrition. Mothers' age was significantly associated with stunting while average household monthly income and household economic activity were significantly associated with underweight. There was a significant relationship between overall mothers' nutrition knowledge and the nutritional status for children in Malava Sub-county, Kakamega County

6.3 Recommendations

6.3.1 Recommendations for Policy

The socio-demographic and economic characteristics of the mothers in Malava Sub-county show poor statuses of majority of the indicators. Therefore, the County Government of Kakamega needs to adopt a multi-sectoral approach in addressing the situation in Malava Sub-county. This will involve engagement of several County Government ministries that will play a role through implementing various interventions. Key Ministries that may be involved will include; Ministry of Health Services, Ministry of Education, Science & Technology, Ministry of Finance and Economic Planning, Ministry of Youth and Social Services and the Ministry of Agriculture, Irrigation, Cooperative, Livestock, Veterinary Services and Fisheries. All these ministries needs to work synchronously in order to improve the situation in Malava.

The Ministry of Health Services, through the office of the county nutrition coordinator, needs to invest in capacity building community health promoters and community nutrition champions key nutrition messages for dissemination during community visits and community dialogue days for advocacy of good nutrition practices at the community levels. The community health promoters and nutrition champions also need to be capacity build on nutrition screening and assessment for early identification and referral of malnutrition cases at the community level. Nutrition education on importance of exclusive breastfeeding, introduction of complementary foods, types of complementary foods, continuation of breastfeeding up to 2 years and dietary diversity for children needs to be emphasized all through for better nutrition outcomes of children.

The Ministry of Education should mitigate the school dropouts to alleviate the instances of teenage pregnancies and early marriages. The ministry should also encourage the teenage mothers who did not complete their education to join the vocational training centres to acquaint themselves with skills and knowledge that they can use for income generation. This will help boost their household income and improve access to adequate food for the children thus alleviating malnutrition in children. The Ministry of Youth and Social Services should provide social support and social protection services to the teenage mothers, as they are considered vulnerable. The Ministry of Finance and Economic Planning should come up with livelihood support programmes for the households in Malava Sub-county and educate the mothers on opportunities they can venture in to boost their economic activity engagement.

The Ministry of Agriculture, Irrigation, Cooperative, Livestock, Veterinary Services and Fisheries should educate the households on technologies for producing adequate food for subsistence consumption. They should also be educated on upscaling of crop production pulses such as dried beans, peas, lentils, nuts and seeds and animal rearing to improve the production and consumption of flesh foods such as meat, meat products, poultry and poultry products. The ministry should also advocate for establishment of home gardens that shall promote cultivation of fruits to curb the low fruit intake and vegetables.

The study further recommends that Kakamega County government should fast track the implementation of the Kakamega County Agri-Nutrition strategy. The strategy aims at integrating nutrition sensitive strategies such as agriculture, food security, women empowerment, child protection and school with nutrition specific interventions such as promoting optimal breastfeeding, proper complementary feeding, proper dietary

diversification and responsive feeding practices among others. The study also recommend

frequent evaluation of the County Nutrition Action plan at the sub-county levels. This will

enable the county to understand which sub-counties are performing better and those which

find difficulties in implementation of the policy. The study further recommends

development of a framework for capacity building and retaining community nutrition

champions. This will enhance a continuous nutrition activism at the community level and

realize greater improvements in the nutrition indicators.

6.3.2 Recommendations for Further Research

The study recommends similar studies to be done in urban and rural settings to provide

for comparison with the current study. Further research to investigate the association

between relationship between household demographic and economic characteristics on

the nutritional status of children. More researches should be done on more nutrition

practices of mothers and their influence on nutritional status of children.

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APPENDICES

Appendix I: Informed Consent

Dear respondent,

My name is Zadok Maingi, a Masters student from Masinde Muliro University of Science and Technology, pursuing MSc. Public Health Nutrition. I am conducting a research on "*Nutrition knowledge and practices of mothers and the nutritional status of children 6-59 months' years in Malava, Kakamega County, Kenya.*". The information obtained from this study will solely be used for the purpose of academics. The study has been cleared by the University ethics and review committee, National commission for science and technology, Ministry of health-Kakamega County and the required permissions have been obtained from the relevant authorities.

