

**ASSESSING FACTORS HINDERING THE EFFECTIVENESS OF THE
FAMILY MUAC PROGRAM IN DETECTING MALNUTRITION AMONG
UNDER-FIVE YEARS CHILDREN IN BANISA SUB-COUNTY, MANDERA
COUNTY**

**SAIDA ROBLE HASSAN
REG NO: HND-3-1892-1/2021**

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DECLARATION

STUDENT'S DECLARATION

I declare that this thesis is my original work and has not been presented in any other University for examination.

Signature: ----- Date: -----

Saida Roble Hassan

HND-3-1892-1/2021

SUPERVISOR'S DECLARATION

The thesis has been submitted for examination with our approval as University Supervisors.

Signature: ----- Date: -----

Name: Dr. Lily Masinde

Signature: ----- Date: -----

Name: Dr. Lawrence Mugambi

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ABSTRACT

The Family MUAC Program, which involves training mothers and caregivers to use a Mid-Upper Arm Circumference (MUAC) tape to detect signs of malnutrition in children, has shown positive outcomes in terms of improving nutrition surveillance and early detection of malnourished children. In its implementation, there have been challenges which have made the program not successful as it was intended. The study general objective focused on the barriers to effectiveness of family MUAC programs in Banisa sub-county in Mandera County. In this case, the study focused on four objectives which included; assessing mothers' sociodemographic characteristics, socioeconomic factors, health facility services, and training factors' influence on nutrition surveillance and early detection of malnutrition among children aged 6-59 months in Banisa sub-county in Mandera County. The early detection and nutritional surveillance amounted to effectiveness of the family MUAC programs. The study was guided by Cognitive Behavioral Theory (CBT) which informed the study variables. The study adopted correlation research design, where the study sought to establish any statistically significant correlations between the independent and the dependent variable, effectiveness of family MUAC program. Target population was 293 mothers from Banisa Sub-County, from where a sample size was established at 236 mothers, but managed to get 209 fully filled questionnaires. This corresponded to 89% response rate which was considered adequate for analysis of the findings. The sample size was through systematic simple random sampling method. The researcher interviewed mothers presenting to the clinic until the sample size was achieved. Data collection was primary and the researcher administered questionnaires and interview guides. Data was analyzed using SPSS version 26. Presentation was on tables, frequencies and percentages. Bivariate analysis was done, having Pearson correlations coefficients and multivariate analysis was done through multiple linear regression, with ANOVA and regression coefficients. The findings of the study showed that there was a positive significant relationship between Socio-economic factors, training factors, health facility, and effectiveness of family MUAC programs ($p < .001$). Only mothers' characteristics was not significantly correlated to effectiveness of MUAC programs. The study recommendation and conclusion aimed at training mothers to capacity build on using the family MUAC program, and to know the features and indicators to look for in enhancing nutritional surveillance and early detection of malnutrition among children under five.

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LIST OF ABBREVIATION

CBT:	Cognitive Behavioral Theory
CMAM:	Community Based Management of Acute Malnutrition
GWG:	Gestational Weight Gain
IBW:	Infant Birth Weight
KDHS:	Kenya Demographic Health Survey
MAMMS:	Maternally Administered Malnutrition Monitoring Systems
MNHA:	Mothers' nutritional and health awareness
MUAC:	Mid- Upper Arm Circumference
NDMA:	National Drought Management Authority
OTP:	Outpatient Program
PTSD:	Post-Traumatic Stress Disorders
SAM:	Severe Acute Malnutrition
SOC:	Standard Care
SPSS:	Statistical Package for Social Science
UNICEF:	United Nations International Children's Emergency Fund
USD:	United States Dollar
WHO:	World Health Organization
WHZ:	Wright for Height Z-Score

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

For proper human growth and development, nutrition is a key component. According to United Nations Children's Fund (UNICEF, 2020), one in every three people are experiencing malnutrition in one form or another globally. Malnutrition related challenges are characterized by generally triple burden of malnutrition that is, under nutrition, micronutrient deficiencies also known as hidden hunger and over-nutrition. According to Jebero et al. (2023) it is estimated that 150.8 million children who are below the age of five years (22.2%) are stunted while 50.5 million children (7.4%) are wasted. While the rates of overweight and obesity are rising in low- and middle-income countries, it is estimated that 45% of deaths among children below five years of age are associated with under nutrition. The medical, economic and social impacts of global malnutrition are detrimental and lasting for individuals, families and communities at large.

Morbidity and mortality rates associated with malnutrition in sub-Saharan Africa are reported to be increasing compared to other parts of the world. It is estimated that about 26%- 38% of children below five years of age are suffering from malnutrition resulting to about 3.5 deaths of children under five years of age. The situation of under nutrition in Kenya is almost similar to the global outlook, about a quarter of children aged five years and below are stunted contributing to 26%, 4% are wasted and 11% are under weight. These figures differ from county to county with Kitui and West Pokot leading stunting levels at 46%. Arid and semi-arid counties have the highest wasting levels up to 20% attributed to poor feeding practices, poor diets and diseases (UNICEF, 2020). The Kenya demographic health survey (KDHS, 2022) reported a decline in stunting from 35.3% 2008 to 26% in 2014, and further to 18% in 2022. Of the 16.4 million children aged 6-59 months suffering from severe acute malnutrition, only

7%-13% receive treatment every year (Guerrero, 2018). In Mandera, there is an increase in the rates of children at the risk of malnutrition to about 19.7%, the global acute malnutrition rate is at 20.4%, moderate acute malnutrition is at 16.4 % while severe acute malnutrition stands at 4% (Teshale et al., 2023). Despite the fact that severe acute malnutrition (SAM) screening and treatment have been covered more by community-based management of acute malnutrition (CMAM) over the past ten years, there are still persistent SAM cases and coverage gaps, which makes it urgent for the public health community to identify strategies for increasing access to healthcare and ways to scale up these strategies. Nevertheless, these rates can be reduced through the use of Mid-Upper Arm Circumference (MUAC) for early detection of malnutrition cases (UNICEF, 2020).

The use of MUAC by healthcare providers at facility and community level for screening and early detection of SAM was linked to the initial success of CMAM and has remained to be simple, accurate, affordable and acceptable. Despite having the word community in the acronym CMAM, there was seldom a measurement component at household level. Community health workers have successfully diagnosed and treated child illnesses for many decades but their potential for addressing the burden of under nutrition alone remains largely untapped, hence family MUAC program was introduced. The roles of the community health workers to detect, diagnose and even treat uncomplicated SAM cases are expanded to decentralize SAM care. The prospect of MUAC-focused management led by community members and caregivers is believed to have great potential for improving public health. It increases coverage of CMAM programs, community sensitization, early detection of the affected children, reducing cases of complicated SAM due to late detection. Detecting these cases of malnutrition early allows us to avert the worst-case scenario rather than waiting until children are in desperate nutritional need. Nevertheless, many cases of malnutrition are diagnosed late leading to a high mortality

rate risk, especially among children under the age of five. People living in slums and areas prone to drought have a higher risk of hunger and malnutrition.

Among other methods of detecting malnutrition in the communities, there is use of MUAC tape, also known as the Mid-Upper Arm Circumference tape, is a basic-colored tape. It is a very revolutionary and simple-to-use technology that enables mothers to diagnose malnutrition while at home and without the assistance of healthcare professionals. It is suitable for children aged 6 months to 5 years. Wrap it around the kid's arm and use the color code to determine how malnourished the youngster is. Green implies that MUAC has discovered no acute malnutrition, yellow shows that the kid is suffering from moderate acute malnutrition, and red denotes severe acute malnutrition. Despite the existence of efficient CMAM programs, many children with acute malnutrition are still recognized too late, putting them at a higher risk of death (Tessema et al., 2020).

Family Mid-upper arm circumference (MUAC) screening is a method in which mothers are taught to measure MUAC and test for edema to detect acute malnutrition in their children (Gerber et al., 2019). Mothers' participation in nutrition screening activities acknowledges that they are best positioned to detect early indicators of malnutrition and underscores their responsibility in preserving and improving their children's health. The main goal for introduction of this program globally was to enlarge the coverage and frequency of creating awareness, screening for early detection and treatment of acute malnutrition among children. In 2012 the family MUAC approach was introduced, when the Alliance for International Medical Action did its first trial in Niger and from then other countries, non-governmental organizations and the United Nations have adopted the approach. To avoid close contact between many people during the Covid 19 pandemic in the year 2020, countries such as Kenya

and Zambia adopted family MUAC approach where it gained popularity in communities for continuity of screening for wasting at the same time reducing contamination chances.

According to Bahwere et al (2024), suggested that to assess the effectiveness of Family MUAC approach, monitoring and evaluation strategy must be defined at community and health centre levels. In west and central Africa region there is no standardized implementation of the family MUAC, however certain similarities are observed across contexts in terms of training, thus the need to conduct more research and studies to evaluate factors that hinder the effectiveness of family MUAC program in early detection of malnutrition cases.

1.2 Statement of the Problem

The rates of malnutrition in Mandera County are still alarming. The Coping Strategy Index (CSI) for the month of January 2021 in Mandera is 17.45, which is an increase from the value of 16.8 in the month of December 2020. In addition, from December 2020 to January 2021, the percentage of children under the age of five who were at risk of malnutrition (MUAC) increased from 21.7% to 23.4 %. Consequently, there is an increase in the morbidity rate and mortality rates of children below 5 years. One way to avert this scenario is application of early detection of malnutrition at family level which will help in provision of further management. The most efficient and applicable way of early detection of malnutrition at family level is the use of family MUAC. The information regarding factors hindering the effectiveness of family MUAC are not well elucidated. Therefore, there is need to assess factors hindering the effectiveness of Family MUAC as an appropriate technique in detecting malnutrition earlier to reduce the number of child mortality and morbidity.

1.3 Purpose of the Study

Pandey and Pandey, (2021) noted that purpose of a study clearly defines what the study aims to achieve, how it will be conducted, and what it will accomplish. Further, they emphasized on the need for reflecting the research questions, methodology, and theoretical framework of

the study. Therefore, conducting a study on Famil MUAC (Mid-Upper Arm Circumference) programs and their impact on nutrition surveillance and early detection of malnutrition among children aged 6-59 months serves the following purpose. The study was of significance in assessing the effectiveness of family MUAC programs in detecting malnutrition cases early. Moreover, there was the need to establish whether they constitute timely interventions.

1.4 Research Objectives

The study was guided by both general and specific objectives.

1.4.1 General Objective

The study general objective assessed the factors hindering the effectiveness of family MUAC program on nutrition surveillance and early detection on malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County.

1.4.2 Specific Objectives

The study specific objectives included the following;

- i. To assess the influence of mothers' characteristics on the effectiveness of family MUAC programs on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County.
- ii. To identify socio-economic factors hindering the effectiveness of family MUAC programs on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County.
- iii. To examine the influence of health facility services on the effectiveness of family MUAC programs on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County.
- iv. To assess the influence of training factors on the effectiveness of family MUAC programs on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County.

1.5 Research Hypotheses

- H01:** There is no statistically significant relationship between mothers' characteristics and effectiveness of family MUAC program on detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County.
- H02:** There is no statistically significant relationship between socio-economic factors and effectiveness of family MUAC program in detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County.
- H03:** There is no statistically significant relationship between health facility services and effectiveness of family MUAC program on detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County.
- H04:** There is no statistically significant relationship between training factors and effectiveness of family MUAC program in detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County.

1.6 Justification of the Study

The justification of the study is a critical component that outlines the reasons why the research is important, relevant, and necessary (Nayak & Singh, 2021). First, due to high prevalence of malnutrition, Banisa Sub-County tend to have high prevalence of malnutrition among children aged 6-59 months, as seen in many rural areas. Secondly, due to limited access to healthcare facilities in Banisa Sub-County creates a bigger challenge for families to access regular health check-ups for their children.

The study findings are of critical importance to different stakeholders. For instance, the county government and the national government is able to use the findings to initiate measures to strengthen the family MUAC program in Mandera county. Further, scholars are able to benefit from this study findings as they can act as point of reference for future studies. In the same case, the findings add to the pool of literaterature on community and family survaillance of

malnutrition among under-fives. The study findings also contribute to the discussion on how the local communities can better improve the monitoring and surveillance of malnutrition cases in remote areas.

1.7 Limitation of the Study

Alam, (2021) explains limitations to be factors that places restrictions and influences a research study and which the researcher does not have control over. For residents of Banisa Sub-County, accessing information required for this research might be a challenge. The respondents may tend to withhold information for fear that it may be misused or used for other purposes apart from academic research purpose. To overcome this challenge, the research assistants carried along an introduction letter and research permit which was used to approach the management to assist in data collection.

Second, limiting oneself to a case study of Banisa Sub-County does not allow for the generalization of the findings. The findings are only limited to organizations similar to Banisa Sub-County. However, to allow for generalization of findings, data collection tool was checked for validity and reliability through a pilot test to ensure that it was accurate and reliable data.

Lastly, the study was reflective and relied on the recall capacity of the respondents and their ability to provide objective responses in the questionnaire. Therefore, the study could be affected by biased reporting and poor recall capacity of the respondents. However, the respondents were notified of the importance of their accurate and objective responses in the study.

1.8 Delimitation of the Study

Coker (2022) noted that delimitation refers to the boundaries and limitations that the researcher establishes within the scope of the study. Therefore, delimitation help focus on the study and make it more manageable by explicitly stating what will be included and excluded from the investigations. The main limitation of the study is that the study targets Banisa Sub-County,

thus limiting the generalizability of findings to other regions or contexts. Moreover, factors unique to this area may influence the effectiveness and implementation of family MUAC programs differently compared to other responses.

1.9 Operational Definitions of Variables

Social-Demographic Factors: It tends to play a significant role in the effectiveness of MUAC programs on nutrition. In the study, sociodemographic factors included maternal education, employment, age, and socioeconomic status which are linked by nutritional outcomes of children. They were measured by closed-ended questions, provided as options to the respondents.

Mother Characteristics: In the study, it will constitute to mothers' level of awareness and understanding among mothers regarding the importance of nutrition and the signs of malnutrition can greatly impact surveillance efforts. The mother characteristics included caregiving practices, household food security, and their knowledge of family MUAC program. The variable was measured by both open and closed-ended questions.

Health Facility: It will constitute on the availability and accessibility of healthcare facilities, including clinics and hospitals, play a crucial role in early detection and surveillance of malnutrition cases. Factors such as distance to healthcare facilities, transportation infrastructure, and affordability of healthcare services can impact access. The health facility factors were measured using both closed- and open-ended questions given to the respondents.

Training Factors: Provides comprehensive training to community health workers who play a crucial role in conducting nutrition surveillance and early detection. This training should cover aspects such identification of signs of malnutrition, conducting nutritional assessments, and educating caregivers on proper nutrition practices. The training factors were also measured through open- and closed-ended questions.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section provides a literature review on factors that hinder effectiveness of family MUAC program on nutrition surveillance and early detection of malnutrition. Subtitles included are overview of malnutrition, programmes used to assess malnutrition, measuring malnutrition, Nutrition assessment systems, measuring MUAC, family MUAC among mothers, cost effectiveness of family MUAC program, effects of using family MUAC in early detection of acute malnutrition and challenges affecting use of family MUAC among mothers.