Procedures to be followed

The research assistants will explain to you the purpose of this study. With your consent for you and your child to participate in this study, we intend to ask you questions on the nutrition care practices and nutritional status of your child. We will also ask several questions to assess your nutrition knowledge and practices as the mother. We will also take measurements of height and weight of your child to make us assess the nutritional status of your child. Lastly, you may be called upon to participate in a Focus Group discussion amongst other mothers. We will try our best to make the sessions as short as possible and also make sure that you are comfortable as a participant. I assure you that the research team has been trained appropriately to take an approach that protects you by making discussions wholesome, discrete and confidential as possible.

Privacy and Confidentiality

When conducting this research, privacy will be observed. The questions will be asked in an enclosed room with the research participant and the researcher/research assistant only. The measurements will also be taken in this room for purposes of maintaining privacy. The participant should note that any information given to the researchers will be treated with confidentiality. The information will be used for statistical purposes and records relating to the participant's identity such as name will not be revealed to any community

members. Thus, codes will be assigned to the participants and will be used to trace the participants instead there's need to recall.

Autonomy

Appropriate sampling techniques will be used depending on the population to be studied, to avoid bias. Please note that every mother/caregiver and their child residing with the selected wards of Malava Sub-County will have an equal chance of taking part in the study and there will be no discrimination whatsoever in those chosen to participate in the study

Voluntarism

Participants will be informed on the purpose of the study and participation will be purely on voluntary basis, thus as the respondent you have the right to terminate the study at any point. The researcher may also terminate the study for reasons that will be explained to the participants. No participant will be coerced by any means to participate in the study.

Beneficence

There will be no physical or material rewards given for one to take part in the study. The respondents will not accrue any direct benefits from the research as it is meant to generate generalizable data and information that will help all mothers understand the impact their nutrition knowledge and practices on the nutritional status of their children. Feedback from the data collected and analyzed will be shared with the participants and the Ministry of Health-Kakamega County.

Person to Contact

You are welcome to ask questions before consenting and at any time thereafter. The principal investigator and other research team members will be available to answer your questions anytime during the data collection. In case of further queries regarding the study, you may contact me or the MMUST Ethical Review Secretariat using the contact information given below. Your participation will be highly appreciated.

Zadok Maingi

Masinde Muliro University of Science and Technology

P.O Box 190-50100, Kakamega

Tel: +254-704403156 Email: zadokmaingi@gmail.com

Respondent's consent

I have understood the above information as fully explained to me by the principal investigator, and I voluntarily consent to participate in this study (Please indicate by signing your willingness to participate in this study)

Yes ☐   No ☐

Signature _____ Date _____

Investigator's Statement

I, the undersigned, have explained to the volunteer participant in the most understandable way and language, the procedures to be followed, risks and benefits involved in this study.

Name of investigator /Research Assistant _____

Investigator's signature _____   Date _____

A SEMI-STRUCTURED QUESTIONNAIRE ON THE NUTRITION KNOWLEDGE AND PRACTICES OF MOTHERS AND THE NUTRITIONAL STATUS OF CHILDREN 6-59 MONTHS IN MALAVA SUB-COUNTY, KAKAMEGA COUNTY, KENYA.

PART A: SOCIO-DEMOGRAPHIC DATA

This section contains data of the household composition, occupation of the family caregiver, religious beliefs and the economic activities engaged by the family. (*Circle the applicable*)

	Question	Responses (Tick in the brackets)
1.	Number of household members	_____members
2.	Head of the household	1. Mother [ ] 2. Father [ ] 3. Sibling [ ] 4. Grandparent [ ] 5. Others [ ]
3.	Gender of Household head	1. Male [ ] 2. Female [ ] 3. Trans gender [ ]
4.	Age of the mother	_____ years
5.	Marital status of mother to the child	1. Married [ ] 2. Single [ ] 3. Widowed [ ] 4. Divorced [ ] 5. Separated [ ]
6.	Parity of the child	
7.	Level of education of the mother (Completed)	1. No education [ ] 2. Primary [ ] 3. Secondary [ ] 4. Tertiary Education [ ]
8.	Religious beliefs of the mother/caregiver	1. Christian [ ] 2. Muslim [ ] 3. Hindu [ ] 4. Others [ ]
9.	Occupation of the mother	1. Unemployed [ ] 2. Self-employed [ ] 3. Employed [ ]