2.2 Empirical Review

2.2.1 Mothers Characteristics on effectiveness of family MUAC program

Mothers' awareness of health and nutrition is also crucial in reducing the risk of malnutrition in children. A study in a marginalized district of Punjab, Pakistan found that malnutrition was high in the district, and around 91.84% of malnourished children belonged to the low mothers' nutritional and health awareness (MNHA) category compared to medium and high MNHA categories. According to a study by Shahid et al. (2022) examined a study on whether mothers' awareness of health and nutrition, a case of malnutrition in marginalized rural community of Punjab, Pakistan. Maternal nutritional awareness might reduce the risk of malnutrition in children. This study assesses the impact of MNHA on the nutritional status of pre-school children in rural South Punjab. Using a proportionate purposive simple random sampling technique, the researchers collected data with the help of a self-administered questionnaire on height, age, the weight of children, and socio-economic profile from 384 rural households in one of the marginalized districts of Punjab. The study applied the binary logistic regression model to compute the probability of malnutrition. The results indicate that malnutrition was high in the district (the prevalence rate for underweight is 46.1%, for stunting 34.83%, and for wasting is 15.49%). Around 91.84% of malnourished children belonged to the low MNHA

category compared to medium (5.61%) and high (2.55%) MNHA categories. The results further show that the prevalence of moderate and severe stunting, wasting, and underweight in low MNHA categories was much higher with large differences compared to both medium and high MNHA categories. The binary logistic regression results depict that, across the household deprivation index (HDS), the odds of a child becoming malnourished were lower in households HDS-2 category (OR = 0.02, 95% CI: 0.01–0.89), and odds were also lower in households HDS-3 category (OR = 0.001, 95% CI: 0.001–0.16). Similarly, across the scores of MNHA index, the odds of malnutrition were lower among the children of those mothers who had medium MNHA (OR = 0.04, 95% CI: 0.002–1.24), and also the probability of child malnutrition was lower among the children of mothers who had high MNHA (OR = 0.008, 95% CI: 0.002–0.29). The study urges that well-resourced, targeted, and coordinated health and nutritional education and awareness programs are required to tackle malnutrition.

Andersen et al. (2024) examined a study on maternal and child nutrition services associated with nutritional knowledge and practices in India. To evaluate whether maternal and child nutrition activities provided through the Indian Integrated Child Development Services scheme in India were associated with improved nutritional knowledge and practices among beneficiary women, used a multistage sampling design to randomly select 4400 pregnant women or mothers of children younger than 2 years for a cross-sectional telephone survey. The respondents were beneficiaries of the scheme from across 11 Indian states. The study used multivariate regression models controlling for sociodemographic factors to estimate the association between: scheme activities and nutrition messages heard; and scheme activities and nutrition practices. The study estimated the proportion of the total association with nutrition practices which was mediated by nutrition messages. Among 110 regression models testing unique pairs of seven activities and 18 nutrition messages, 103 showed a statistically significant positive relationship (median risk ratio, RR: 1.14). For activities and nine nutrition practices,

39 out of 54 tested pairs were significantly associated (median RR: 1.16). The study observed statistically significant mediation through nutrition messages for 28 out of 42 tested pairs of activities and nutrition practices. Receipt of the scheme's activities was associated with improved nutrition knowledge and practices. Improvements in practices were statistically mediated by improvements in knowledge. These findings suggest that a large-scale nutrition scheme with a strong counselling component could successfully change beneficiary behaviors.

In a regional hospital in northeast Namibia, a study found that most mothers had appropriate nutritional knowledge, but only a minority had appropriate practices regarding feeding their children, indicating a knowledge/ practice mismatch regarding the significance of exclusive breastfeeding during the first six months and the vitality of breast milk to the child. Moreover, Albanus and Ashipala, (2023) emphasized on a study on nutritional knowledge and practices of mothers with malnourished children in a regional hospital in Northeast Namibia. An estimated 159 million children under five are affected by malnutrition, with an additional 101 million children under five being underweight in sub-Saharan Africa. In Namibia, 24% of children under age 5 are stunted and 8% are severely stunted. The Kavango region has the highest rate of stunting (38.8%) in the country. The purpose of the study was to determine and describe the nutritional knowledge and practices of mothers with malnourished children regarding feeding at Rundu Intermediate Hospital, Kavango East Region, Namibia. A quantitative cross-sectional research design was used. A convenience sampling technique was used to select 199 mothers with malnourished children who were admitted to the pediatric ward. Data were collected via self-administered questionnaires with closed-ended question and its was established that most mothers (51.8%) had appropriate nutritional knowledge. However, only a minority (35.6%) of the mothers had the appropriate practices regarding feeding their children. Hence, there was a knowledge/practice mismatch regarding the significance of exclusive breastfeeding during the first six months, and generally the vitality of

breast milk to the child. These findings may be used to develop strategies and target interventions to create awareness among mothers regarding effective breastfeeding practices.

In Kenya, mothers have been empowered to detect acute malnutrition in their children through the use of a simplified MUAC tape. This approach has been successful, with two-thirds of mothers and caregivers able to use the tape accurately to minimal training. According to Ndemwa et al. (2017) conducted a nutritional status and association of demographic characteristics with malnutrition among children less than 24 months in Kwale County, Kenya. Malnutrition is an underlying cause of mortality in about half of the cases that occur among children less than five years in developing countries. In Africa including Kenya, this problem may be exacerbated by socio-demographic and socio-economic factors. The study aimed at determining nutritional status and association of demographic characteristics with malnutrition among children aged 1 day to 24 months in Kwale County, Kenya.

A study by Gichana (2013) in Dagoretti in Nairobi County focused on nutritional knowledge of mothers and nutritional status of their children 6-59 months under Malezi bora programme implemented in Dagoretti in Nairobi County. The author used cross-sectional survey approach, and a sample of 322 under-five children who were assessed for nutritional status via anthropometric measurements. The findings were that mothers interviewed had some low knowledge of the nutritional status of their children, and this affected how they made decisions on their children nutritional evaluation. The authors concluded that there was need to enhance their nutritional knowledge among mothers to increase health surveillance of their children.

In addition, another study by Maingi (2023) focused on nutrition knowledge and practices of mothers and the nutritional status of children 6-59 months in Malava, Kakamega county, Kenya. The study was done to establish the relationship between nutritional knowledge and practices of mothers and the nutritional status of their under-five children. The authors used a

cross-sectional research design, with simple random sampling, leading to 344 mothers. Further, questionnaires were used, along with descriptive and inferential statistics processed using SPSS and WHO Anthro software. The study findings were that mothers' nutritional knowledge was strongly correlated with nutritional status of children ($p < 0.046$, 95% CI). This meant that mothers having substantial nutritional status was translated to being aware of the children nutritional status.

Further, another study by Abdirahman (2019) focused on Nutrition knowledge, dietary practices and nutrition status of pregnant adolescents in Mandera County, Kenya. The study was based on the fact that nutritional knowledge of the mother influenced the nutritional status of the children. The authors used a cross-sectional study design, having 258 pregnant adolescents. Questionnaires were used and data processed using SPSS. Both descriptive and inferential statistics were used, embracing logistical regression analysis. The findings were that there was low nutritional knowledge among the pregnant adolescents, and it was correlated with poor nutritional status ($r = 0.56$, $p < 0.005$). The low education level was associated with poor health and nutritional outcomes. The study (gap) was unique in that it focused on pregnant adolescents, where the current study narrows to all adult mothers.

A cross-sectional study was done in Mwaluphamba Location, Kwale County, Kenya. Data was collected using a semi-structured questionnaire and administered to 380 randomly selected mothers who had children under the age of two years. Nutrition status was determined using anthropometric measurements. Data was analyzed using descriptive statistics and associations were determined by univariate logistic regression. Malnutrition prevalence for children in Kwale was high with 29.2% of the children being stunted and 13.4% being severely stunted. Underweight prevalence was at 20.8% of whom 9.5% were severely underweight. The global acute malnutrition rate was 18.9%. Stunting differed significantly between sex (males 35.1%

compared to females 21.7%; $p = 0.005$). Significant differences were also observed in stunting and underweight due to age ($p < 0.005$). The prevalence of stunting, underweight and global acute malnutrition rates was high among the children. Male children were associated with a significantly higher prevalence of stunting than the females. The prevalence of underweight and stunting significantly increased with increasing age. The research gap is that the author focused on children under two years, as opposed to the current study which focused on mothers with children under five years.

2.2.2 Socio-Economic Factors on effectiveness of family MUAC program

Socio-economic factor plays a crucial role in effectiveness and uptake of family MUAC programs for nutrition surveillance and early detection. According to Mohamed et al. (2022) examined a study on maternal diet, nutritional status and infant birth weight in Malaysia. Women's diet and nutritional status during pregnancy are important in influencing birth outcomes. The study adopted systematic scoping review of the best available evidence regarding dietary intake of Malaysian pregnant women, and the associations of maternal diet, anthropometry, and nutrition-related co-morbidities with the infant's birth weight (IBW). The study objectives examined the adequacy of micronutrient intake among pregnant women; and the association of maternal factors (anthropometry, diet, plasma glucose and blood pressure) during pregnancy with IBW. Eleven search engines such as Proquest, EbscoHost, Scopus, Cochrane Library, Science Direct, Wiley Online Library, PubMed, Google Scholar, MyJournal, BookSC and Inter Library Loan with Medical Library Group were extensively searched to identify the primary articles. Three reviewers independently screened the abstracts and full articles based on the inclusion and exclusion criteria. Extracted data included details about the population characteristics, study methods and key findings related to the review objectives. Seventeen studies published from 1972 to 2021 were included, following the PRISMA-ScR guideline. Studies showed that maternal micronutrient intakes including

calcium, iron, vitamin D, folic acid, and niacin fell short of the national recommendations. Increased maternal fruit intake was also associated with increased birth weight. Factors associated with fetal macrosomia included high pre-pregnancy body mass index (BMI), excess gestational weight gain (GWG) and high blood glucose levels. Low pre-pregnancy BMI, inadequate GWG, intake of confectioneries and condiments, and high blood pressure were associated with low birth weight.

According to Gope et al (2022) examined a study on the prevalence of undernutrition based on Mid-Upper Arm Circumference among the preschool children of India. Nutritional status during preschool period is a paramount importance because of their rapid growth and this period is the foundation for lifetime health, strength and intellectual vitality. Given the above fact, present review has been undertaken to get an impression of the overall MUAC based undernutrition and sex variation of undernutrition among the preschool children of India as recommended by WHO guideline. The study also noted the existence of international and national databases were searched using Google search engine, and PubMed etc. This review showed that the prevalence of MUAC based undernutrition was very high among the preschool children of India. It was recommended that the policy maker may implement measurement of MUAC at primary health care level to identify severe and moderate acute malnutrition as measurement of MUAC is a very simple and very much inexpensive and non-invasive method to assess nutritional status among the young children.

Chitekwe et al. (2018) examined a study on impact of socio-economic factors on MUAC program-based case-detection, admission, and discharging of under five children in large scale community-based management of acute malnutrition programs in Nigeria. Severe acute malnutrition (SAM) threatens the lives of millions of children worldwide particularly in low and middle-income countries (LMICs). Community-based management of acute malnutrition

(CMAM) is an approach to treating large numbers of cases of severe acute malnutrition (SAM) in a community setting. There is a debate about the use of mid-upper arm circumference (MUAC) for admitting and discharging SAM children. This article describes the experience of using MUAC for screening, case-finding, referral, admission, and discharge in a large-scale CMAM program delivered through existing primary health care facilities in Nigeria. Over one hundred thousand ($n = 102,245$) individual CMAM beneficiary records were collected from two of the eleven states (Katsina and Jigawa) that provide CMAM programming in Nigeria. The data were double entered and checked using EpiData version 3.2 and analyzed using the R language for data-analysis graphics. This study confirms that MUAC can be used for both admitting and discharging criteria in CMAM programs with MUAC < 115 mm for admission and MUAC ≥ 115 mm or at discharge (a higher discharge threshold could be used). Long distances between home and treatment centers, lower MUAC at admission, or having diarrhea, vomiting, fever, or cough during the treatment episode were factors associated with negative outcome. Providing CMAM services closer to the community, using mobile and / or satellite clinics, counseling of mothers by health workers to encourage early treatment seeking behavior, and screening of patients at each patient visit for early detection and treatment of comorbidities are recommended.

Morris et al. (2017) examined a study on nutritional status and association of demographic characteristics with malnutrition among children less than 24 months in Kwale County, Kenya. Malnutrition is an underlying cause of mortality in about half of the cases that occur among children less than five years in developing countries. In Africa including Kenya, this problem may be exacerbated by socio-demographic and socio-economic factors. The study aimed at determining nutritional status and association of demographic characteristics with malnutrition among children aged 1 day to 24 months in Kwale County, Kenya. A cross-sectional study was done in Mwaluphamba Location, Kwale County, Kenya. Data was collected using a semi

structured questionnaire and administered to 380 randomly selected mothers who had children under the age of two years. Nutrition status was determined using anthropometric measurements. Data was analyzed using descriptive statistics and associations were determined by univariate logistic regression. Malnutrition prevalence for children in Kwale was high with 29.2% of the children being stunted and 13.4% being severely stunted. Underweight prevalence was at 20.8% of whom 9.5% were severely underweight. The global acute malnutrition rate was 18.9%. Stunting differed significantly between sex (males 35.1% compared to females 21.7%; $p = 0.005$). Significant differences were also observed in stunting and underweight due to age ($p < 0.005$). The prevalence of stunting, underweight and global acute malnutrition rates was high among the children. Male children were associated with a significantly higher prevalence of stunting than the females. The prevalence of underweight and stunting significantly increased with increasing age.

Another study done in Kenya was by Wanjihia, et al. (2021) was on the association between nutritional knowledge, socio-economic status of caregivers and stunting of children under 5 years in Kwale County of Kenya. The study was based on the fact that caregivers' socioeconomic characteristics influenced the nutritional status of children under five years. The authors used simple random sampling, using 681 households. A nutritional recall method was used to fill the questionnaire, where the findings did not find any significant association between nutritional knowledge of mothers and the nutritional indicators of children. Similarly, the study did find significant correlation between wealth status of the parents, and nutritional status of the children ($p < 0.002$). The study therefore concluded that wealth status had a positive impact on nutritional status of children. The research gap in this study was that it was done in Kwale, while the current one is done in Mandera County, which have significant different socioeconomic status. Further, the study by Wanjihia et al. (2021) focused on stunting while the current study focused on MUAC program and nutritional surveillance.

Another study by Kabubo-Mariara et al. (2009) focused on determinants of children's nutritional status in Kenya. The study used the demographic and health surveys. The study used both 1998 and 2003 DHS data set, focusing on household characteristics. The study used correlation design, where the findings were that maternal education was more important and significant ($p < 0.002$) in influencing children's nutritional status. Further, wealth levels were also found to have significant influence on children nutritional status. The research gap in this study was that it used a data from previous DHSs hence the situation could have changed.

Another study by Gewa et al. (2012) was on maternal nutrition in rural Kenya: health and socio-demographic determinants and its association with child nutrition. The study focused on malnutrition among children, using a cross-sectional design and collected data from children aged 4-24 months in Kisumu County. The study established that socioeconomic status (wealth status), maternal age, and household food security were found to have positive significant correlation with child nutritional status. Further, the study noted that maternal weight, and MUAC body mass index (BMI) were also found to influence nutritional status of children. The study gap is that it was done across Kenya while the current study focused on Mandera County alone. Further, the study had more variables including children's sociodemographic predictors of nutritional status.