10.	Household average monthly income	1. < Ksh 5,000 [ ] 2. Ksh 5001-10,000 [ ] 3. Ksh10,001-15,000 [ ] 4. Above Ksh 15,001 [ ]
11.	**Main** source of income to the family	1. Salaried-Employment [ ] 2. Casual jobs [ ] 3. Business [ ] 4. Farming [ ] 5. Others …………………………………
12.	What is the major economic activity the household head is engaged in?	1. Farming (*go to qn. 12*) 2. Business (*go to qn. 15*) 3. Others
13.	If farming, what type of farming?	1. Subsistence farming [ ] 2. Cash-crop farming [ ] 3. Mixed farming [ ]
14.	If subsistence farming, which major food crops are grown	1. Starchy (grains, tubers and roots) [ ] 2. Legumes and nuts [ ] 3. Fruits [ ] 4. Vegetables [ ]
15.	If cash crop farming, which major cash crops are grown?	1. Tea [ ] 2. Coffee [ ] 3. Sugarcane [ ]
16.	If engaged in business, what type of business?	5. Wholesale [ ] 1. Retail [ ] 2. Hawking [ ] 3. Others specify [ ]

PART B: NUTRITION KNOWLEDGE AND PRACTICES OF MOTHERS

	A. Nutrition Knowledge
	I. Knowledge on breastfeeding

	Question	Responses
1.	Have you ever received information on breastfeeding?	Yes [ ] No [ ]
2.	If yes, where did you get the information from?	Hospital [ ] Community [ ] Others, specify
3.	Who/ what was the source of the information? [Tick ALL responses given]	1 = Health worker [ ] 2 = Family/relatives/friends (specify) [ ] 3 = Traditional birth attendant [ ] 4 = Media (magazines/ newspapers/ television/radio) (specify) [ ] 5 = other (specify) [ ]

4.	When did you receive this breastfeeding information?	1 = during ANC of the baby [ ] 2 = at the time of delivery of this baby [ ] 3 = at the time of delivery of past babies [ ] 4 = during post-natal clinic of other babies [ ] 5 = maternal and child clinic [ ] 6 = in the non-perinatal period [ ]
5.	Why is breastfeeding important?	1 = Do not know [ ] 2 = It is nutritious [ ] 3 = It prevents pregnancy [ ] 4 = It protects against infections [ ] 5 = other (specify) [ ]
6.	For how long should a mother exclusively breastfeed?	_____
7.	What should a baby be given immediately after a safe delivery? (*tick all responses given*)	1 = Breast milk [ ] 2 = Cow milk [ ] 3 = Plain water [ ] 4 = Infant formula [ ] 5 = Salt-sugar solution [ ] 6 = Sugar/ glucose solution [ ] 7 = Others (specify) [ ]
8.	After how long should a baby be put to the breast after a safe delivery?	1 = within 30 minutes [ ] 2 = Less than 24 hrs but after 1hour [ ] 3 = More than 24 hrs [ ] 4 =Do not know [ ]
9.	Should the baby be fed on the yellowish liquid (colostrum) that comes from the breast during the first few days?	Yes [ ] No [ ] Do not know [ ]
10.	**II. Knowledge on complementary feeding**	
11.	At what age should a baby be given other foods apart from breast milk?	_____Months
12.	After introducing complementary foods in children for how long should the child continue to be breastfed?	_____Months

13.	What type of foods should a child of;
	   a. 6-8 months consume?
	
	   b. 9-11 months consume?
	
	   c. 1-5 years consume?	