2.2.3 Health Facility services on the effectiveness of Family MUAC

Studies done show that health facility services like nutrition assessments, counselling and even supplementary feeding programs have had an effect on nutritional surveillance and reduction of malnutrition cases. For instance, Al Jawaldeh et al. (2023) conducted a study on qualitative review of national nutrition surveillance systems in the Eastern Mediterranean region. The World Food Conference in 1974 emphasized the significance of establishing global nutrition surveillance to monitor and address nutritional challenges effectively. However, many countries, especially in the EMRO region, continue to encounter substantial difficulties in

regularly generating disaggregated data on nutrition. The current study aimed to review the existing nutrition surveillance systems in the region and to identify their strengths and weaknesses, as well as the challenges they face in functioning optimally. The study focused on the functional nutrition surveillance systems in eight Arab countries; namely Kuwait, Morocco, Oman, Palestine, Saudi Arabia, Sudan, Syria, and Yemen. The study's analysis involved utilizing primary data collected from both published and unpublished reports. Additionally, a structured checklist was employed to gather information from all countries involved in the study. Furthermore, interviews were conducted with the EMRO offices to gain deeper insights into the challenges, if any, that these nutrition surveillance systems face in functioning optimally. All countries use health facilities as a basic source of data for their nutrition surveillance, some countries triangulate their nutrition surveillance reports with data from other sources of information such as community or school surveys. Identified nutrition surveillance approaches are closely split between those who operate in stable settings and use routine health information systems (Morocco, Saudi Arabia, Oman, and Kuwait) and other countries that operate in fragile settings; for example, Yemen, Syria, Palestine, and Sudan struggle to provide early warning reports for rapid nutritional responses. Nutrition surveillance systems that utilize existing health information systems are the most sustained in the EMRO region. However, by integrating data from multiple sources, such as health facilities, surveys, and population censuses, countries can provide a holistic view of the nutritional situation, enhance their response to any emergency, and can leverage the infrastructure and resources already in place for health data collection and reporting. Collaboration between countries in the region through sharing experiences and success stories is important in order to reach a standardized system that can be implemented in different settings.

Ruiz et al. (2024) examined a study on low quality of maternal and child nutritional care of the primary care in Mexico; an urgent call of action for policymakers and stakeholders. Maternal

and child malnutrition represents a public health problem in Mexico Primary care (PC) is responsible for introducing women and children under five to the health system, detecting diseases on time, and providing medical services, including pharmacological treatment if necessary. Providing these services with quality is essential to improve maternal and child health. This study evaluated the quality of nutritional care during preconception, pregnancy, postpartum, infancy, and preschool age at the PC health units across six Mexican states between 2020 and 2021. The study conducted a cross-sectional study with a mixed approach in units of the Secretary of Health to assess the quality of nutritional care during preconception, pregnancy, postpartum, childhood, and preschool age. The level of quality was calculated by the percentage of compliance with 16 indicators that integrated a Quality Index of Maternal and Child Nutritional Care (ICANMI, by its Spanish acronym). Compliance by indicator, by life stage, and overall was categorized using the following cut-off points: poor quality ($\leq 70\%$), insufficient quality (71-89%), and good quality ($\geq 90\%$). The perceptions of the barriers and facilitators that affect maternal and child nutrition were evaluated through semi-structured interviews with health professionals (HP) and users. All qualitative instruments were developed with a gender and intercultural perspective. Considering the whole sample studied, maternal and child nutritional care quality during the five life stages evaluated was bad (compliance: $\leq 12\%$), reflected in the ICANMI, which had a compliance of 8.3%. Principal barriers identified to providing high-quality nutritional care were the lack of knowledge and training of health professionals, shortages of equipment, medicine, personnel, and materials, the disappearance of the social cash transfer program Prosper, the absence of local indigenous language translators to support communication between doctor and patient, and the persistence of machismo and other practices of control over women. The findings underscore the need for initiatives to improve the quality of nutritional care in PC facilities across Chihuahua, State of Mexico, Veracruz, Oaxaca, Chiapas, and Yucatan. It is necessary for government and health

authorities, along with various stakeholders, to collaboratively devise, implement, and assess intercultural and gender-oriented policies and programs geared towards ensuring the health infrastructure and enhancing the training of health professionals to diagnose and treat the prevalence and occurrence of diverse forms of malnutrition in both maternal and child populations.

Chitekwe et al. (2018) examined a study on mid upper arm circumference-based case detection, admission, and discharging of under five children in a large-scale community-based management of acute malnutrition program in Nigeria. Severe acute malnutrition (SAM) threatens the lives of millions of children worldwide particularly in low and middle-income countries (LMICs). Community-based management of acute malnutrition (CMAM) is an approach to treating large numbers of cases of severe acute malnutrition (SAM) in a community setting. There is a debate about the use of mid-upper arm circumference (MUAC) for admitting and discharging SAM children. The study described the experience of using MUAC for screening, case-finding, referral, admission, and discharge in a large-scale CMAM program delivered through existing primary health care facilities in Nigeria. Over one hundred thousand ($n = 102,245$) individual CMAM beneficiary records were collected from two of the eleven states (i.e. Katsina and Jigawa) that provide CMAM programming in Nigeria. The data were double entered and checked using EpiData version 3.2 and analyzed using the R language for data-analysis graphics. The median MUAC at admission was 109 mm. Among admissions, 37.4% (38,275) had a comorbidity recorded at admission and 7.4% (7537) were recorded as having developed comorbidity during the treatment. Analysis in the better performing state program in the most recent year for which data were available found that 87.1% ($n = 13,273$) of admitted cases recovered and were discharged as cured, 9.2% ($n = 1396$) defaulted and were lost to follow-up, 2.9% ($n = 443$) were discharged as non-recovered, 0.7% ($n = 104$) were transferred to inpatient services, and 0.2% ($n = 27$) were known (died, to be dead or to have

passed) during the treatment episode. The program met SPHERE minimum standards for treatment outcomes for therapeutic feeding programs. Factors associated with negative outcomes (default, non-recovery, transfer, and death) were distance between home and the treatment center; lower MUAC, diarrhea and cough at admission; or developing diarrhea, vomiting, fever, or cough during the treatment episode. The study confirms that MUAC can be used for both admitting and discharging criteria in CMAM programs with MUAC < 115 mm for admission and MUAC $\geq$ 115 mm or at discharge (a higher discharge threshold could be used). Long distances between home and treatment centers, lower MUAC at admission, or having diarrhea, vomiting, fever, or cough during the treatment episode were factors associated with negative outcome. Providing CMAM services closer to the community, using mobile and / or satellite clinics, counseling of mothers by health workers to encourage early treatment seeking behavior, and screening of patients at each patient visit for early detection and treatment of comorbidities are recommended.

Karki (2023) examined a study on adoption of family MUAC program on nutritional surveillance and early detection in Morang. A community based cross-sectional study was conducted in Kerabari rural municipality, Morang district to study the nutritional status of 6-59 months' children. A total of 155 children residing in Kerabari Rural Municipality were taken for the study. Data was collected using pretested, semi-structured questionnaire to obtain information on socio economic status, child and maternal characteristics, hygiene practices, feeding practices and vaccination status. Anthropometric measurements (height, weight, MUAC) were used to determine if the children were wasted, stunted or underweight based on WHO reference. The study revealed that the prevalence of wasting, stunting and underweight were 7.1%, 28.4% and 14.8% respectively. Severe stunting was found to be 11.6% but none of the children were found to be severely wasted and underweight respectively. The study found that there was significant association of underweight with type of the family ($P=0.022$).

Similarly, there was significant association of stunting with mother education status ($P=0.028$), type of family ($P=0.045$) and exclusively breastfeeding ($P=0.018$). On the basis of MUAC 1.9% were moderately malnourished. The result shows that more nutritional education is needed on the part of the mother so that the poor nutritional status of the children can be improved to ensure healthy living for both mother and their children. The research gap in this study was that it focused on Morang district, which is in Nepal, while this study is done in Mandera County in Kenya. The socioeconomic and health facilities could have a difference between the countries, hence showing different results.

2.2.4 Training Factors on effectiveness of family MUAC Program

According to Gebreayohanes and Dessie (2022) examined a study on training factors of prevalence of stunting and its associated factors among children 6-59 months of age in pastoralists community Northeast Ethiopia; a community based cross sectional study. Globally, stunting is a significant public health concern and it is very critical in Ethiopia. The study determined the prevalence of stunting and its correlates among children in the pastoral community. A community-based cross-sectional study was conducted in Dubti District, Afar Region, North East Ethiopia from 2–31 January 2018. A total of 554 children were recruited using a multi-stage sampling technique and participated in this study. A binary logistic regression analysis was performed to determine factors linked to stunting. The significance of the associations was determined at a p -value < 0.05 and the adjusted odds ratio at 95% CI was calculated to evaluate the strength of the associations. The prevalence of stunting was 39.5% (95% CI: 35.4–43.5%). The odds of stunting were increased, so does the age of the child increased as compared to 6–11 months of children. Initiating breastfeeding after 1 hour after birth (AOR = 1.99; 95% CI: 1.22, 3.23), not exclusively breastfeeding for at least 6 months (AOR = 2.57; 95% CI: 1.49, 4.42), poor dietary diversity (AOR = 1.93; 95% CI: 1.03, 3.62), and using unprotected water for drinking (AOR = 1.68; 95% CI: 1.21, 2.94) were significant

factors. Among children aged 6–59 months, the level of stunting in the pastoral community was significantly high. The study found that stunting was associated with multiple nutritional and non-nutritional factors. To tackle stunting, inter-sectoral cooperation is needed by enhancing the clean water supply of the community, optimal breastfeeding practice, food diversity, and economic status.

Mirasol and Gordoncillo (2023) on a study related to factors associated with competency of Barangay Nutrition scholars in Cabuyao, Laguna in the implementation of the family MUAC approach. The focus was on malnutrition among children aged 6-59 months, where the research problem was the challenges experienced implementing family MUAC approaches in Philippines. The quantitative study was done to establish the correlate factors of competency of Barangay nutrition scholars in implementing family MUAC program. The sample size was 18 scholars and data were collected using questionnaires. The findings showed that competency was positive correlated with household size, last MUAC training, refresher trainings, supervisory visits and availability of selected supplies. The authors recommended that the government agencies needed to support training of staff, supervision as well as to have refresher trainings for the staff to effectively implement the family MUAC programs. The research gap in this study is that it focused on scholars in Philippines while the current study is in Mandera County, Kenya. Further, the study does not have the other factors like last MUAC training and supervisory visits as predictors of effectiveness of family MUAC program.

Another study by Guesdon et al. (2020) narrowed on the potential consequences of expanded MUAC-only programs on targeting of acutely malnourished children and ready-to-use-therapeutic-food allocation. The authors used cross-sectional surveys, done since 2007, with a target population of 550 children. The findings were that using the expanded MUAC only program, there was a risk of excluding some children. Further, the study suggested trainings

on the staff to help detect malnutrition among children early enough to warrant their treatment. The research gap in this study was that it focused on using MUAC only as program for detecting and treating malnutrition, where staff needed refresher trainings on using MUAC anthropometric.

Locally, Goodman (2020) did a study on the barriers and facilitators associated with Kenyan caregiver's engagement in a Child Nutritional Mobile Health Intervention. The study focused on Kenya, and particularly in Migori County where an application called Mama Aweza, an mHealth intervention, teaches mothers of children aged 6-59 months about using family MUAC programs to assess to nutritional status of their children, sending the measurements weekly to a centralized place. Data was collected from focus group discussions (FGDs) with caregivers, assessing sociodemographic and training factors associated with effective response to the MUAC program. The findings were that most of the caregivers (71%) adhered to the trainings and send the weekly anthropometric measurements. The study noted that shared phones as well as high levels of illiteracy were barriers to effective MUAC measurements (RR- Relative risk- 0.7, $p < 0.001$). Another key finding was that facilitators needed higher education levels to use with ease the MUAC tape. The recommendations included adapting to the mHealth systems through continuous trainings for the staff as this was a significant predictor of how efficient the staff were using MUAC programs. The research gap was that it was not dealing with family MUAC program but the general nutrition status of children and the factors associated with the malnutrition.

Another study was done by Gudu et al. (2020) on factors that were associated with malnutrition in children under five years in Western Kenya. The study used 94 cases and 281 controls for children aged 6-59 months, who were subjected to age-appropriate anthropometric measurements. The findings were that paternal and maternal lack of formal education (OR -

odds ratio- 4.9; 95% CI) were significant predictors of malnutrition. This was associated with lack of training and knowledge on mothers' child nutrition and measurements that the caregivers and the spouses needed more training on. The research gap in this study is that it was a quasi-experimental design, while in this current study, a cross-sectional correlational study design was used.

2.3 Theoretical Review

The study was guided by Beck's in 1960 Cognitive Behavioural Theory (CBT) in which an individual's emotional and behavioral reactions are determined by the perceptions and spontaneous thought about a given situation in an environment. The basic principle of this theory is the individual's belief in the development process in the interaction with others and the environment. Interactions between individuals, others, and the environment are likely to influence the behavior negatively or positively. Consequently, as the people interact in an institution or society, spontaneous thoughts made when faced with certain life situations such as; parental separation, physical violence from close relatives and sexual abuse due to economic strains and frustrations may lead to irrational judgments or discussions such as substance use. The use of substances may be caused by individual trauma.

The Cognitive Behavioural Theory (CBT) is a psychotherapeutic treatment aimed at helping traumatized individuals to recognize and change automatic dangerous behaviors or irritating thought patterns that negatively influence feelings and behaviors (substance use) and transform the distorted thinking patterns, emotional and behavioral responses into a better life pattern. It's imperative that the use of Cognitive Behavioural Theory in Psychotherapy has proved to be effective in the treatment of various mental disorders namely; Post- Traumatic Stress Disorder (PTSD), Anxiety disorders, bodily dysfunctions, Obsessive-Compulsive Disorders, and Substance use (Misciagna, 2020). The use of the CBT theory was suited in this study as it addresses how people identify and change thinking as well as behavioral patterns that can be

ineffective or harmful, replacing them with more functional behaviors. In using CBT, the researcher notes that the mothers (caregivers) characteristics, the socioeconomic factors, health facility factors as well as the training factors could be adjusted to help in facilitating efficient family MUAC programs.

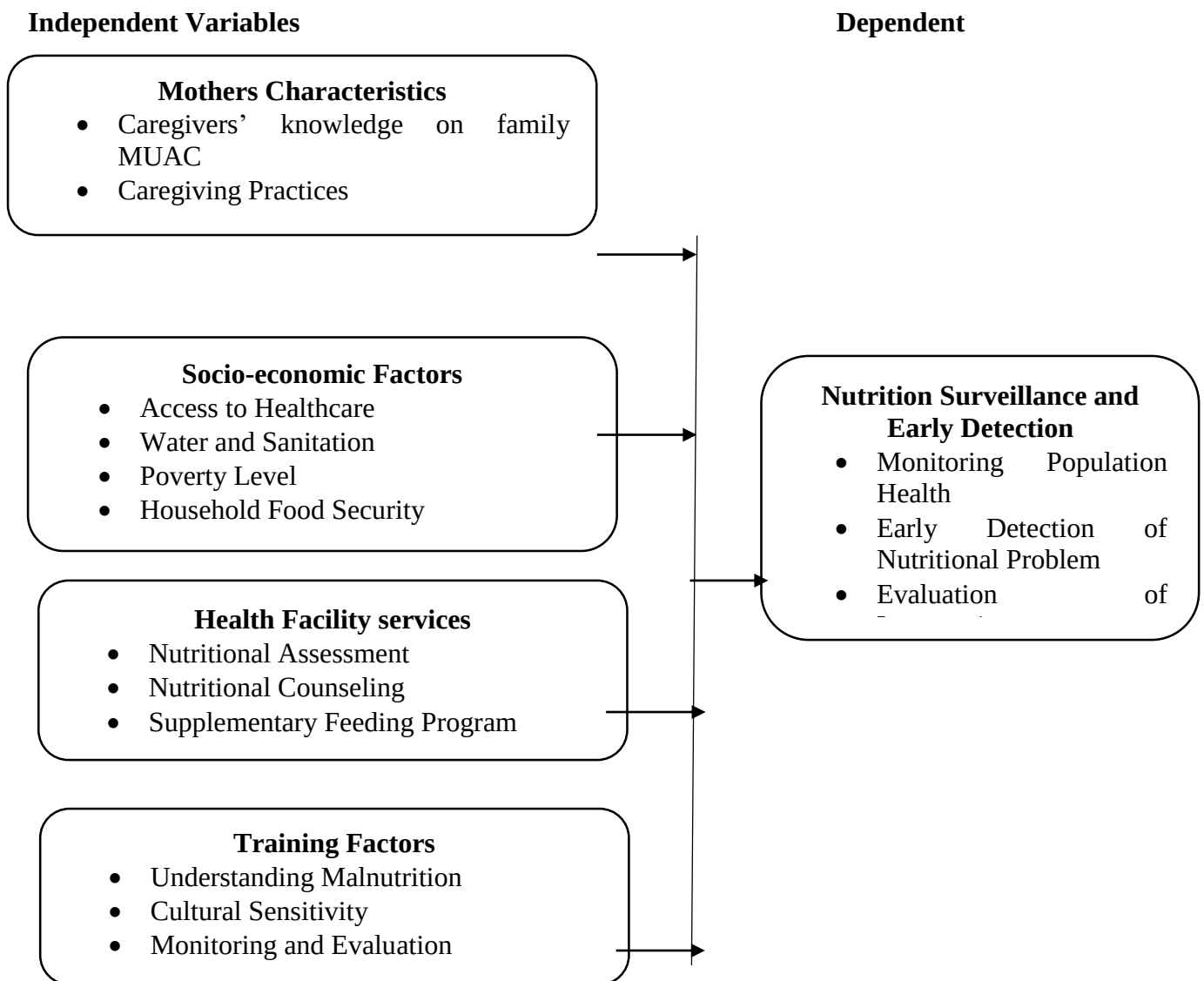
2.3 Conceptual Framework

According to Houghton et al. (2015), a conceptual framework explains, either graphically or diagrammatically or even in narratives form, the main things to be studied, the key factors, constructs or variables and the presumed relationships among them” (p.18). This conceptual framework hypothesizes that there exists a link between monitoring and evaluation practice and project success. Varpio et al.(2020) opine that a conceptual framework can be likened to a design that identifies a sequence of coherent stages or variables and interfaces which fill the gap from beginning to the end of the research process. Conceptual framework is an analytical tool with several variations and contexts. It’s used to make conceptual distinctions and organise ideas. Strong conceptual framework captures something real and does this in a way that is easy to remember and apply. In the below framework we have two indicators, independent variables and dependent variables. In this conceptual framework of the study, the independent variable, family MUAC programs consisting of four constructs regarded as subcomponents, is considered to have a directly proportional affect nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County.

Garg and Kothari (2014) state that the independent variable is that variable that can undergo manipulation or be changed while the dependent variable is the discerned outcome of the independent variables undergoing manipulation. This therefore ensures interaction between these variables (dependent and independent) that guarantees the process of performance is comprehensive and successful. The conceptual framework was deduced in Figure 2.1.

Figure 2.1

Conceptual Framework



Source: Author (2024)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The chapter presented the research design and methodology that was applied in this study. This includes the research design that was adopted, the study area, the study population for the study, the sampling design and the sample size. Also presented in the chapter is the procedure for data collection, data collection instruments and the methods that was applied for data analysis and presentation. Finally, the ethical and legal issues that was considered in this study are presented in this chapter.

3.1 Study Design

Garg and Kothari (2014) define research design as decisions regarding what, where, when, how, much, by what means concerning an inquiry or a research study constitute a research design. “A research design is the arrangement for conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure”. The study focused on the family MAUC Program hinderance on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County. The research approach was quantitative and descriptive correlational study design. The quantitative design made use of observations and interviews of mothers in Banisa Sub-County. The use of quantitative and descriptive correlational study was preferred as it helped describe how the independent variables correlated (influenced) the dependent variable.

The descriptive design helped in gaining deeper insights as regards the issues the specific issues of family MUAC program hindrance. Through correlation, the researcher was able to understand the issues had statistically significantly influence on family MUAC program, with focus on nutrition surveillance and early detection of malnutrition cases. Correlation study shows the interconnectedness among variables (Shiddike & Rahman, 2020). The principal

reason for correlational research was to find out the connection between variables, and if a relationship exists, to find out a regression equation condition that could be utilized to make predictions to a populace.

The quantitative approach was also supported by the use of interviews and questionnaires. The researcher also used descriptive design to answer the questions of what extend does family MUAC programs hinderance on nutrition surveillance and early detection of malnutrition.

3.2 Study Area

The rationale behind the establishment of Banisa Sub-County in Mandera County is based on administrative and political considerations. Banisa Sub-County has been delineated with three divisions, 14 locations, and 23 sub-locations, covering an area of 3,944 km², making it one of the smaller sub-counties in terms of geographical size in Mandera County (County & Virginia, 2022). Mandera County is one of the 47 counties in Kenya, located to the far North Eastern Kenya region, and bordering Somalia to the East and Ethiopia to the North (A map is provided in Appendix V). The county also borders Wajir County to the South and West. The selection of Banisa Sub- County was based on the reviewed literature that showed that there was no study that had been carried out in Kenya on the family MUAC programs. Similarly, Banisa sub-county is one of the remotest sub-counties with limited nutritional and health coverage, and distant health facilities, hence the need to engage family caregivers in nutritional surveillance to detect early cases of malnutrition.

3.3 Study Population

According to Creswell and Creswell (2017), a population refers to the entire group of people; event or organizations that a researcher wants to study. The target population for this study was mothers with children aged 6-59 months in Banisa Sub County. The inclusion criteria for the study population were mother with a child aged 6-59 months and who were recruited in the

family MUAC programme in Banisa Sub County. Therefore, the estimated population was 293 Mothers from Banisa Sub County and the researcher opted for census method.

3.4 Sample Size Determination

Garg and Kothari (2014) define a sample size as the number of items to be selected from the universe to constitute a sample. Sample size is a portion of the population that is used for a research investigation, it's a proportion of the population that possesses the same characteristics as the population and is a smaller version of the entire population that the research is investigating. The larger the sample, the more likely are its mean and standard deviation of the target population.

The view of Creswell and Creswell (2017) in relation to sample size is that normally within quantitative research it is typical “ to study a few individuals or a few cases (page 209). A general rule of thumb is to select as large as a sample as possible from the population. The larger the sample, the less the potential error is that the sample was different from the population. A good populations sample is between 10% and 30% of the entire population (Mugenda & Mugenda, 2013). The researcher opted for systematic random sampling. The aim was to gather information from mothers visiting the health centers. From the Banisa sub-county well-baby clinic, there were 293 entries of mothers and children under five years recorded as at January to March 2024, the period of data collection. The researcher used the 293 entries as the sample size. The sample size determination was of significance in computing the number of mothers that were included in the study. Notably, the study sample size was obtained using Yamane formula.

3.5 Sampling Procedure

Sampling is a process or technique of choosing a sub-group from a population to participate in the study; it is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the large group from which they were selected. A systematic

simple random sampling procedure was used among the mothers on the basis of their age brackets and their visiting. While the researcher was keen not to recruit a homogeneous group for the sample size, the sampling procedure ensured there was no bias by skipping one mother as she came to the clinic (mother-child clinic). The systematic random sampling design ensured all the mothers and children had an equal opportunity for being included in the study. By using the Yamane formula, the following was the sample size;

$$n = \frac{N}{1+N(e)^2}$$

$$n = \frac{293}{1+293(0.05)^2} = 169$$

From the 169 respondents, the researcher added 40% (67 persons) extra respondents to cater for non-responses, leading to a total of 236 respondents. The 40% attrition rate was randomly picked to cater for non-responses and to ensure balanced sample size in terms of the age groups of the mothers.

Table 3.1

Sample Size

Category (Mothers)	Target Population	Percentage
Below 18 Years	35	14.8%
18-30 Years	187	79.3%
31-45 Years	14	5.9%
Total	236	100%

Source: Author (2024)

3.6 Inclusion and Exclusion Criteria

The researcher included those mothers who were visiting the well-baby clinic (MCH- mother-child health clinic) only. Secondly, only those mothers who had come for the well-baby and nutritional screening/clinic and not for other health consultations. Thirdly, the children had to

be between 6 and 59 months. Literacy levels were not used as inclusion/exclusion criteria as the researcher was able to question them in their local language. Further, the exclusion included mothers who had children less than 6 months, and those who had not given birth yet. Another exclusion criteria were for the mothers who were not from Banisa sub-county.

3.7 Data Collection Tools and Instruments

Instrument is the generic term that researchers use for a measurement device (survey, test, questionnaire) (Garg & Kothari, 2014). In this study the researcher used the primary data collection instruments of questionnaires because the data from participants were words in the context of the researcher problem. This approach allowed greater latitude in providing answers therefore the Banisa residents especially the mothers and other stakeholders were able to provide in-depth information regarding the phenomenon. To ensure the credibility of the data collected, the researcher laid aside her preconceived ideas by writing down her opinion on family MUAC programs hinderance on nutrition surveillance and early detection of malnutrition at Mandera County. The participants were not guided by the researchers' prior knowledge of the phenomenon, but by their own experience. Through the systematic random sampling design, the researcher picked every second mother-and child pair for the questionnaire, until the sample size was achieved.

The researcher collected data by means of questionnaires where a series of questions and other prompts for gathering information from respondents was obtained.

Interviews were also conducted where questions were asked by the researcher to obtain information from the interviewees. The main purpose of doing interviews was; they are useful to obtain detailed information about personal feelings, perceptions and opinions. They also allow more detailed questions to be asked, they usually achieve a high response rate.

3.8 Data Validity, Reliability and Pretesting of the Study Tools

Before embarking on data collection, a pre-test of the instruments was done. This was done in order to assess the clarity of the terms, validity and reliability of the instruments (Mugenda & Mugenda, 2003). The pre-testing was carried out on mothers from neighboring Wajir County and any questions found to be interpreted differently during pre-testing were rephrased so that they could have the desired meaning to all respondents.

Data validity was ensured by reviewing the data collection tools. Content validity was ensured by ensuring the questionnaire had research prompts/questions targeting every research objective. Secondly, the researcher gave the questionnaire to the university supervisors to read through and suggest adjustments. The peer review from the supervisors ensured the tool was valid enough to collect data. Therefore, the researcher used content validity to ensure the tools were appropriate for data collection.

Data reliability was measured using the Cronbach's reliability coefficients. The researcher subjected the data to the reliability test, where the coefficients for the five variables was established. According to the Mugenda and Mugenda (2003) a Cronbach's alpha coefficients of 0.6 and above (up to 1.0) is considered appropriate to allow further data analysis. In this case, the researcher established the following as the Cronbach's alpha coefficients; mothers characteristics (0.68); socioeconomic factors (0.71); health facility services (0.76); training factors (0.73); and nutrition surveillance and early detection (0.84). The data from the variables was therefore considered reliable enough to allow further data analysis.

3.9 Analysis and Presentation of Data

Analysis was done through both descriptive and inferential statistics. In descriptive analysis, the researcher performed measures of central tendencies like mean, percentages, and standard deviations, which were used to describe the data. These measures were then used to describe the data, especially the prompts given by the respondents. The percentages were used to express

how the respondents agreed or disagreed with certain statements. Secondly, the use of inferential statistics was to establish the significance of correlation and influence between the variables. In this case, the researcher used Pearson correlation coefficients to establish correlation at bivariate level (two variables) and linear regression analysis to establish the influence of the independent variables against the dependent variable. The simple linear regression was preferred as it showed the direct correlations between an independent variable and the dependent variable (early detection of malnutrition cases).

3.10 Ethical Consideration

Ethics are norms or standards of behavior that guide the moral choices about our behavior and our relationship with others. All parties in research should observe ethical behavior. According to the Neuman (2013), research is an activity designed to test hypothesis, permit conclusions to be drawn, and thereby develop or contribute to generalized knowledge expressed in theories, principles and statements of relationships. The researcher obtained a letter from Kenya Methodist University allowing her to undertake the study and the introductory letter explaining the purpose of the study and that was confidentiality upheld for all the respondents. The researcher issued a letter from the university to seek a research permit from the National Council for Science and Technology. After obtaining the permit, the researcher made preliminary arrangements with mothers at Banisa Sub-County two weeks before the material date, in order to create sufficient rapport with the respondents, raise their confidence and awareness as to the nature and purpose of the study, as well as inform them of their freedom to make informed choice.

Bryman (2016) states that it is the responsibility of the researcher to carefully assess the possibility of harm to research participants, and the extent that it is possible; the possibility of the harm should be minimized. The researcher recognized if the issues under study were sensitive hence asked for informed consent from the respondents before administering the

questionnaire. Secondly, the data was sensitive, touching on nutritional status of children, hence the need to keep the information confidential. The researcher therefore, protected the identity of the respondents as much as possible by keeping it confidential. Further, the questionnaires did not have respondent names or details that could reveal their identity. All parties in research observed ethical behavior and other people's ideas, process, results, were given appropriate credit.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

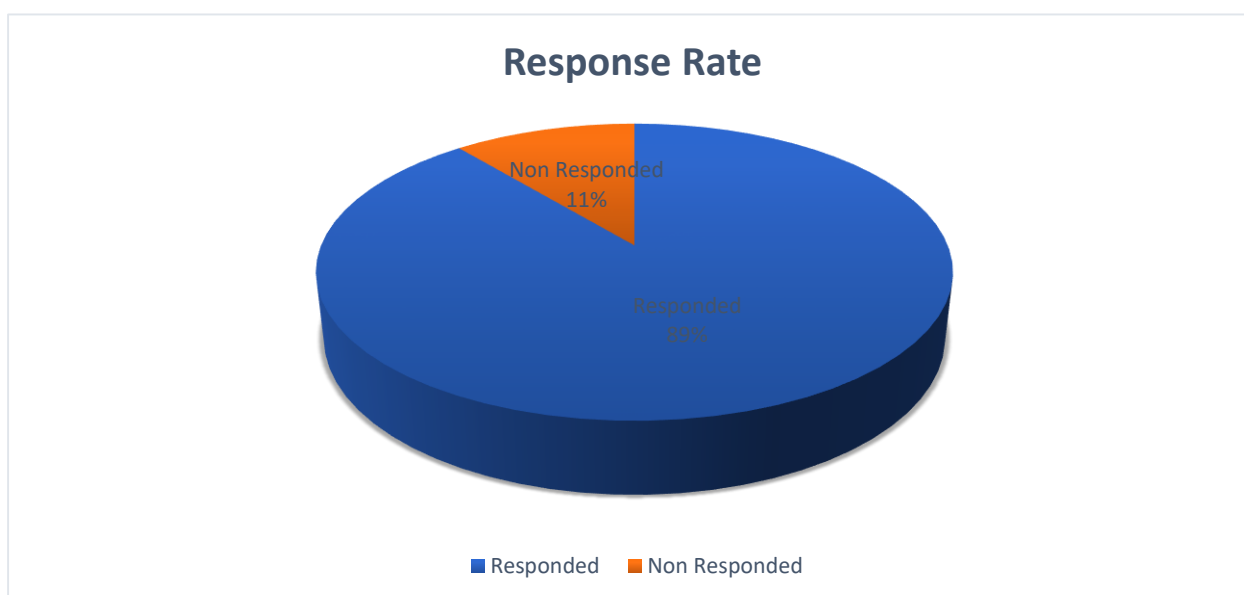
In this section, the study presents the results of data analysis under the three objectives of the study. In addition to presenting the findings on respondents' demographic and response rate, this chapter will also present the descriptive and inferential statistics of the study.