14.	How do you prepare the foods for giving to your child?	
15.	Do you mix ingredients when preparing food for your child?	Yes [ ] No [ ]
16.	If yes, what are some of the ingredients that you mix?	
17.	For cereal products, do you germinate first before processing?	
18.	How many meals should a child of; a. 6-8 months consume in a day? b. 9-11 months consume in a day? c. 1-5 years consume in a day?	
19.	**B. Nutrition Practices**	
20.	**Question**	**Response**
21.	Did you breastfeed your child?	Yes [ ] No [ ]
22.	If yes, for how many months did you breastfeed the child	_____ months
23.	If no, give reasons why?	
24.	Are you still breastfeeding your young child?	Yes [ ] No [ ]
25.	If yes; How many times do you breastfeed during the day? How many times do you breastfeed during the night?	……………… times ……………… times
26.	If no, at what age did you stop breastfeeding?	……………… months
27.	What made you stop breastfeeding?	
28.	Each time you breastfeed, do you feed from one breast or both?	Yes [ ] No [ ]
29.	Did you at some point express breastmilk for feeding the child later?	Yes [ ] No [ ]
30.	If yes, how do you store the expressed breast milk?	
31.	Do you ever give your child anything to drink in a baby bottle? (*Additionally, look to see if there is a bottle present with the child.*)	Yes [ ] No [ ]
32.	Do you give your baby any feedings besides breastfeeding?	Yes [ ] No [ ]
33.	At what age did you start giving the child other foods apart from breastfeeding?	

34.	What made you to give the child other foods?	
35.	Did you continue breastfeeding after introducing other foods?	Yes [ ] No [ ]
36.	If yes, what do you give the child? *(List all that apply)*	
37.	If yes, how many times do you feed your baby each day?	…………… times
38.	Who feeds your young child?	The mother [ ] The father [ ] Family relative [ ] Caretaker [ ] Others (specify) [ ]
39.	Do you or the person you feeds the young child wash your hands before you feed your child?	Yes [ ] No [ ]
40.	Do you always use soap? (***If possible, observe if there is a handwashing station in the house.***)	Yes [ ] No [ ]
41.	Do you watch your child eat?	Yes [ ] No [ ]
42.	Do you encourage your child to finish all the food?	Yes [ ] No [ ]
43.	What do you do to encourage the child to feed? *(List all that apply)*	
44.	Do you ever feed your young child food that you prepared earlier in the day?	Yes [ ] No [ ]
45.	Please tell me what, if anything, you do to the food before serving it again.	

PART C: DIETARY ASSESSMENT

24-hour dietary recall

Note to enumerator: Explain to the respondent to describe everything that the child ate or drank the previous day since morning whether at home or away from home. Record the amount on the 24-hour recall sheet using household equipment. Probe until the respondent says nothing else. If the respondent mentions mixed dishes such as porridge, *githeri* probe what ingredients were in that mixed dish**.**

Meal time	Type of meal	Description/ ingredients	Amount served (Household measure)	Amount consumed (Household measure)	Net grams served	Net grams consumed
Breakfast						
Morning snack						
Lunch						
Evening snack						
Supper/ dinner						
Late night snack						

PART D: NUTRITIONAL STATUS ASSESSMENT

This part contains information on the health assessment of the child, immunization status and nutrition assessment data on anthropometrics, clinical features and dietary assessment.

Section I: Morbidity

Child ID	Date of birth (*Card*)	Age in months	Gender of the child M= Male F= Female		Has your child been sick for the last two weeks, including today?		If yes, how many times?	If sick, has your child been eating relatively normal?	
			M	F	Yes	No		Yes	No

Did your child suffer from			1.Yes		2.No	Did you seek health assistance?		If yes, where? (*Tick where applicable*) 1.Own medication 2.Traditional healer 3.Private clinic/health facility 4.Public health facility	
If yes			No of times	No of days		Yes	No		
a) Diarrhea									
b) Cough									
c) Malaria									
d) Shortness of breath									
e) Vomiting									
f) Headache									
g) Bloody stool									
h) Bloody urine									
i) Rashes									
j) Joint and body pains									