4.2 Response Rate

Out of the 236 questionnaires administered to the respondents, a total of 209 questionnaires were duly filled and returned for data analysis which translated to 89% response rate. The 209 had no gaps or empty spaces, hence they were right for further analysis. No questionnaire had a missing data. According to Mugenda and Mugenda (2003), this response rate is above 70%, therefore, is excellent for making study inferences.

Figure 4.1

Response Rate



Source: Author (2024)

4.3 Demographics of the Respondents

The study collected demographic information to help understand the distribution of study respondents. In terms of gender, results as shown in Table 4.2. In respect to the age of the respondents, 147(70.3%) of the respondents were between 21-30 Years, 15(7.2%) of the respondents were between 31-40 years, 40(19.1%) of the respondents were between the age of 41-50 years, and finally, 7(3.3%) of the respondents were above 50 Years. Marital status of the respondents showed that 87(42%) of the respondents were married, 15(7.2%) of the respondents were single, 62(29.7%) of the respondents were separated, 13(6.1%) of the respondents were divorced and finally, 32(15%) of the respondents were widowed. In respect to the number of children, 124(59.3%) of the respondents were had 1 to 3 children, 47(22.5%) of the respondents had 4 to 6 children and finally, 38(18.2%) of the respondents had 7 to 10 children.

Table 4.1*Demographic of the Respondents*

Variables	Category	Percentage
Age of Respondents		
21-30 Years	147	70.3%
31-40 Years	15	7.2%
41-50 Years	40	19.1%
Above 50 Years	7	3.3%
Total	209	100%
Marital Status		
Married	87	42%
Single	15	7.2%
Separated	62	29.7%
Divorced	13	6.1%
Widowed	32	15%
Total	209	100%
Number of Children		
1 to 3	124	59.3%
4 to 6	47	22.5%
7 to 10	38	18.2%
Total	209	100%
Level of Education		
No Schooling	71	34%
Pre School	31	15%
Primary	42	20%
Secondary	50	24%
Tertiary	15	7%
Total	209	100%
Occupation of the HHs		
Farmers	14	7%
Business	100	48%
Casual Workers	40	19%
Civil Servants	10	5
Housewife	29	13%
Others	16	8%
Total	209	100%

Source: Author (2024)

The study also noted that 71(34%) of the respondents had no schooling, 31(15%) of the respondents' highest level of education was preschool, 42(20%) of the respondents' highest

level of education was primary, and 15(7%) of the respondents' highest level of education was tertiary. The study findings also elaborated on the owners of households in which 191(91%) of the respondents agreed that men were the owners while 18(9%) of the respondents agreed that owners of the households were female. In line with occupation of the households, 14(7%) of the respondents were farmer, 100(48%) of the respondents were business owners, 40(19%) of the respondents were casual workers, 10(5%) of the respondents were civil servants, 29(13%) of the respondents were housewife while 16(8%) of the respondents were others.

4.4 Influence of Mother Characteristics on Effectiveness of Family MUAC Programs

First, the study sought to establish respondents' level of agreement with various statements to the influence of social demographic on effectiveness of family MUAC programs surveillance and early detection on malnutrition. The descriptive results were presented using agree, neither, and disagree. Likert scale results combined with mean and standard deviation. Data for the strongly agree and agree were combined to form agree while data for the strongly disagree and disagree were combined to form disagree as shown in Table 4.2. The results showed that means for social demographic sub-variables ranges from 0.533 to 1.182. Generally, the established composite means of 3.19 greater than 3.0 indicated that participants agree that mothers' characteristics influences effectiveness of family MUAC programs surveillance and early detection of malnutrition. In the statement (1) "How confident are your ability to identify signs of malnutrition in your child aged 6-59 months," out of 209, 184(88%) of the respondents agreed, 17(8%) of the respondents were neutral and 9(4%) of the respondents disagreed with a mean of 3.83 and standard deviation 0.533. A mean greater than the composite mean suggest that majority of the respondents agreed with the statement. Statement (2) "To what extent do you believe that regular monitoring of your child's growth is important for detecting malnutrition," out of 209, 69(33%) of the respondents agreed, 37(18%) of the respondents were neutral, 103(49%) of the respondents disagreed with a mean of 2.78 and standard deviation

0.969. A mean lower than the composite mean suggest that majority of the respondents did not fully agree with the statement.

Statement (3), “I promptly seek medical advice when I notice any changes in my child’s eating habits, “out of 209, 53(25%) of the respondents agreed with the statement, 51(24%) of the respondents are neutral and 105(51%) of the respondents disagreed with a mean of 2.72 and standard deviation 0.883. A mean lower than the composite mean suggest that majority of the respondents were not fully in agreement with the statement. In statement (4),” I am knowledgeable about the signs and symptoms of malnutrition in children,” out of 209, 156(75%) of the respondents agreed with the statement, 26(12%) of the respondents were neutral and 26(12%), and 27(13%) of the respondents disagreed with a mean of 4.12 and standard deviation 1.182. A mean greater than the composite mean suggest that majority of the respondents agreed with the statement. In statement (5) “I communicate effectively with health providers regarding my child’s nutritional needs,” out of 209, 58(28%) of the respondents agree, 27(13%) of the respondents were neutral and 124(59%) of the respondents disagreed with a mean of 2.50 and standard deviation 1.097 with a mean of 2.50 and standard deviation of 1.097.

Table 4.2

Influence of Social Demographic Factors on Effectiveness of Family MUAC Programs

Social Demographic Factors	Agree N (%)	Neither N (%)	Disagree N (%)	Mean	Std Dev
How confident are you ability to identify signs of malnutrition in your child aged 6-59 months?	184(88%)	17(8%)	9(4%)	3.83	.533
To what extent do you believe that regular monitoring of your child's growth is important for detecting malnutrition	69(33%)	37(18%)	103(49%)	2.78	.969
I promptly seek medical advice when I notice any changes in my child's eating habits	53(25%)	51(24%)	105(51%)	2.72	.883
I am knowledgeable about the signs and symptoms of malnutrition in children	156(75%)	26(12%)	27(13%)	4.12	1.182
I communicate effectively with health provides regarding my child's nutritional needs	58(28%)	27(13%)	124(59%)	2.50	1.097
Composite Mean and Standard Deviation				3.19	0.9328

N = Frequency, % - Percentage in brackets

4.4.1 Hypothesis Testing

Hypothesis H01: There is no statistically significant relationship between mothers' characteristics on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County. The findings from the bivariate analysis (Table 4.3) showed that there was no significant correlation between mother's characteristics and effectiveness of family MUAC programs surveillance and early detection of malnutrition ($r(207) = .048, p = .489 > .05$). The results suggest the relationship

between the two variables is insignificant, and that mothers' characteristics have no influence on the effectiveness of family MUAC programs surveillance and early detection of malnutrition in Banisa, Mandera County.

Table 4.3

Correlation Results of Influence of Mother Characteristics on effectiveness of family MUAC Programs on nutrition Surveillance and Early Detection of Malnutrition

Variables		Effectiveness of family MUAC Programs Surveillance and Early Detection
Mothers	Pearson	.048
Characteristic	correlation	.489
s	Sig. (2-tailed)	209
	N	

**. Correlation is significant at the 0.01 level (2-tailed)

Further, a regression analysis was done to test the hypothesis of the study as indicated in Table 4.4. First, the ANOVA results demonstrated that there was no significant change in the influence of mothers characteristics on effectiveness of family early detection of malnutrition ($F(1,207) = .480$, $p = .489 > 0.05$, $R^2 = .002$). The regression coefficient therefore meant that there was no significant effect of mothers' characteristics on effectiveness of family MUAC programs surveillance and early detection of malnutrition.

Table 4.4

Regression Results of Influence of Mothers Characteristics on Effectiveness of Family MUAC Programs on nutrition Surveillance and Early Detection of Malnutrition

Model Summary & ANOVA					
R-Square	.002				
df	1, 207				
F-Statistics	.480				
Sig.	.489 ^b				
Coefficients					
Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
1 (Constant)	2.163	.141		15.335	.000
Mothers Characteristics	.030	.043	.048	.693	.489

a. Dependent Variables: Effectiveness of Family MUAC Programs Surveillance and Early Detection of Malnutrition

b. Predictors: (Constant), Mothers Characteristics

From the literature reviews, the findings contradict the conclusions made by Shahid, et al. (2022) in Pakistan who found that children of mothers with moderate and high nutrition and health awareness (MNHA) had lesser likelihoods of being malnourished. This current study also contradicted the findings by Andersen et al. (2024) in India who established that nutrition practices among mothers was mediated by nutrition messages which then led to improved nutrition among children. Similarly, the findings also contradict with observations made by Albanus and Ashipala, (2023) in Namibia who associated mothers' knowledge to better improve nutrition of their children.

4.5 Influence of Socio-economic Factors of Family MUAC Program

The second objective of the study determined respondents' level of agreement with various statements related to the influence of socio-economic on effectiveness of family MUAC program surveillance and early detection. Likert scale results like agree, neither and disagree

together with means and standard deviation for all the socio-economic factors variables ranges between 2.47 to 3.93 and from 0.921 to 1.325 respectively.

Table 4.5

Influence of Socio-Economic of Family MUAC Program on nutrition Surveillance and Early Detection of Malnutrition

Socio-Economics Factors	Agree N (%)	Neutral N (%)	Disagree N (%)	Mean	Std Dev
I believe that access to nutritious food is sufficient for children in Banisa Sub-County	194(93%)	12(6%)	3(2%)	3.93	.353
Adequate healthcare facilities are available in Banisa Sub-County to address malnutrition	63(10%)	34(16%)	112(54%)	2.72	.952
Community awareness programs effectively educate parents and caregivers about proper nutrition for children	122(58%)	11(5%)	76(37%)	3.34	1.325
Economic opportunities in Banisa Sub-County contribute positively to families ability to provide nutrition needs for their children.	48(23%)	12(6%)	149(71%)	2.47	.925
There is sufficient access to clean water and sanitation facilities in Banisa Sub-County, which positively impacts child nutrition	98(45%)	76(36%)	40(19%)	3.15	1.003
The overall economic status of families in Banisa Sub-County influences the prevalence of malnutrition among children.	54(26%)	75(36%)	80(38%)	3.93	.353
I believe that access to nutritious food is sufficient for children in Banisa Sub-County	194(93%)	12(6%)	3(2%)	2.72	0.961
Composite Mean/SD				3.18	0.839

N = Frequency, % - Percentage in brackets

The Table 4.5 results demonstrated a composite mean of 3.085 which suggest that to some extent, respondents slightly disagree that socio-economic factors has had a much positive impact on effectiveness of family MUAC program. In statement (1) “I believe that access to nutritious foods is sufficient for children in Banisa Sub-County, “out of 209, 194(93%) of the respondents agreed with the statement, 12(6%) of the respondents were neutral and 3(2%) of

the respondents disagreed with the statement with a mean of 3.93 and standard deviation of 0.353. A mean greater than the composite mean suggest that majority of the respondents agreed with the statement. Statement (2) “Adequate healthcare facilities are available in Banisa Sub-County to address malnutrition” Out of 209, 63(10%) of the respondents agreed with the statement, 34(16%) of the respondents were neutral and 112(54%) of the respondents disagreed with the statement with a mean of 2.72 and standard deviation 0.952. A mean lower than the composite mean suggest that majority of the respondents did not fully agree with the statement. Statement (3) “Community awareness programs effectively educate parents and caregivers about proper nutrition for children” out of 209, 122(58%) of the respondents agreed with the statement, 11(5%) of the respondents were neutral and 76(37%) of the respondents disagreed with the statement with a mean of 3.34 and standard deviation 1.325. A mean greater than the composite mean suggest that majority of the respondents were fully satisfied with the statement. Statement (4) “Economic opportunities in Banisa Sub-County contribute positively to families’ ability to provide nutrition needs for their children,” out of 209, 48(23%) of the respondents agreed with the statement, 12(6%) of the respondents were neutral and 149(71%) of the respondents disagreed with the statement with a mean of 2.47 and standard deviation of 0.925. A mean lower than the composite mean suggest that majority of the respondents did not agree with the statement. Statement (5) “There is sufficient access to clean water and sanitation facilities in Banisa Sub-County, which positively impacts child nutrition, “out 209, 98(45%) of the respondents agreed with the statement, 76(36%) of the respondents were neutral and 40(19%) of the respondents disagreed with the statement with a mean of 3.15 and standard deviation 1.003. A mean greater than the composite mean suggest that majority of the respondents fully agreed with the statement.

4.5.1 Hypothesis Testing

Hypothesis H02: There is no statistically significant relationship between socio-economic factors of family MUAC program on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County. Second, the study demonstrated a correlation analysis – strength of linear relationship – between adoption of family MUAC. The outcome provided in Table 4.6 showed that there was a positive moderate correlation between socio-economic factors on MUAC programs on nutrition surveillance and early detection ($r(207) = .232, p = .001$). The results suggest there is moderate linear positive relationship between socio-economic factors and effectiveness of family MUAC Program.

Table 4.6

Correlation Results of Influence of socio-economic factors on family MUAC program on nutrition surveillance and early detection of malnutrition

Variables		Effectiveness of family MUAC Program
Socio-Economic Factors	Pearson correlation	.232**
	Sig. (2-tailed)	.001
	N	209

**. Correlation is significant at the 0.01 level (2-tailed)

A regression analysis was further conducted to test the second hypothesis of the study and the results presented in Table 4.7. The reported ANOVA findings indicated that there is a significant variation in the influence of socio-economic factors family MUAC program ($F(1, 207) = .11.728, p = .001, R^2 = .054$). This meant that socioeconomic factors led to effective MUAC Programs on Nutrition Surveillance and Early Detection of Malnutrition.

Similarly, the regression coefficient results demonstrated a significant and positive influence of socio-economic factors of family MUAC Programs and family MUAC Program ($B = .180,$

p = .001). The outcome display that the study rejected the null hypothesis and concluded that there is a significant and positive influence of socio-economic factors on family MUAC programs.

Table 4.7

Regression Results of Influence of Socio-Economic Factors on family MUAC Programs on Nutrition Surveillance and Early Detection of Malnutrition

Model Summary & ANOVA

R-Square	.054
df	1, 207
F-Statistics	11.728
Sig.	.001 ^b

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.684	.170		9.921	.000
Socio-Economic Factors	.180	.053	.232	3.425	.001

a. Dependent Variable: Effectiveness of Family MUAC Program

b. Predictors: (Constant), Socio Economic Factors of MUAC Program

From the literature review, it was established that the findings correlate with other observations from different studies. For instance, Mohamed, et al. (2022) through meta-analysis established that socioeconomic factors like micronutrient intake among the mothers influenced the uptake of nutritionally-sound practices, including vitamin supplementation and anthropometric measurements like MUAC. The findings in the current study also concur with that of Gope et al (2022) in India, who found that mothers with college education were appreciative of the need to use anthropometric measures like MUAC to measure nutrition status of the children. Similarly, the study findings correlate with Chitekwe et al. (2018) findings in Nigeria where the findings showed that distances between homes and treatment centers, lower MUAC at

admission and mothers' knowledge on the nutritional screening (MUAC and CMAM) contributed to higher and effective use of the community-based management of malnutrition. The findings in this current study were also similar to what Morris et al. (2017) established in Kwale county in Kenya, that sociodemographic factors influenced the nutritional status of the children.

4.6 Influence of Health Facility services on Effectiveness of Family MUAC

Program

The third objective of the study determined respondents' level of agreement with various statements related to the influence of health facility on surveillance and early detection. Likert scale results like agree, neither and disagree together with means and standard deviation for all the health facility MUAC Program variables ranges between 1.41 to 3.90 and from 0.393 to 1.178 respectively.

Table 4.8

Influence of Health Facility services on effectiveness of Family MUAC Program and Early Detection of Malnutrition Descriptive Results

Adoption of Family MUAC Program	Agree (N%)	Neither (N%)	Disagree (N%)	Mean	Std Dev
The health facility staff are knowledgeable about the signs and symptoms of malnutrition in children aged 6-59 months.	192(91%)	12(6%)	5(3%)	3.90	.393
The health facility has sufficient resources (e.g weighing scales, measuring inputs) to accurately assess the nutritional status of children aged 6-59 months	29(14%)	18(9%)	162(77%)	2.21	.920
The health facility provides regular training to its staff on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months.	4(2%)	2(1%)	203(97%)	1.41	.682
The health facility provides regular training to its staff on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months	24(12%)	18(9%)	167(79%)	2.13	.848
The health facility conducts regular screening sessions specifically targeting children aged 6-59 months to identify malnutrition cases early.	161(77%)	20(10%)	28(13%)	3.69	.810
The health facility promptly refer malnourished children to appropriate higher level facilitate or programs for further management and care.	13(6%)	25(12%)	171(82%)	2.17	.746
Composite Mean				2.525	

N = Frequency, % - Percentage in brackets

In statement (1), “the health facility staff are knowledgeable about the signs and symptoms of malnutrition in children aged 6-59 months,” out of 209, 192(91%) of the respondents agreed with the statement, 12(6%) of the respondents were neutral and 5(3%) of the respondents disagreed with a mean of 3.90 and standard deviation 0.393. A mean higher than the composite mean suggest that majority of the respondents agreed with the statement. Statement (2) “The health facility has sufficient resources (i.e weighing scales, measuring tapes) to accurately

assess the nutritional status of children aged 6-59 months,” out of 209, 29(14%) of the respondents agreed with the statement, 18(9%) of the respondents were neutral and 162(77%) of the respondents disagreed with the statement with a mean of 2.21 and standard deviation 0.920. A mean lower than the composite mean suggest that majority of the respondents did not agree with the statement.

Statement (3) “The health facility provides regular training to its staff on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months.” Out of 209, 4(2%) of the respondents agreed with the statement, 2(1%) of the respondents were neutral and 203(97%) of the respondents disagreed with the statement with a mean of 1.41 and standard deviation 0.682. A mean lower than the composite mean suggest that majority of the respondents did not fully agree with the statement. In the statement (4) “The health facility conducts regular screening sessions specifically targeting children aged 6-59 months to identify malnutrition cases early,” out of 209, 161(77%) of the respondents agreed with the statement, 20(10%) of the respondents were neutral and 28(13%) of the respondents disagreed with the statement with a mean of 3.69 and standard deviation 0.810. A mean that is greater than the composite mean suggest that majority of the respondents agreed with the statement. Statement (5) “Caregivers feel supported and encouraged by health facility staff to follow nutritional advice and recommendation for their children aged 6-59 months,” out of 209, 161(77%) of the respondents agreed with the statement, 20(10%) of the respondents were neutral with the statement and 28(13%) of the respondents disagreed with the statement with a mean of 3.69 and standard deviation was 0.810. A mean greater than the composite mean suggest that majority of the respondents agreed with the statement.

4.6.1 Hypothesis Testing

Hypothesis H03: There is no statistically significant relationship between health facility on nutrition surveillance and early detection of malnutrition cases among children aged 6-59

months in Banisa Sub-County. The third hypothesis of the study aimed to establish whether there was significant relationship between health facility. The results outlined in Table 4.9 exhibited that there is a significant and positive moderate correlation between health facility and effectiveness of family MUAC program ($r(207) = .208, p = .003$). The study outcome depicts a moderate linear relationship between the two variables of the study.

Table 4.9

Correlation Results of Influence of health facility MUAC Program

Variables		Hindering effectiveness of family MUAC
Health	Pearson	.208**
Facility	correlation	.003
	Sig. (2-tailed)	209
	N	

**. Correlation is significant at the 0.01 level (2-tailed)

Concerning regression analysis output as depicted in Table 4.10, the ANOVA results revealed that there exist significant positive changes in the influence of health facility on hindering effectiveness of family MUAC program ($F(1, 207) = 9.316, p = .003 < 0.05, R^2 = .043$). Generally, the regression coefficient findings further provided that there is a significant and positive influence of health facility of family MUAC programs lack of awareness on hindering effectiveness of family MUAC program ($B = .308, p = .003$). The regression results, therefore, depicted that the study rejected the null hypothesis and concluded that there is a significant and positive influence of health facility of family MUAC Programs.

Table 4.10*Regression Results of Influence of health facility services on Family MUAC Program*

Model Summary & ANOVA					
R-Square	.043				
df	1, 207				
F-Statistics	9.316				
Sig.	.003 ^b				
Coefficients					
Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
1 (Constant)	1.412	.279		5.064	.000
Adoption of Family MUAC Program	.308	.101	.208	3.052	.003

a. Dependent Variable: Hindering Effectiveness of Family MUAC

b. Predictors: (Constant), Health Facility

From the literature review, the findings correlate with Al Jawaldeh et al. (2023) via a qualitative study of nutritional surveillance in the Eastern Mediterranean Region where the authors established that health facilities were a basic source of data for their nutritional surveillance, and through the facilities, they were able to provide holistic view of nutritional situation of populations. The findings also concur to Ruiz et al. (2024) observations in Mexico that quality of nutritional care was strongly associated with effective health facilities. Similarly, the current study also was linked to similar results by Karki (2023) in Morang municipality, where the findings were that health facilities played a significant role in passing nutritional information, hence leading to embracing of family-MUAC and other health facility-based nutrition programs.

4.7 Influence of Training Factors on Effectiveness of Family MUAC Programs

The fourth objective of the study to assess training factors has an influence on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in

Banisa Sub-County, Mandera County. The Likert scale results including agree, neither, and disagree together with means and standard deviation were presented in Table 4.11. Data for strongly agree and agree scale were combined to form 'agree' while data for strongly disagree and disagree scales were combined to form disagree. Largely, the outcome 3.26 and standard deviation ranges from .769 to 1.306. The established composite mean of 2.44 less than 3.0 suggested that respondents slightly disagree that training factors has successfully influence nutrition surveillance and early detection on malnutrition. In statement (1) "The availability of trained healthcare personnel for nutrition surveillance in Banisa Sub-County is adequate," out of 209, 192(91%) of the respondents agreed with the statement, 12(6%) of the respondents were neutral, and 5(3%) of the respondents disagree with a mean of 3.90 and standard deviation .393. A mean that is higher than the composite mean suggest that majority of the respondents agreed with the statement. Statement (2) "There is sufficient funding allocated to support nutrition surveillance program in Banisa Sub-County," out 209, 29(14%) of the respondents agreed with the statement, 18(9%) of the respondents were neutral while 162(77%) of the respondents disagreed with a mean of 2.21 and standard deviation .920. A mean lower than the composite mean suggest that majority of the respondents did not fully agree with the statement. In statement (3)," The commonly awareness about the importance of nutrition surveillance for children aged 6-59 months in high," out of 209, 4(2%) the respondents agreed with the statement, 2(1%) of the respondents were neutral and 203(97%) of the respondents disagreed with the statement with a mean of 1.41 and standard deviation .682. A mean lower than the composite mean suggest that majority of the respondents did not agree with the statement. Statement (4) "Accessibility of healthcare facilities for malnutrition screening in Banisa Sub-County is adequate," out of 209, 161(77%) of the respondents agreed with the statement, 20(10%) of the respondents were neutral and 167(79%) of the respondents disagreed with the

statement with a mean 2.13 and standard deviation .848. With a mean lower than the composite mean suggest majority of the respondents disagreed with the statement.

In statement (5) “There is adequate availability of nutritional supplements and therapeutic foods for malnourished children,” out 209, 161(77%) of the respondents agreed with the statement, 20(10%) of the respondents were neutral and 28(13%) of the respondents disagreed with the statement with a mean of 3.69 and standard deviation of .810. With a mean higher than the composite mean suggest that majority of the respondents agreed with the statement. In statement (6),” The training provided to healthcare workers on identifying and managing malnutrition cases is sufficient,” out of 209, 13(6%) of the respondents agreed with statement, 25(12%) of the respondents were neither and 171(82%) disagreed with a mean of 2.17 and standard deviation .746. The study noted that a mean lower than the composite mean suggest that majority of the respondents did not agree with the statement.

Table 4.11*Influence of Training Factors on Family MUAC Program*

Training Factors on MUAC Program	Agree (N%)	Neither (N%)	Disagree (N%)	Mean	Std Dev
The availability of trained healthcare personnel for nutrition surveillance in Banisa Sub-County is adequate	192(91%)	12(6%)	5(3%)	3.90	.393
There is sufficient funding allocated to support nutrition surveillance programs in Banisa Sub-County.	29(14%)	18(9%)	162(77%)	2.21	.920
The commonly awareness about the importance of nutrition surveillance for children aged 6-59 months in high.	4(2%)	2(1%)	203(97%)	1.41	.682
The accessibility of healthcare facilities for malnutrition screening in Banisa Sub-County is adequate.	24(12%)	18(9%)	167(79%)	2.13	.848
There is adequate availability of nutritional supplements and therapeutic foods for malnourished children in Banisa Sub-County.	161(77%)	20(10%)	28(13%)	3.69	.810
The training provided to healthcare workers on identifying and managing malnutrition cases is sufficient	13(6%)	25(12%)	171(82%)	2.17	.746
				2.525	
Composite Mean					

N = Frequency, % - Percentage in brackets

4.7.1 Hypothesis Testing

Hypothesis H04: There is no statistically significant relationship between training factors on malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County. The findings were that training factors were significantly and positively correlated to effectiveness of family MUAC program in detecting malnutrition as shown on Table 4.12 ($r=0.114$, $p\text{-value } 0.003 < 0.005$, $N=209$). The conclusion was that training factors significantly influenced effectiveness of family MUAC program.

Table 4.12*Correlation Results of Influence of Training Factors on family MUAC Program*

Variables		Hindering effectiveness of family MUAC
Training	Pearson	.114**
Factors	correlation	.003
	Sig. (2-tailed)	209
	N	

** . Correlation is significant at the 0.01 level (2-tailed)

Concerning regression analysis output as depicted in Table 4.12, the ANOVA results revealed that there exist significant positive changes in the influence of training factors on hindering effectiveness of family MUAC program A regression analysis was conducted to generate the regression model summary shown in Table 4.21. The results showed a coefficient determination of 0.114, R – Square of 0.013, and a p-value of 0.99, which pointed that there was no statistically significant influence between training factors and family MUAC program at multivariate level. The established R² indicated that the training factors had no statistical influence on family MUAC programs at multivariate level as shown on Table 4.13.

Table 4.13*Regression Results of Influence of training factors of Family MUAC Program*

Model Summary & ANOVA					
R-Square	.013				
df	1, 207				
F-Statistics	.099				
Sig.	.099 ^b				
Coefficients					
Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
1 (Constant)	1.828	.165		11.105	.000
Training Factors on Family MUAC Program	.101	.061	.114	1.655	.099

a. Dependent Variable: Hindering Effectiveness of Family MUAC

b. Predictors: (Constant), Training Factors

Findings in this current study on training factors and the influence on success of family MUAC program, several studies had similar observations. For instance, Zaba et al. (2021) in a study in Ethiopia established that training factors like equipping healthcare staff with knowledge and updated scientific and evidence-based practices was associated with effective child nutritional monitoring and health status. The findings also relate to what Ruiz et al. (2024) established in Mexico, that equipping mothers and healthcare professionals with frequent trainings and seminars amounted to increased nutritional status and effectiveness of family MUAC programs.

4.7 Effectiveness of Family MUAC Program on Nutritional Surveillance

The final objective of the study determined respondents' level of agreement with various statements related to effectiveness of family MUAC program surveillance and early detection. Likert scale results like agree, neither and disagree together with means and standard deviation for all the inadequate training variables ranges between 1.85 to 3.93 and from 0.347 to 1.019

respectively. In the statement (1) “Caregivers can accurately assess MUAC, although the quality of this measurements may decline with time after training,” out 209, 197(94%) majority of the respondents agreed with the statement, 8(4%) were neutral with statement and 4(2%) of the respondents disagreed with a mean of 3.93 and standard deviation 0.347. A mean greater than the composite mean suggest that majority of the respondents agreed with the statement. In the statement (2) “Family MUAC approach can lead to improved coverage of screening,” out of 209, 45(22%) agreed with the statement, 30(14%) of the respondents were neutral and 134(64%) of the respondents disagreed with the statement with a mean of 2.54 and standard deviation .888. A mean greater than the composite mean suggest that majority of the respondents agreed with the statement.

In statement (3) “There is little evidence linking family MUAC to a shorter length of stay in the program and/or an impact on program performance,” out of 209, 13(6%) of the respondents agreed with the statement, 4(2%) of the respondents were neutral and 192(92%) of the respondents disagreed with statement with a mean of 1.85 and 0.737. A mean lower than the composite mean suggest that majority of the respondents did not agree with the statement. Statement (4) “Despite different tools, approaches and calculations to estimate and compare costs,” out of 209, 18(9%) of the respondents agreed with statement, 2(1%) of the respondents were neutral and 189(90%) of the respondents disagreed with a mean of 1.90 and standard deviation 0.791. A mean lower than the composite mean suggest that majority of the respondents disagree with the statement. Finally, statement (5) “There is some evidence that family MUAC leads to earlier detection of wasting, earlier presentation for services and hence hospitalization,” out of 209, 27(13%) of the respondents agreed with the statement, 28(13%) of the respondents were neutral with the statement and 154(74%) of the respondents disagreed with the statement with a mean of 2.01 and standard deviation 1.019.

Table 4.14*Effectiveness of Family MUAC Program on Nutritional Surveillance*

Effectiveness of Family MUAC Program on Nutritional Surveillance and Early Detection	Agree (N%)	Neutral (N%)	Disagree (N%)	Mean	Std Dev
Caregivers can accurately assess MUAC, although the quality of this measurement may decline with time after training	197(94 %)	8(4%)	4(2%)	3.93	.347
Family MUAC approach can lead to improved coverage of screening	45(22%)	30(14%)	134(64%)	2.54	.888
There is little evidence linking family MUAC to a shorter length of stay in the program and/or an impact on program performance indicators	13(6%)	4(2%)	192(92%)	1.85	.737
Despite different tools, approaches and calculations to estimate and compare costs.	18(9%)	2(1%)	189(90%)	1.90	.791
Need for integration into the health systems to ensure continued training and monitoring and evaluation					
There is some evidence to suggest that family MUAC leads to earlier detection of wasting, earlier presentation for services and hence less hospitalization.	27(13%)	28(13%)	154(74%)	2.01	1.019
Composite Mean/Standard Deviation				2.446	0.7564

N = Frequency, % - Percentage in brackets

4.8 Joint Influence Assessing Factors Hindering Effectiveness of Family MUAC Programs

Additionally, the study demonstrated a summary of the joint correlation and regression analyses results of the influence of assessing factors hindering effectiveness of family MUAC program (Mothers characteristics, socio-economic factors and health facility) on nutrition surveillance and early detection of malnutrition using multiple regression model.

4.8.1 Correlation Analysis

The Bivariate Pearson Correlation output in Table 4.15 indicated that only health facility, $r(217) = .232, p = .003$, and socio-economic factors MUAC Program, $r(204) = .232, p = .001$, variables have a significant and moderately positive correlation with effectiveness of family MUAC programs. The results further show that mothers characteristics and training factors had no significant influence on effectiveness of family MUAC program. This is shown in Table 4.15.