Section II: Anthropometric assessment

Weight in Kgs (*to the nearest 0.1 kg*)			Height to the nearest 0.5 cm			MUAC (*to the nearest 0.5 cm)*	Pallor skin/ eye membrane *1=yes 2=no*	Presence of edema *1=yes 2=no*
Wt 1	Wt 2	Av. Weight	Ht 1	Ht 2	Av. Height			

Section III: Observation Checklist for Clinical assessment of malnutrition

BODY PART	CLINICAL FEATURES	YES	NO
HAIR	Thin?		
	Sparse?		
	Discolored?		
EYE	Parlor?		
	Bitot spot?		
	Ulceration?		
	pallor eye membrane		
TEETH	Discolored?		
LIPS	Cracked?		
SKIN	Dry, flaky, cracked?		
	pallor skin		
NAILS	Spoon shaped?		
LEGS	Bow shaped, knocked knees?		

Thank you for your responses

****

THE END

****

Appendix III: Focus Group Discussion Guide

1. Have you ever received information about breastfeeding (probe when, where and who gave the information)

2. What were you told about breastfeeding and for how long should a mother exclusively breastfeed?

3. At what age do most mothers in your community start complementary feeding?

4. At what age do most mothers in your community stop breastfeeding?

5. Do mothers in your community continue breastfeeding after introducing complementary foods?

6. What are the major challenges facing Exclusive Breastfeeding practice in your community?

7. How many meals in a day are children of 6-8, 9-11 and 12-59 months given in your community?

8. What type of foods are given to children of 6-8, 9-11 and 12-59 months given in your community?

9. What are the major challenges mothers in your community face when introducing complementary feeds to children?

10. Do mothers in your community mix ingredients when preparing food for the children? If yes, what type of foods are mixed? (probe)

11. Are mothers aware of germinating cereal products before processing and cooking? If yes, what are the perceived benefits?

12. As a mother, how do you encourage your child to eat?

13. How do you notice that your child is sick? What do you do the child

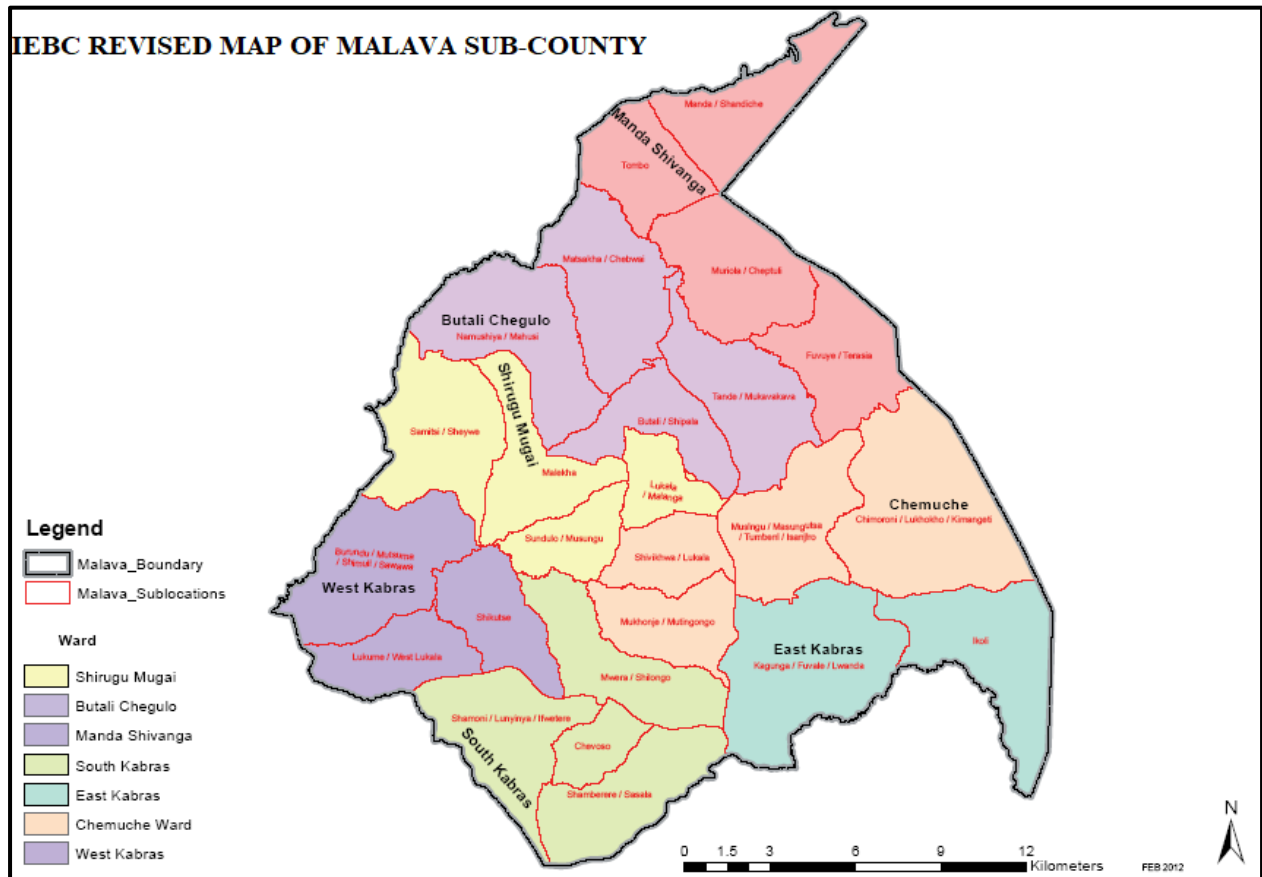**Appendix IV: Map Of The Study Area**

Map of Kakamega County
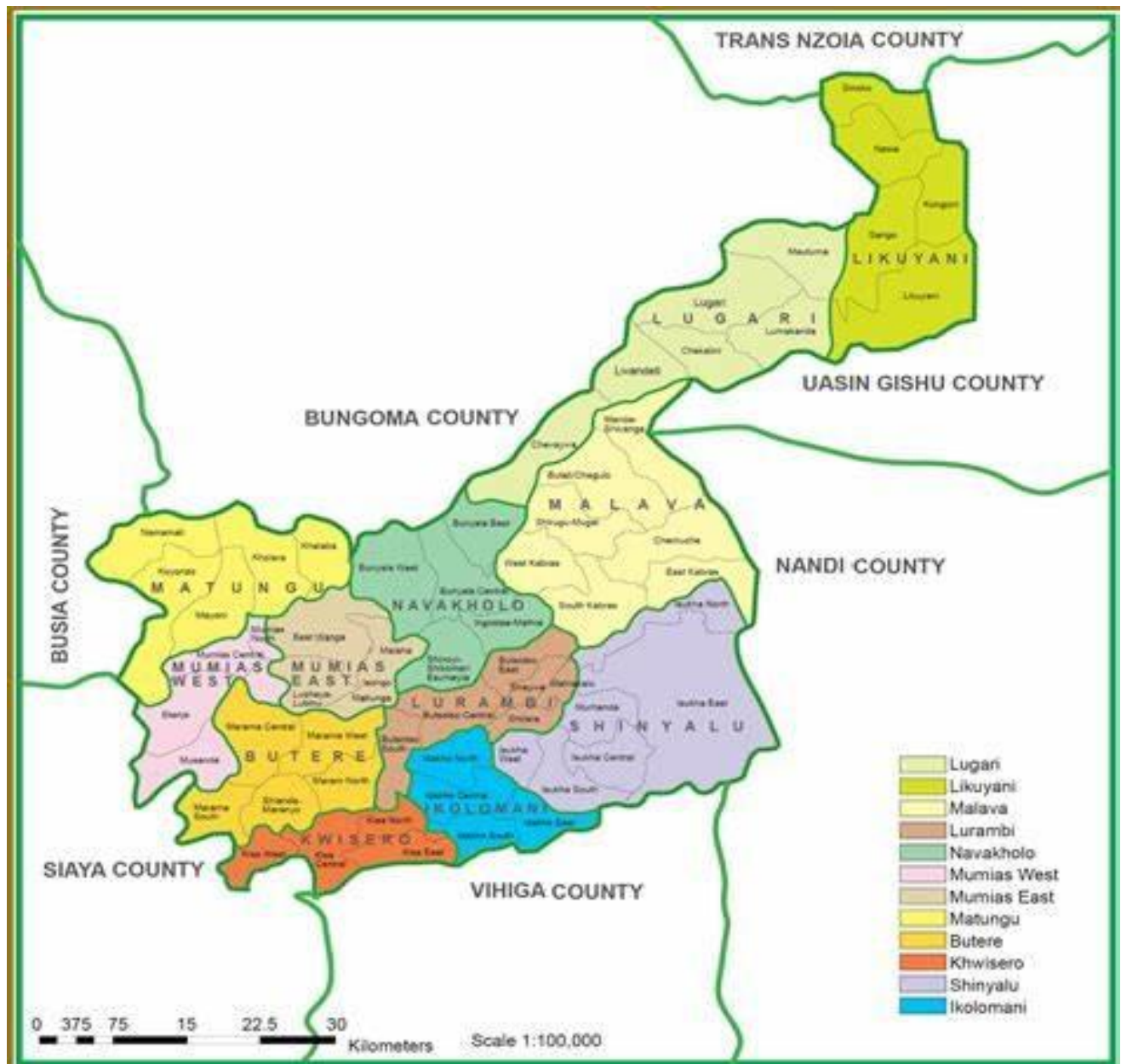
Source: Kakamega County Integrated Development Plan. (2018-2022)