Table 4.15

Assessing Factors Hindering Effectiveness of Family MUAC Program on Nutrition Surveillance and Early Detection of Malnutrition Joint Correlation Analysis Results.

Variables		Mothers Charact eristics	Socio- Economic Factors	Health Facility	Training Factors	Effectiveness of Family MUAC Program
Mothers Characteris tics	Correlation Sig.(2-tailed) N	1 209				
Socio- Economic Factors	Correlation Sig.(2-tailed) N	.092 .186 209	1 209			
Health Facility	Correlation Sig. (2-tailed) N	-.089 .199 209	-.279** .000 209	1 209	1	
Training Factors	Correlation Sig. (2- tailed) N	.557** .000 209	-.136** .049 209	.271** .000 209	209	
Effective ness of Family MUAC Program	Correlation Sig.(2 tailed) N	.048 .489 209	.232** .001 209	.217 .003 209	.114 .099 209	1 209

**. Correlation is significant at the 0.01 level (2-tailed)

4.8.2 Regression Analysis

The study further conducted a joint regression analysis to report a combined show assessing factors hindering effectiveness of family MUAC program on nutrition surveillance and early detection of malnutrition cases (see Table 4.16). The established $R = .370$ is the coefficient of determination which illustrates the correlation between independent variables (mothers cartelistic, socio-economic factors, training factors and facility facility) and hindering effectiveness of family MUAC program. The established $R - \text{Square} = .137$ indicate that all the four independent variables explains 13.7% changes in effectiveness of family MUAC program on nutrition surveillance and early detection of malnutrition ($F(4, 204), = 8.107, p <$

.001, $R^2 = .137$). This suggest that there could be other factors hindering effectiveness of family MUAC program on nutrition surveillance and early detection of malnutrition and not included in this study.

At the multivariate level, the regression coefficients for the three independent variables (Socio-economic factors (p-value), Training Factors, Health Facility) were significant predictors of effective family MUAC Program in detecting malnutrition and nutritional surveillance. This was shown by the p-values of below 0.05 as shown on Table 4.16. Only mothers' characteristics was not a significant predictor of effectiveness of family MUAC programs (p value $0.723 > 0.05$).

Table 4.16

Assessing Factors Hindering Effectiveness of family MUAC Program Joint Regression Analysis Results

Model Summary & ANOVA					
R	.370 ^a				
R – Square	.137				
df	4, 204				
F – Statistics	8.107				
Sig.	000 ^b				
Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	.095	.419		.228	.820
Mothers Characteristics	.017	.047	.027	.355	.723
Socio-economic factors	.255	.059	.327	4.347	.000
Training Factors	.432	.108	.267	4.007	.000
Health Facility	.435	.102	.293	4.263	.000

a. Dependent Variable: Hindering Effectiveness of Family MUAC Program

The results therefore show that three major factors including; Socio-economic factors; Training Factors; and Health Facility were significant predictors of effectiveness of family MUAC

Programs in Banisa sub-county in Mandera County, Kenya. Only mothers' characteristics were not found to have significant influence on the effectiveness of family MUAC programs at both bivariate and multivariate level analysis. In following the linear regression formular, the following was realized;

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$; where X_1 (mothers characteristics) was found not to have significant influence of effectiveness of family MUAC program was dropped.

Effectiveness of family MUAC program = $0.095 + 0.255$ (socioeconomic factors) + 0.432 (training factors) + 0.435 (health facility factors). This meant that a unit increase in socioeconomic factors led to 0.255 times positive increase in effectiveness of family MUAC effectiveness. Similarly, a unit increase in training factors led to 0.435 times increase in effectiveness of family MUAC program. The phenomenon was the same for health facility factors where a unit increase was associated with 0.435 times positive increase in effectiveness of family MUAC programs.

CHAPTER FIVE: SUMMARY, DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter briefly provides the summary of the study including the findings together with a broad discussion of the study findings. The chapter further covers conclusions, recommendations of the study, and areas of further research.

5.2 Summary

The Family MUAC approach is a community screening approach that empowers mothers, caregivers, and other family members to screen their own children for acute malnutrition using color-coded MUAC tapes. From the findings, the family MUAC program is an effective way to detect malnutrition cases among children and improve nutrition surveillance. However, there are several factors that can hinder its effectiveness.

The study has chapter one on introduction, having the background information on the study, then the problem statement and the research objectives. Chapter two focused on literature reviews and theoretical reviews and the conceptual framework. Chapter three handled the research methodology, addressing sample size, sampling procedures and data analysis. Chapter four presented to the findings and discussions, while chapter five presented the conclusion and recommendations from the study.

To overcome these challenges associated with the family MUAC program, it is important to raise awareness about the importance of regular MUAC screenings and provide training to parents or caregivers on how to use the MUAC tape correctly. Healthcare facilities should be made more accessible, especially in remote or underserved areas. Stigma can be addressed through community engagement and education. Adequate resources should be allocated to the program, and data management systems should be strengthened to ensure timely and accurate reporting of malnutrition cases. By addressing these factors, the family MUAC program can

be more effective in improving nutrition surveillance and early detection of malnutrition cases among children.

5.3 Conclusions

The study focused on the factors hindering success of family MUAC program in Banisa sub-county in Mandera County. The following were the findings; on the mothers' characteristics and their influence on effectiveness of the family MUAC program, it was found not have any statistically significant correlation at both bivariate and multivariate levels. Secondly, socioeconomic factors were, on the other hand, established to have strong positive significant correlation with effectiveness of family MUAC program. Similarly, the training factors and health facilities services were also statistically significant predictors of family MUAC program. This means that only three independent variables, apart from mothers' characteristics, had positive influence on the effectiveness of family MUAC program.

Overall, nutrition surveillance and early detection of malnutrition among children aged 6-59 months in Banisa Sub-County, Mandera County, are hindered by a variety of factors. From the study findings, mother's characteristics was seen to hinder the effectiveness of nutrition surveillance and early detection. It is mostly associated with low levels of maternal education which is associated with poor knowledge about nutrition and health practices. That is, mothers with limited education may not understand the importance of proper nutrition, vaccination, and timely healthcare seeking.

Meanwhile, socio-economic factors was the second in line that have high levels of poverty limited the access of nutritious food, healthcare services, and clean water. As a matter of fact, families with limited financial resources often struggle to provide balanced diets for their children. Finally, training factors, inadequate training of healthcare workers in nutrition surveillance and malnutrition management can lead to misdiagnosis of malnutrition cases.

5.4 Recommendations

After conducting a search, the researcher opted for a number of recommendations aimed at addressing the hinderance of family MUAC programs on nutrition surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera County. However, the Family MUAC approach is a widely implemented program in countries across Africa and Asia, including Kenya. Ideally, continuous training of mothers and other caregivers to identify early signs of malnutrition in their children using a simple technique such as the use Mid-Upper Arm Circumference (MUAC) tape. The approach was developed with the objective of improving coverage of treatment services, detecting cases earlier, and improving awareness of malnutrition

Moreover, the study also emphasized on additional techniques such as “The Mama Aweza” randomized controlled trial found that Family MUAC supported by a two-way SMS miHealth platform was associated with a one-third reduction in wasting. The mid-upper arm circumference (MUAC) tape is a game-changer in identifying malnutrition in children. The Mandera West Nutrition Survey. The study also recommended the need for a blanket supplementary feeding program (BSFP) for children aged 6 to 59 months to address the micro-nutrient and malnutrition issues in the area. The report also highlights that the district has few health facilities, and the majority of the population is living more than 5km from the nearest facility. In conclusion, while there were no specific recommendations found to improve the effectiveness of the Family MUAC program in Banisa Sub-County, Mandera County, the Family MUAC approach is a widely implemented program in countries across Africa and Asia, including Kenya.

On the future studies, there is need to explore other factors that could have an influence on the effectiveness of the family MUAC program since the four independent variables only

contribute 13.7% of the overall change in the effectiveness of the family program. This shows that there are possibly other factors that could be explored and studies empirically to establish their influence on the success of the MUAC program. Similarly, the study scope can be expanded to include other counties including Wajir, Garissa, Isiolo and other northern Kenya counties.

REFERENCES

- Abdirahman, M. K. (2019). *Nutrition knowledge, dietary practices and nutrition status of pregnant adolescents in Mandera County, Kenya* [Doctoral dissertation, Dissertation, Kenya University, Kenya]. <https://ir-library.ku.ac.ke/server/api/core/bitstreams>.
- Alam, M. (2021). A systematic qualitative case study: questions, data collection, NVivo analysis and saturation. *Qualitative Research in Organizations and Management: An International Journal*, 16(1), 1-31. <https://doi.org/10.1108/QROM-09-2019-1825>.
- Albanus, F.S. & Ashipala, D.O. (2023). Nutritional knowledge and practices of mothers with malnourished children in a regional hospital in Northeast Namibia. *Journal Public Health Africa*. 14(8). 2391-94. <http://doi: 10.4081/jphia.2023.2391>.
- Al Jawaldeh, A, El Hajj, H. O, Qureshi, A.B, Zerbo, F.C, Alahnoumy, S, Bozo, M, Al-Halaika M, Al-Dakheel, M.H, Alhamdan, L. & Mujib, S.A, (2023). Qualitative Review of National Nutrition Surveillance Systems in the Eastern Mediterranean Region. *Nutrients*. 15(17). 3689. <https://doi.org/10.3390/nu15173689>
- Andersen, C.T, Chopra, P.K, Dave, N, Hariprasad, D, Kak, M, Pandey, R, Tanwar, D. & Chaudhery, D.N. (2024) Maternal and child nutrition services associated with nutritional knowledge and practices, India. *Bull World Health Organisation*. 102(1) 9-21. <http://doi:10.2471/BLT.22.289129>.
- Bahwere, P., Funnell, G., Qarizada, A.N., Woodhead, S.& Bengnwi, W, L. (2024). Effectiveness of a nonweight-based daily dosage of ready-to-use therapeutic food in children suffering from uncomplicated severe acute malnutrition: A nonrandomized, noninferiority analysis of programme data in Afghanistan. *Maternal Children Nutrition*. 20(3). e13641. <http://doi: 10.1111/mcn.13641>
- Bryman, A. (2016). *Social research methods*. Oxford University Press.
- Chitekwe, S., Biadgilign, S., Tolla, A., & Myatt, M. (2018). Mid-upper-arm circumference based case-detection, admission, and discharging of under five children in a large scale community based management of acute malnutrition program in Nigeria. *Archives of Public Health*, 76, 1-10. <https://doi.org/10.1186/s13690-018-0266-4>.
- Cichon, B., Lopez Ejeda, N., Charle Cuellar, P., Hamissou, I., Karim, A., Aton, C., & Oteyza, S. (2023). Cost of Acute Malnutrition Treatment Using a Simplified or Standard Protocol in Diffa, Niger. *Nutrients*, 15(17), 3833-39. <https://doi: 10.3390/nu15173833>
- Coker, D. (2022). A Thematic Analysis of the Structure of Delimitations in the Dissertation. *International Journal of Doctoral Studies* 17(2022) 141-159. <https://doi.org/10.28945/4939>
- Creswell, J., & Creswell, D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage.
- Gichana, M. B. (2013). *Nutritional knowledge of mothers and nutritional status of their children 6-59 months under Malezi bora programme in Kawangware sub location, Dagoretti, Nairobi county* [Doctoral dissertation, University] <http://erepository.uonbi.ac.ke/handle/11295/56292>.
- Garg, G., & Kothari, C. (2014). *Research methodology: methods and techniques*. New Age International Limited.

- Gebreayohanes, M., & Dessie, A. (2022). Prevalence of stunting and its associated factors among children 6-59 months of age in pastoralist community, Northeast Ethiopia: A community-based cross-sectional study. *PLoS One*, 17(2). <https://doi.org/10.1371/journal.pone.0256722>.
- Gerber, L.H., Weinstein, A.A., Mehta, R. & Younossi, Z.M. (2019) Importance of fatigue and its measurement in chronic liver disease. *World Journal of Gastroenterol.* 15(28). 3669-3683. doi: 10.3748/wjg.v25.i28.3669.
- Gewa, C. A., Oguttu, M., & Yandell, N. S. (2012). Maternal nutrition in rural Kenya: health and socio-demographic determinants and its association with child nutrition. *Maternal & child nutrition*, 8(3), 275-286. doi: 10.1111/j.1740-8709.2011.00322.x
- Goodman, J. L. (2020). *Barriers and Facilitators Associated with Kenyan Caregiver's Engagement in a Child Nutritional Mobile Health Intervention*. [Master's Thesis, University of Washington]. <http://hdl.handle.net/1773/45720>
- Gope, S., Biswas, S., & Bisai, S. (2022). Prevalence of undernutrition based on Mid-Upper Arm Circumference among the Preschool Children of India: A Systematic Review Antrocom. *Online Journal of Anthropology*, 18(1), 23-29. <https://antrocom.net/wp/wp-content/uploads/2024/05/gope>.
- Gudu, E., Obonyo, M., Omballa, V., Oyugi, E., Kiilu, C., Githuku, J., ... & Ransom, J. (2020). Factors associated with malnutrition in children < 5 years in western Kenya: a hospital-based unmatched case control study. *BMC nutrition*, 6, 1-7. <https://doi.org/10.1186/s40795-020-00357-4>.
- Guesdon, B., Faruqi, M., Siddiqui, M., Usman, G., Ariser, K., Shah, R., & Memon, K. (2024). Mid-upper arm circumference only protocol in Pakistan: missed opportunities for children suffering from severe acute malnutrition? A mixed methods observational study. *Public Health Nutrition*, 27(1), 312-324. <https://doi.org/10.1017/S1368980024000041>.
- Guesdon, B., Couture, A., Pantchova, D., & Bilukha, O. (2020). Potential consequences of expanded MUAC-only programs on targeting of acutely malnourished children and ready-to-use-therapeutic-food allocation: lessons from cross-sectional surveys. *BMC nutrition*, 6(2), 1-13. <https://doi.org/10.1186/s40795-019-0328-1>.
- Houghton, C., Murphy, K., Shaw, D., & Casey, D. (2015). Qualitative case study data analysis: an example from practice. *Nurse Research*, 22(8), 8-12. <https://doi.org/10.7748/nr.22.5.8.e1307>
- Jebero, Z., Moga, F., Gebremichael, B., & Tesfaye, T. (2023). Determinants of Acute Malnutrition among Under-Five Children in Governmental Health Facilities in Sodo Town, Southern Ethiopia: Unmatched Case-Control Study. *International Journal of Pediatrics*, 2023(1), 3882801. <https://doi.org/10.1155/2023/3882801>
- Kabubo-Mariara, J., Ndenge, G. K., & Mwabu, D. K. (2009). Determinants of children's nutritional status in Kenya: evidence from demographic and health surveys. *Journal of African Economies*, 18(3), 363-387. <https://doi.org/10.1155/2023/3882801>
- Karki, S. (2023). *Nutritional Assessment of 6-59 Months Children of Kerabari Rural Municipality, Morang* [Doctoral dissertation, Department of Nutrition & Dietetics Central Campus of Technology Institute of Science and