Map of Malava Sub-County

Source: Independent Electoral and Boundaries Commission Revised Maps, 2012

Appendix V: MMUST Directorate of Postgraduate Studies Approval

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

Tel: 056-30870
Fax: 056-30153
E-mail: directordps@mmust.ac.ke
Website: www.mmust.ac.ke

P.O Box 190
Kakamega – 50100
Kenya

Directorate of Postgraduate Studies

Ref: MMU/COR: 509099

7th July 2021

Zadok Maingi,
HPN/G/01-53164/2018,
P.O. Box 190-50100,
KAKAMEGA.

Dear Mr. Maingi,

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your Masters Proposal entitled: *"Nutrition Knowledge and Practices of Mothers and Nutrition Status of Children 6-59 Months in Malava Sub-County, Kakamega"* and appointed the following as supervisors:

1. Dr. Silvenus Konyole   -   SPHBST, MMUST
2. Dr. Lucy Mutuli   -   SPHBST, MMUST

You are required to submit through your supervisor(s) progress reports every three months to the Director Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Public Health, Biomedical Sciences and Technology Graduate Studies Committee and Chairman, Nutritional Sciences Department. Kindly adhere to research ethics consideration in conducting research

It is the policy and regulations of the University that you observe a deadline of two years from the date of registration to complete your master's thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

Dr. Consolata Ngala
DEPUTY DIRECTOR, DIRECTORATE OF POSTGRADUATE STUDIES

Appendix VI: MMUST IERC Approval

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

Tel: 056-31375   P. O. Box 190-50100
Fax: 056-30153   Kakamega, Kenya
E-mail: ierc@mmust.ac.ke
Website: www.mmust.ac.ke

Institutional Ethics Review Committee (IERC)

Ref: MMU/COR: 403012 Vol 4 (01)   Date: 14th July, 2021

Zadok Maingi,
HPN/G/01-53164/2018,
Masinde Muliro University of Science and Technology,
P.O. Box 190-50100, Kakamega.

Dear Mr. Maingi,

RE: Nutrition Knowledge and Practices of Mothers and Nutrition Status of Children 6-59 Months in Malava Sub-County, Kakamega. - MMUST/IERC/200/2021

Thank you for submitting your proposal entitled as above for initial review. This is to inform you that the committee conducted the initial review and approved (with no further revisions) the above Referenced application for one year.

This approval is valid from 14th **July, 2021** through to 14th **July, 2022**. Please note that authorization to conduct this study will automatically expire on by 14th **July, 2022.** If you plan to continue with data collection or analysis beyond this date please submit an application for continuing approval to the MMUST IERC by 14th **June, 2022**

Approval for continuation of the study will be subject to submission and review of an annual report that must reach the MMUST IERC Secretariat by 14th **June, 2022.** You are required to submit any amendments to this protocol and any other information pertinent to human participation in this study to MMUST IERC prior to implementation.

Please note that any unanticipated problems or adverse effects/event resulting from the conduct of this study must be reported to MMUST IERC. Also note that you are required to seek for research permit from NACOSTI prior to the initiation of the study.

Yours faithfully,

Dr. Gordon Nguka (PhD)
Chairman, Institutional Ethics Review Committee

Copy to:
- The Secretary, National Bio-Ethics Committee
- Vice Chancellor
- DVC (PR&I)

Appendix VII: NACOSTI Research License

Ref No: 858150

Date of Issue: 21/July/2021

RESEARCH LICENSE

This is to Certify that Mr.. ZADOK MUNYWOKI MAINGI of Masinde Muliro University of Science and Technology, has been licensed to conduct research in Kakamega on the topic: Nutrition Knowledge and Practices of Mothers and Nutrition Status of Children 6-59 Months in Malava Sub-County, Kakamega for the period ending : 21/July/2022.

License No: NACOSTI/P/21/11883

858150

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE TECHNOLOGY &
INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document,
Scan the QR Code using QR scanner application.

NATIONAL COMMISSION FOR
SCIENCE, TECHNOLOGY & INNOVATION

REPUBLIC OF KENYA

Appendix VIII: County Commissioner Research Authorization

REPUBLIC OF KENYA

THE PRESIDENCY
MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL GOVERNMENT

Telephone: 056 -31131

Email: cckakamega12@yahoo.com
When replying please quote:

Ref: ED 12/1/VOL.V/171

County Commissioner
Kakamega County
P O BOX 43 - 50100
KAKAMEGA

Date: 26th July, 2021

Mr. Zadok Munywoki Maingi
Masinde Muliro University of Science and Technology
P.O Box 190 – 50100
KAKAMEGA

RE: RESEARCH AUTHORIZATION

Following your authorization vide letter **Ref: No. NACOSTI/P/21/11883** dated 21st July, 2021 by **NACOSTI** to undertake research on "*Nutrition Knowledge and Practices of Mothers and Nutrition Status of Children 6-59 months in Malava Sub County, Kakamega*" for the period ending 21st July, 2022. I am pleased to inform you that you have been authorized to carry out the research on the same in this county.

EREDI C.M.
FOR: COUNTY COMMISSIONER
KAKAMEGA COUNTY

123

Appendix IX: Kakamega County Ministry of Health Approval

REPUBLIC OF KENYA
COUNTY GOVERNMENT OF KAKAMEGA

Telephone: 056 31125
Website: www.kakamega.go.ke

E-mail: pdmswestern@gmail.com

DIRECTOR HEALTH SERVICES
P O BOX 2309- 50100
KAKAMEGA

July 28th 2021

DEPARTMENT OF HEALTH SERVICES

To Malava SCMOH

DEAR SIR,

RE: Study on Nutrition Knowledge and Practices of Motherhood and Nutrition Status of Children 6-59 Months in Malava Sub- county

This is to acknowledge that Zadok Maingi, a master student at Masinde Muliro University of Science and Technology has received ethical approval from the university's Institutional Ethics Review Committee (MMUST/IERC/200/2021) and National Commission for Science Technology and Innovation (NACOSTI/P/21/11883) on the topic named above.

This letter is to certify that he has followed due procedure before starting any form of data collection for this study within Kakamega, department of health. His study protocol satisfactorily addresses all the ethical considerations as approved by the ethical review committees- refer to the study protocol and ethical approval that he will provide.

He shall be required to work closely with the County Nutrition Officer during the study period and to share the study findings with all key stakeholders through the Kakamega Director of Health Services' office.

Kindly accord him the necessary support to enable him achieve his objectives as well as contribute to evidence towards Nutrition knowledge and practices in Malava Subcounty. The department looks forward to findings from this study as it addresses previously identified information gaps. This letter covers his data collection period that expires on 21nd July 2022.

Best Regards,
For Dr. John Otieno,

Ag. Director Health Services,
Department of Health, Kakamega County.