- Technology Tribhuvan University], Nepal.
<http://202.45.146.37:8080/jspui/handle/123456789/271>
- Kenya Demographic and Health Survey. (2022). *Kenya Demographic and Health Survey 2022 - Key Indicators Report*.
<https://dhsprogram.com/pubs/pdf/PR143/PR143.pdf>
- Kumar, P., Sinha, R., Arora, S., Sarwai, R., Sultana, F., Daniel, A., & de Wagt, A. (2023). Viewpoints from the National Consultation on Addressing Acute Malnutrition on Mainstreaming Community-Based Program for Management of Acute Malnutrition in India. *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*, 48(1), 7-22. https://doi.org/10.4103/ijcm.ijcm_205_22
- Maingi, Z. (2023). *Nutrition Knowledge and Practices of Mothers and The Nutritional Status of Children 6-59 Months in Malava, Kakamega County, Kenya*. [Master's Thesis, Masinde Muliro University]
<https://irlibrary.mmust.ac.ke/xmlui/handle/123456789/2675>
- Misciagna, S. (Ed.). (2020). *Cognitive Behavioral Therapy - Theories and Applications*. *IntechOpen*. 7(1).1-12 doi: 10.5772/intechopen.78446
- Mohamed, H., Loy, S., Miltra, A., Kaur, S., Teoh, A., Rahman, S., & Amarra, M. (2022). Maternal diet, nutritional status and infant birth weight in Malaysia: a scoping review. *BMC Pregnancy and Childbirth*, 22(1), 294-9. <https://doi.org/10.1186/s12884-022-04616-z>.
- Morris, N., Sheru, W., Satoshi, K., Mohammed, K., & Makokha, A. (2017). Nutritional status and association of demographic characteristics with malnutrition among children less than 24 months in Kwale County, Kenya. *The Pan African Medical Journal*.28(65). 1-17
<https://doi.org/10.11604/pamj.2017.28.265.12703>
- Mirasol, X. P., & Gordoncillo, N. P. (2023). Factors Correlated with the Competency of Barangay Nutrition Scholars in Cabuyao, Laguna in the Implementation of the Family MUAC Approach. *Journal of Human Ecology and Sustainability*, 1(1), 7-20. <https://www.researchgate.net/profile/>.
- Mugenda, O.M. & Mugenda, A.G. (2003) *Research Methods, Quantitative and Qualitative Approaches*.
 ACT.
- Nayak, J., & Singh, P. (2021). *Fundamentals of research methodology problems and prospects*. SSDN Publishers & Distributors.
- Ndemwa, M., Wanyua, S., Kaneko, S., Karama, M. & Anselimo, M. (2017) Nutritional status and association of demographic characteristics with malnutrition among children less than 24 months in Kwale County, Kenya. *Pan African Medical Journal*.28(1) 265-8.
<https://doi.org/10.11604/pamj.2017.28.265.1270>
- Neuman, W. (2014). *Social Research Methods: Qualitative and Quantitative Approaches*. Pearson
- Pandey, P., & Pandey, M. (2021). *Research methodology tools and techniques*. Bridge Center.
- Ruiz, O.A., Ancira-Moreno, M.& Omaña-Guzmán, I. (2024). Low quality of maternal and child nutritional care at the primary care in Mexico: an urgent call to action for policymakers and stakeholders. *International Journal of Equity Health* 23(35).
<https://doi.org/10.1186/s12939-024-02129-z>.
- Shahid, R., Shoker, M. & Chu, L.M. (2022). Impact of low health literacy on patients' health outcomes: a multicenter cohort study. *BMC Health Service Research* 22(1), 11-48
<https://doi.org/10.1186/s12913-022-08527-9>

- Shiddike, M., & Rahman, A. (2020). *Case study method in human resource development: Reviewing the research literature*. <https://ideas.repec.org/a/ibn/ibrjnl/v13y2020i4p113.html>.
- Tessema, Z.T., Teshale, A.B. & Tesema, G.A. (2021) Determinants of completing recommended antenatal care utilization in sub-Saharan from 2006 to 2018: evidence from 36 countries using Demographic and Health Surveys. *BMC Pregnancy Childbirth* .21(2021), 192-201. <https://doi.org/10.1186/s12884-021-03669-w>
- Teshale, E., Nigatu, Y., & Delibiso, T. (2023). Relapse of severe acute malnutrition among children discharged from outpatient therapeutica program in western Ethiopia. *BMC peditaric*, 23(1), 441-445. <https://doi.org/10.1186/s12887-023-04269-7>.
- Tickell, K., Achieng, C., Masheti, M., Anyango, M., Ndirangu, A., Diakhate, M., & McGrath, C. (2023). Family MUAC supported by a two way SMS platform for identifying children with wasting: the Mama Aweza randomized controlled trial. *Eclinicalmedicine*, 64(1), 1-8. <https://doi:10.1016/j.eclinm.2023.102218>
- United Nations Children's Fund (2020) *UNICEF Annual Report 2020 Responding to COVID-19*. <https://www.unicef.org/reports/unicef-annual-report-2020>
- Varpio, L., Paradis, E., Ujitdehaage, S., & Young, M. (2020). The distinction between theory, theoretical framework, and conceptual framework. *Academic Medicines*, 95(7), 989-994. <https://doi:10.1097/ACM.0000000000003075>
- Wanjihia, V. W., Chepkirui, F., Hitachi, M., Muniu, E., Nyandieka, L., & Ndemwa, P. (2021). The association between nutritional knowledge, socio-economic status of caregivers and stunting of children under 5 years in Kwale County of Kenya: A baseline survey. *Austin Journal Nutrition Metabolism*, 8(2), 1-7. <https://doi.org/10.1177/16094069241229777>

APPENDICES

APPENDIX I: QUESTIONNAIRE FOR BENEFICIARIES

I am a postgraduate student at the Kenya Methodist University, pursuing a master's degree in Human Nutrition. I am undertaking the research on assessing factors hindering effectiveness of family MUAC programs on nutritional surveillance and early detection of malnutrition cases among children aged 6-59 months in Banisa Sub-County, Mandera. I would be very grateful if you could answer the questions in the questionnaires provided as honestly as possible.

Instructions: Tick where appropriate

Section A: Background Information

1. Age of the Respondents

21- 30 () 31-40 () 41-50 () Above 50 ()

2. What is your marital status?

- a) Married ()
- b) Single ()
- c) Separated ()
- d) Divorced ()
- e) Widowed ()

3. How many children do you have?

a) 1-3 () 4-6 () 7-10 ()

5. Level of education

- a) No Schooling ()
- b) Pre-School ()
- c) Primary ()
- d) Secondary ()
- e) Tertiary ()

6. Who is the occupation of the household head?

- a) Farmer () b) Business () c) Casual Workers ()
- d) Civil Servant () e) House wife () f) Other ()

Section B: Measurements of Study Variables

Instructions; Tick where appropriate

Measurement of Independent variables

1. Mothers Characteristics	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
How confident are you ability to identify signs of malnutrition in your child aged 6-59 months?					
To what extent do you believe that regular monitoring of your child's growth is important for detecting malnutrition early?					
I promptly seek medical advice when I notice any changes in my child's eating habits					
I am knowledgeable about the signs and symptoms of malnutrition in children					
I regular attend health education sessions on child nutrition and health					
I communicate effectively with healthcare provides regarding my child's nutritional needs					
2. Socio-Economic Factors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I believe that access to nutritious food is sufficient for children in Banisa Sub-County					
Adequate healthcare facilities are available in Banisa Sub-County to address malnutrition					

Community awareness programs effectively educate parents and caregivers about proper nutrition for children.					
Economic opportunities in Banisa Sub-County contribute positively to families ability to provide nutritious needs for their children					
There is sufficient access to clean water and sanitation facilities in Banisa Sub-County, which positively impacts child nutrition					
The overall economic status of families in Banisa Sub-County influences the prevalence of malnutrition among children.					

3. Health Facility services	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The health facility staff are knowledgeable about the signs and symptoms of malnutrition in children aged 6-59 months.					
The health facility has sufficient resources (e.g weighing scales, measuring tapes) to accurately assess the nutritional status of children aged 6-59 months.					
The health facility provides regular training to its staff on nutrition surveillance and early detection of					

malnutrition cases among children aged 6-59 months.					
The health facility conducts regular screening sessions specifically targeting children aged 6-59 months to identify malnutrition cases early.					
The health facility promptly refers malnourished children to appropriate higher level facilitate or programs for further management and care					
Caregivers feel supported and encouraged by health facility staff to follow nutritional advice and recommendations for their children aged 6-59 months.					

4. Training Factors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The availability of trained healthcare personnel for nutrition surveillance in Banisa Sub-County is adequate					
There is sufficient funding allocated to support nutrition surveillance programs in Banisa Sub-County.					
The commonly awareness about the importance of nutrition surveillance for children aged 6-59 months in high.					

The accessibility of healthcare facilities for malnutrition screening in Banisa Sub-County is adequate.					
There is adequate availability of nutritional supplements and therapeutic foods for malnourished children in Banisa Sub-County.					
The training provided to healthcare workers on identifying and managing malnutrition cases is sufficient					

Measurement of Dependent variable

Effectiveness of Family MUAC Program on Nutritional Surveillance and Early Detection	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Caregivers can accurately assess MUAC, although the quality of this measurement may decline with time after training					
Family MUAC approach can lead to improved coverage of screening					
There is little evidence linking family MUAC to a shorter length of stay in the program and/or an impact on program performance indicators					
Despite different tools, approaches and calculations to estimate and compare costs.					

Need for integration into the health systems to ensure continued training and monitoring and evaluation					
There is some evidence to suggest that family MUAC leads to earlier detection of wasting, earlier presentation for services, and hence less hospitalization.					

End

Thank you for your response

APPENDIX II: RESEARCH PERMISSION



KENYA METHODIST UNIVERSITY

P. O. Box 267 Meru - 60200, Kenya

Fax: 254-64-30162

Tel: 254-064-30301/31229/30367/31171

Email: deanrd@kemu.ac.ke

DIRECTORATE OF POSTGRADUATE STUDIES

May 16, 2023

Commission Secretary,
National Commission for Science, Technology and Innovations,
P.O. Box 30623-00100,
NAIROBI.

Dear Sir/Madam,

RE: SAIDA ROBLE HASSAN – (REG. NO. HND-3-1892-1/2021)

This is to confirm that the above named person is a bona fide student of Kenya Methodist University, in the School of Medicine and Health Sciences, Department of Public Health, Human Nutrition and Dietetics undertaking a Masters' Degree in Human Nutrition and Dietetics. She is conducting research on: "Evaluating Factors Hindering Effectiveness of Family MUAC Program on Nutrition Surveillance and Early Detection of Malnutrition Cases among Children Aged 6-59 Months In Banisa Sub County, Mandera".

We confirm that her research proposal has been presented and approved by the University. In this regard, we are requesting your office to issue a research license to enable her collect data.

Any assistance accorded to her will be appreciated.

Thank you.

Yours sincerely,

16 MAY 2023

Dr. John M. Muchiri (PhD)

Director, Postgraduate Studies

Cc: Dean - SMHS

CoD - PHHND

Program Coordinator

Student Supervisors



KENYA METHODIST UNIVERSITY

P. O. BOX 267 MERU - 60200, KENYA
TEL: 254-064-30301/31229/30367/31171

FAX: 254-64-30162
EMAIL: INFO@KEMU.AC.KE

May 16, 2023

KeMU/ISERC/HND/05/2023

SAIDA ROBLE HASSAN

HND-3-1892-1/2021

Dear Saida,

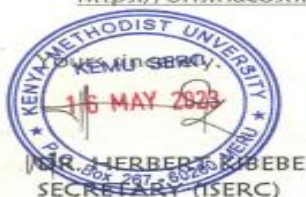
SUBJECT: EVALUATING FACTORS HINDERING EFFECTIVENESS OF FAMILY MUAC PROGRAM ON NUTRITION SURVEILLANCE AND EARLY DETECTION OF MALNUTRITION CASES AMONG CHILDREN AGED 6-59 MONTHS IN BANISA SUB COUNTY, MANDERA

This is to inform you that Kenya Methodist University Institutional Scientific Ethics and Review Committee has reviewed and approved your research proposal. Your application approval number is KeMU/ISERC/HND/04/2023. The approval period is 16th May, 2023 – 16th May, 2024.

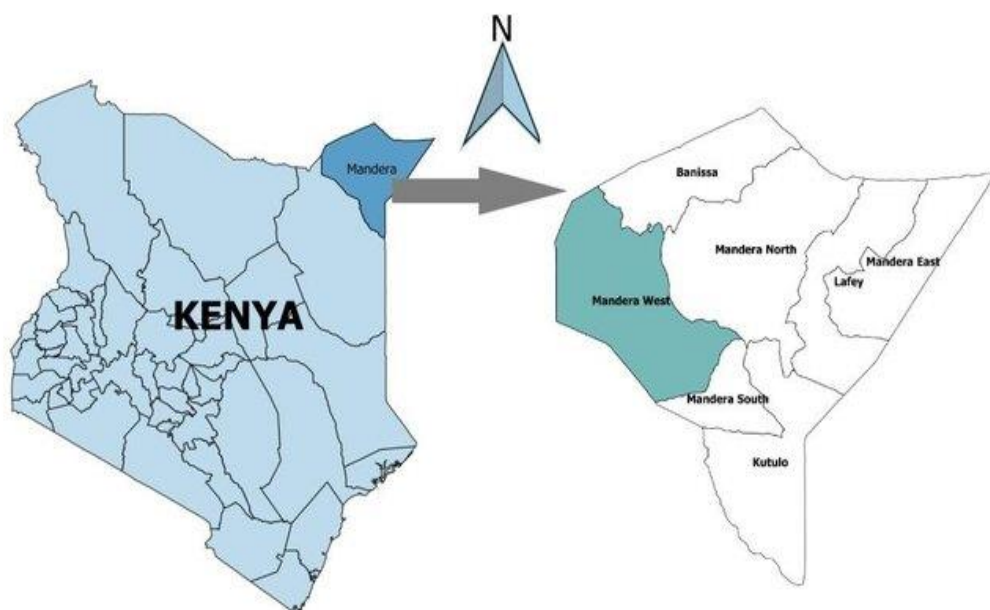
This approval is subject to compliance with the following requirements:-

- I. Only approved documents including (informed consents, study instruments, MTA) will be used.
 - II. All changes including (amendments, deviations, and violations) are submitted for review and approval by Kenya Methodist University Institutional Scientific Ethics and Review committee.
 - III. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KeMU ISERC within 72 hours of notification.
 - IV. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KeMU ISERC within 72 hours.
-
- V. Clearance for export of biological specimens must be obtained from relevant institutions.
 - VI. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
 - VII. Submission of an executive summary report within 90 days upon completion of the study to KeMU ISERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.



APPENDIX III: MAP OF RESEARCH AREA

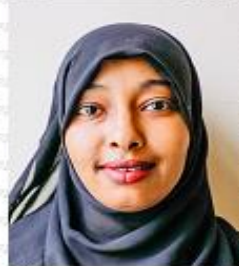




REPUBLIC OF KENYA

Ref No: 465881

RESEARCH LICENSE



This is to Certify that Miss. SAIDA ROBLE HASSAN of Kenya Methodist University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Mandera on the topic: EVALUATING FACTORS HINDERING EFFECTIVENESS OF FAMILY MUAC PROGRAM ON NUTRITION SURVEILLANCE AND EARLY DETECTION OF MALNUTRITION CASES AMONG CHILDREN AGED 6-59 MONTHS IN BANISA SUB COUNTY, MANDERA for the period ending : 25/July/2024.

License No: NACOSTI/P/23/27592

Applicant Identification Number

465881

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.

See overleaf for conditions

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
 - i. Endanger national security
 - ii. Adversely affect the lives of Kenyans
 - iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
 - iv. Result in exploitation of intellectual property rights of communities in Kenya
 - v. Adversely affect the environment
 - vi. Adversely affect the rights of communities
 - vii. Endanger public safety and national cohesion
 - viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke