CAREGIVERS' NUTRITIONAL KNOWLEDGE, CHILD DIETARY PRACTICES, AND NUTRITIONAL STATUS OF CHILDREN AGED 6-59 MONTHS IN MAJENGO SLUM, NAROK COUNTY, KENYA

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A Thesis Submitted to the Institute of Postgraduate Studies of Kabarak University in Partial Fulfillment of the Requirement for the Award of Master of Science Degree in Human Nutrition and Dietetics Degree

KABARAK UNIVERSITY

NOVEMBER, 2024

DECLARATION

1. I do hereby declare that
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The thesis entitled: **Caregivers' Nutrition Knowledge, Child Dietary Practices and Nutritional Status of Children Aged 6-59 Months in Majengo Slum, Narok County Kenya**"**”** by **Kotonto Sinantei Asenath** is presented to the Institute of Postgraduate Studies of Kabarak University. We have reviewed the thesis and recommend it be accepted in partial fulfillment of the requirement for the award of the Degree of Master of Science in Human Nutrition and Dietetics.

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DEDICATION

I dedicate this research thesis to God Almighty, my Creator, my sustainer and my source of strength, my inspiration, the giver of wisdom, knowledge and understanding. He has been my guardian throughout this period and only on His wings I soared. I also dedicate this thesis to my family for their unwavering support. A special gratitude to my loving parents, Joseph Kotonto and Priscilla Kotonto whose words of encouragement had pushed me to keep soaring high and not to give up. My siblings Ezra, Samuel, Edith, Shadrack, and Meshack who have been a shoulder to lean on always when things get tougher. My beloved son Eilon Jesse who have always been a symbol of love and patience. Special thanks to my best friend Methuselah Rotich, God bless you abundantly.

ABBREVIATIONS AND ACRONYMS

CDDS	Child Diet Diversity Score
DD	Dietary Diversity
DDS	Dietary Diversity Score
ENA	Emergency Nutrition Assessment
EBF	Exclusive Breastfeeding
GAIN	Global Alliance for Improved Nutrition
HAZ	Height for Age Z-Score
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureaus of Statistics
KPH	Kenya Population and Housing Census
KNDI	Kenya Nutrition and Dietetics Institute
KUREC	Kabarak University Research Ethics Committee
MUAC	Mid-Upper Arm Circumference
MDD	Minimum Dietary Diversity
MMF	Minimum Meal Frequency
NACOSTI	National Commission for Science, Technology, and Innovation
SPSS	Statistical Package for Social Science
SDGs	Sustainable Development Goals
UNICEF	United Nations International Children Funds and Education
WHO	World Health Organization
WAZ	Weight for Height Z-Score
WFA	Weight for Age Z-Score

OPERATIONAL DEFINITION OF TERMS

Caregivers' Nutrition Knowledge -Refers to awareness of practices and concepts related to nutrition and health by those taking care of children aged 6-59 months.

Dietary Practices - Refer to the number of meals, amount of energy, protein and vitamin A consumed, and frequency of food consumption.

Dietary Diversity - This is the number of different foods or food groups consumed over a given reference period by children 6-59 months

Malnutrition - A condition characterized by a person's insufficient intake of calories or nutrients.

Nutritional Status - It is the physiological state of the body as revealed by anthropometric measurements of wasting, stunting, and underweight in children.

Slum **-** Refers to a residential area with substandard housing that is poorly serviced or overcrowded, and therefore , unsafe, and socially undesirable.

Caregiver - A person responsible for feeding the child.

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ABSTRACT

Malnutrition is a significant health concern in developing countries like Kenya, mainly due to insufficient knowledge among caregivers and inappropriate dietary practices for complementary feeding. This is especially true during the first 1000 days of a child's life, as it shapes their overall health, growth, and neurological development. There exists minimal information on caregivers' nutrition knowledge, child dietary practices, and the nutritional status of children aged 6-59 months in Majengo slums, Narok County and thus need for such a study. This study aimed to evaluate the relationship between caregivers' nutrition knowledge, child dietary practices, and the nutritional status of children aged 6-59 months in Majengo slums, Narok County, Kenya. The study utilized a descriptive cross-sectional survey design, using a quantitative data collection approach with a sample size of 341 caregivers and their children aged 6-59 months selected through stratified random sampling. Data on caregivers' nutritional knowledge, child dietary practices, and children's nutritional status were collected using a semi-structured questionnaire. The collected data were analyzed using SPSS version 26 for socio-demographic characteristics, ENA for SMART for anthropometric parameters, and Nutri-survey for the analysis of 24-hour dietary recall and food frequency questionnaire. The results were presented using descriptive and inferential statistics, with data from 297 out of 341 households, resulting in an 87.10% response rate. The majority of caregivers (92.9%) were female, with 34.7% aged 30 to 39, and 34.0% married. Additionally, 33.0% of the children were between 12 and 24 months old. The study found that 28.6%, 11.8%, and 59.6% of caregivers had average, high, and low nutrition knowledge, respectively. Many caregivers had significant gaps in their knowledge about breastfeeding practices, with less than 30% of the children meeting their recommended daily allowance (RDA) for protein and energy, while 54% met their RDA for vitamin A. Furthermore, 33.3% of children were stunted, 23.2% wasted, and 19.9% were underweight which is considered critical, under global acute malnutrition estimate (WHO 2000). After adjusting for other variables, children from caregivers with higher nutrition knowledge and those receiving diversified diets were less likely to be malnourished, with adjusted odds ratios of 0.25 (0.72 - 0.85) and 0.32 (0.13-0.76), respectively.

Keywords: *Majengo Slum, Caregiver's Nutrition Knowledge, Dietary Practices, Nutrition Status*.

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter presents the background of the research problem, objectives of the study, research questions, justification significance, delimitations, and limitations.

1.2 Background of the Study

Suboptimal feeding practices among caregivers contribute to nutritional-related health problems in children in low and middle-income countries (Rahman et al., 2023). Poor dietary habits significantly increase the vulnerability of children under five to malnutrition and micronutrient deficiencies (Jacqueir et al., 2016). Caregivers' knowledge, food consumption, and health are crucial factors in a child's survival, growth, and development. The feeding of young children is a behavior exhibited by caretakers (Ickes et al., 2015). Inadequate levels of nutrition education are often observed among mothers with poor maternal practices and malnourished children; inadequate feeding habits are associated with low nutritional awareness among caretakers (Chakraborty et al., 2014). Research indicates that caregivers' level of nutritional awareness predicts feeding behaviors, thereby influencing the nutritional health of their children (Fekadu et al., 2015). Poor dietary practices in children under five are significantly influenced by caregivers' lack of understanding regarding child feeding (Namkumbi et al., 2015).

The caregiver's level of nutritional knowledge predicts feeding practices and consequently impacts the nutritional status of their children (Imdad et al., 2011). Lack of nutritional knowledge on child feeding among caregivers significantly contributes to the poor dietary practices of children under five years of age (William et al., 2012). According to the World Health Organization (WHO, 2021), malnutrition accounted for approximately 45% of all deaths in children under the age of five in 2020 alone, with nearly 45 million wasted and 149 million stunted globally. During the same period, an estimated 36% of children under five were stunted in Sub-Saharan Africa (Food and Agriculture Organization, (FAO, 2020), with East Africa accounting for approximately 32.6% of stunted children and 5.2% of wasted children, compared to the global prevalence of 6.7% (Global Nutrition Report, 2021). Malnutrition is identified as a significant health concern in developing countries, as highlighted by Chakona and Shackleton (2018). In Kenya, 4.2% of children under five are wasted, and 26.2% are stunted due to poor diet quality related to the inadequate balance of calories and essential macronutrients like protein (Global Nutrition Report, 2022).

The caregiver's socioeconomic status is among the factors influencing child nutrition (Galgamuwa Ls et al., 2017), with low income and maternal literacy being considered major predictors of HAZ, WHZ, and WAZ (Kavozi et al., 2014). According to Abuya et al. (2012), there appears to be a direct association between maternal knowledge and a child's nutritional status. Slum dwellers are particularly vulnerable to malnutrition as they are among the most disadvantaged and neglected groups (Das et al., 2020), facing limited access to safe drinking water, adequate sanitation, secure housing, and sufficient healthcare. Consequently, they are more susceptible to infectious diseases due to overcrowding (Huey et al., 2019). The most vulnerable groups are women, infants, and young children, whose nutritional status is affected, leading to high levels of morbidity and mortality (Das et al., 2020). In Kenya, urban slum dwellers experience a morbidity and mortality rate of around 12% among children, posing a significant risk of inter-generational malnutrition (Goudet et al., 2017).

During the first one thousand days of a child's life, there exists a critical period when linear growth is highly sensitive to environmentally modifiable factors, including food, psychosocial care, and morbidity treatment, despite the complexities surrounding the causes of childhood stunting (Das et al., 2020). Research concerning the nutritional practices and knowledge of caregivers among slum dwellers in the Majengo area of Narok County is scarce, particularly during the formative stages of life when growth trajectories are being established, accounting for an estimated 70% of stunting. Therefore, this study aimed to evaluate caregivers' nutrition knowledge and its impact on dietary practices and the nutritional status of children aged 6-59 months. Assessing caregivers' knowledge of the factors contributing to children's malnutrition lays the groundwork for nutrition education initiatives. Furthermore, it can pinpoint perception gaps, enabling targeted interventions to promote children's health within the slum community. The findings of this research can guide the development of customized interventions to improve children's health and identify criteria for identifying children at risk of malnutrition.

1.3 Problem Statement

Approximately half of deaths among children under the age of five are caused by under-nutrition (WHO, 2024). Nutrition is crucial for their survival, health, and development, underscoring the necessity for increased dedication and investment in Kenya. The investment in nutrition is expected to bring about significant improvements and help the country make substantial progress towards the achievement of the Sustainable Development Goals (SDGs), which aim to end all forms of hunger and malnutrition by 2030 and ensure access to sufficient and nutritious food for all people, especially children and the most vulnerable, throughout the year. Despite efforts to tackle malnutrition, Kenya still experiences a high rate of malnutrition. According to the Child Survival and Development Strategy (2009-2013), nearly 50% of all under-five deaths in Kenya are associated with malnutrition (Ole Tankoi et al., 2016).

According to Kenya's Demographic and Health Survey (KDHS, 2022), approximately 18% of children under five are stunted, 5% are wasted, and 10% are underweight. However, in Narok County, the situation is particularly concerning, with stunting affecting 27.2% of children, underweight at 18.9%, and wasting at 6.8% (Narok County Smart Survey 2018). Malnutrition in informal settlements is closely linked to factors such as food scarcity, inadequate housing, poor water and sanitation, and low income (Kimani-Murage et al., 2017). Remarkably, one in five households in these settlements faces food insecurity, hindering their access to sufficient, safe, and nutritious food to support a healthy and active lifestyle. Urban informal settlements pose significant challenges to child health, nutrition, and survival (Lee Go, et al., 2016).

Caregivers' understanding of nutrition significantly influences the adequacy and appropriateness of children's diets. Consequently, caregivers rely on nutritional information to make decisions regarding the diversity, frequency, timing, and method of feeding their children. Poor dietary practices, coupled with inadequate nutrition knowledge, can result in insufficient nutrient intake and subsequent poor nutritional outcomes in children. This is particularly concerning for children aged 6-59 months, as this stage is considered a critical window of opportunity where inadequate nutrient intake can have long-lasting effects on health. To the researcher's knowledge, limited information exists regarding caregivers' nutrition knowledge, dietary practices, and the nutritional status of children in Narok slums. Therefore, this study aimed to examine the relationship between caregivers' nutrition knowledge, child dietary practices, and nutritional status of children aged 6-59 months, with a bias to stunting as it is the predominant form of malnutrition.

1.4 Justification of the Study

Adequate dietary knowledge is a crucial factor directly influencing the nutrition provided to children, thereby affecting their developmental curves (Asakurak, et al., 2017). Proper nutrition during infancy is pivotal for determining children's long-term nutritional and health outcomes. Caregiver knowledge plays a vital role in shaping a child's diet, ensuring optimal growth and development during this critical period. Effective feeding practices for infants and children under 5 years old are recognized as key interventions to reduce under-5 mortality rates, necessitating improvements in caregiver knowledge and practices (Arifeen, et al., 2008). Early childhood undernutrition can impede physical and cognitive development (Makundi, et al., 2017), underscoring the importance of caregivers' nutrition knowledge in fostering appropriate dietary practices to enhance children's eating habits and nutritional status. In Narok County, the prevalence of stunting among children aged 6-59 months is 27.9%. Thus, it is imperative to explore the relationship between caregivers' nutrition knowledge, dietary practices, and nutritional status in the Majengo slum of Narok County.

1.5 Purpose of the Study

The purpose of this study was to determine the relationship between caregivers' nutrition knowledge on dietary practices and the nutritional status of children aged 6-59 months in Majengo slums, Narok County.

1.5.1 Specific Objectives of the Study

i. To describe the socio-demographic characteristics of caregiver-child pair in Majengo slum, Narok county, Kenya
ii. To assess the nutritional knowledge of the caregivers of children 6-59 months in Majengo slum, Narok county, Kenya

iii. To assess the dietary practices of children6-59 months in Majengo slum, Narok county, Kenya
iv. To establish the nutritional status of children 6-59 months in Majengo slum, Narok county, Kenya
v. To determine the relationship between caregivers' nutrition knowledge, dietary practices, and nutritional status of children 6-59 months in Majengo slum, Narok County, Kenya

1.5.2 Research Questions

i. What is the socio-demographic characteristics of caregiver-child pairs in Majengo slum, Narok County, Kenya?
ii. What is the nutritional knowledge of the caregivers of children 6-59 months in Majengo slum, Narok County, Kenya?
iii. What are the dietary practices of children 6-59 months in Majengo slum, Narok County, Kenya?
iv. What is the nutritional status of children aged 6-59 months in Majengo slum, Narok County, Kenya?
v. How is the relationship between caregivers' nutrition knowledge, child dietary practices, and nutritional status among children aged 6-59 months in Majengo slum, Narok County, Kenya?

1.6 Significance of the Study

Improving the nutritional status of children under five years old relies on caregivers possessing the requisite knowledge, which can then be translated into appropriate dietary practices. However, there is a paucity of research on caregivers' nutritional knowledge, dietary practices, and nutritional status of young children in slum settlements. The results of this study will be used to identify and equip caregivers with the necessary nutrition knowledge. The results will also contribute to the body of knowledge by serving as a baseline for further research. In addition, the caregivers in the urban informal settlements are likely to benefit through interventions formulated as a result of the awareness generated from the study. Finally, the results will be useful for the Ministry of Health, County Ministries of Health, and relevant institutions that support infant and young child feeding to determine the feeding approaches.

1.7 Delimitations of the Study

This study focused on children 6-59 months in Majengo slum, Narok County. Thus, the findings can only be generalized to children of the same age and with similar characteristics.

1.8 Limitations of the Study

i. Some areas were inaccessible due to insecurity issues affecting the region
ii. The food recall bias increases with the days the client was required to make a dietary recall.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter offers a comprehensive review of the existing literature and its alignment with the variables identified by the study objectives. It delves into the interconnectedness of caregivers' knowledge, dietary practices, and the nutritional status of children aged 6-59 months in Majengo Slum, Narok County.

2.3 Demographic and Socioeconomic

2.3.1 Age of the mother or Caregiver

Abdul Rahim (2016) found that caregivers aged 16-25 had a higher prevalence of wasted children compared to mothers aged 36 or older. This could be attributed to caregivers' lack of confidence in their ability to care for their children, potentially resulting in inadequate care (Mongelli & Rullani, 2017). Similarly, a study conducted in Mwingi West by Mbijiwe, Ndung'u, and Kinyuru (2022) revealed that caregivers aged 20-29 years had the highest proportion of stunted, wasted, and underweight children, while those aged 50 years had no children who were stunted, wasted, or underweight.

2.3.2 Level of Education

Research has consistently demonstrated a strong correlation between a caregiver's education levels (Caroline et al., 2021). The direct application of knowledge gained through literacy and numeracy skills acquired from formal education enhances the caregiver's capacity to recognize illness and take appropriate action regarding the nutritional status of dependent children. A study carried out in Obunga Slums in Kisumu revealed a significant association between wasting and the caregiver's level of education (Omondi & Kirabira, 2016). Gelu et al. (2018) further substantiate this link by highlighting the high prevalence of wasting in Ethiopia among caregivers with lower educational attainment levels.

2.3.3 Occupation of the mother or Caregiver

In urban slums, mothers frequently face unemployment, leading them to seek employment in the informal sector. The demands of working outside the home often prevent these mothers from breastfeeding regularly or providing timely additional meals (Kabir, 2017). Additionally, families in these areas often experience low income, relying on various income sources and irregular work patterns such as night shifts, construction work, and long hours to provide sufficient nutrition for their infants. Due to their work commitments, parents often leave their babies in the care of older siblings, neighbors, or relatives from other villages, who may not consistently or timely provide meals or may sometimes neglect to feed them altogether. As a result, babies may not receive adequate nutrition through breastfeeding or complementary feeding due to a lack of consistent supervision.

2.3.4 Household Income

Studies have found that less than half of families' total income is inadequate to support a healthy lifestyle. For instance, there is apositive correlation between children's Mid-Upper Arm Circumference (MUAC) and family income, suggesting that children are more likely to experience malnutrition in households with lower incomes (Tette, et al., 2016). Furthermore, research reveals a positive association between the consumption of nutritious food (as indicated by MUAC) and higher household income. Similarly, numerous studies have highlighted low family income as one of the factors contributing to malnutrition (Clarke et al., 2021). Other studies have also indicated a positive lationship between stunting and low-income households (Gelu et al., 2018; Murarkar et al., 2020).

2.3.5 Religion

Numerous studies have explored the relationship between religion and the dietary practices of caregivers, revealing a complex interplay between faith and food choices. For instance, in Ethiopia, the Orthodox Church has established dietary guidelines that dictate specific foods to be consumed during fasting periods, notably restricting the intake of chicken and meat. These religious practices influence the nutritional decisions of caregivers, shaping the dietary patterns of children and families within the community (Kumera et al., 2018).

In contrast, a study conducted in the Obunga slum of Kisumu found no significant correlation between the dietary habits of children under five and the caregivers' religious affiliations. This suggests that other factors—such as economic constraints, cultural influences, or local food availability—may play a more dominant role in shaping dietary practices in that particular context (Omondi and Kirabira, 2016). The findings highlight the variability in how religious beliefs impact nutrition across different communities and underscore the need for a nuanced understanding of local practices when addressing dietary issues among children.

2.4 Caregivers' Nutritional Knowledge

2.4.1 Food Consumption Patterns

In many developing nations, inadequate dietary intake and heavy reliance on starchy foods are linked to malnutrition. Moreover, staple diets predominantly consist of plant-based sources, with limited consumption of eggs, poultry, red meat, and fish due to religious, economic, or cultural factors (Zulu, 2019). For instance, a study conducted in Burkina Faso noted that edible oil, maize, and leaves are dietary staples (Mank et al., 2020). In Marsabit and Kajiado, Kenya, three-quarters of households primarily fed their children carbohydrates, with at least 70% of children rarely consuming vegetables and fruits (Chege & Kuria, 2017; Galgallo, 2017). Galgallo (2017) found a positive correlation between wasting and inadequate nutrition, while stunting was associated with insufficient dietary diversity. Despite being a pastoralist community, children in Kajiado, a neighboring county to Narok, predominantly consumed milk as a significant animal food source (Chege & Kuria, 2017). Furthermore, children aged 6-59 months consumed fewer fruits and vegetables. Due to limited literature on food consumption patterns in slum areas, this study aims to address this gap.

2.4.2 Breastfeeding Practice

Effective breastfeeding practices commence with exclusive breastfeeding for the first six months of a child's life, followed by the introduction of complementary foods while continuing breastfeeding until the age of two years or beyond. Exclusive breastfeeding offers numerous benefits to infants, including essential nutrients for growth and development, as well as enhanced immune system functioning. For instance, Galgallo (2017) highlighted that exclusive breastfeeding protects against various illnesses such as respiratory infections, gastrointestinal diseases, diarrhoea, iron deficiency anemia, obesity, and diabetes. Furthermore, the World Health Organization (WHO, 2023) recommends initiating exclusive breastfeeding within one hour of childbirth to reduce infant morbidity and mortality rates, lower the risk of chronic diseases, and promote overall well-being.

Continued breastfeeding for the first two years or more is crucial for optimal growth and development, as malnutrition during this period may have enduring effects on cognitive development, potentially impairing learning abilities (Rocha et al., 2022). According to the 2019 Global Breastfeeding Scorecard, approximately 41% of children under six months old were exclusively breastfed, with Kenya leading with a rate of 61% (Kimani-Murage et al., 2021). Similarly, data from ICF Macro and KNBS (2010) indicate that mothers breastfeed their children for an average of 21 months (57%), while in urban settlements in Nairobi, 85% of children were exclusively breastfed for up to one year.

2.4.3 Complementary Feeding

Complementary feeding involves introducing semi-solid or solid foods alongside breast milk to fulfill the growing nutritional requirements of infants. The frequency of meals should increase gradually, from 2-3 meals per day at six months to 3-4 meals daily at 6-8 months, and further to 3-4 times daily between 9-11 months and 12-24 months, with the addition of snacks once or twice per day (WHO, 2010). Moreover, it is recommended to offer an additional snack one to two times a day. Despite notable improvements in exclusive breastfeeding practices, timely initiation of complementary feeding lags.

To address this, Kenya's Ministry of Health has established additional nutritional goals, aiming for more than four servings per day of diversified foods for children aged 6-23 months, with an increase from 39% to 67% (Ahoya et al., 2019). However, findings from the 2014 Kenya Demographic and Health Survey (DHS) revealed that only about half of Kenyan children aged 6–23 months met the minimum meal frequency criteria, 41% met the minimum dietary diversity criteria, and merely 22% had a minimum acceptable diet, representing a decline from previous levels of 39% in 2010 (Ahoya et al., 2019). Additionally, these children are often introduced to non-milk liquids and fruit juice, which may displace the consumption of semi-solid and solid foods. It is anticipated that structural and economic barriers in urban slums adversely affect complementary feeding practices. Therefore, concerted efforts are needed to improve complementary feeding practices in urban slums across Kenya.

2.5 Dietary Diversity

Dietary diversity (DD) plays a crucial role in meeting the macro- and micronutrient requirements of the body, thereby ensuring optimal nutritional status in children. Studies have highlighted a significant association between inadequate dietary diversity and stunting (Galgallo, 2017; Zulu, 2019). DD is measured by the number of food groups consumed by an individual within 24 hours. For children aged 6-59 months, ten food groups are considered for assessing DD: roots, grains, and tubers; dairy products; eggs; vitamin A-rich fruits and vegetables; nuts and legumes; and meat and fats.

The recommended minimum dietary diversity for this age group is four food groups; a Dietary Diversity Score (DDS) of less than four indicates poor dietary diversity (Gelu et al., 2018). However, many children are typically fed diets lacking adequate dietary diversity, leading to insufficient dietary intake and subsequent under nutrition. The first two years of life present a critical window for addressing growth impairments and supporting cognitive and developmental abilities. In Kajiado, for example, 95% of households scored low on DDS (<6), correlating with the 35.7% stunting rate reported in 2017 (Chege & Kuria, 2017). Due to limited literature on dietary diversity among children aged 6-59 months in slum areas, this study aims to fill this gap.

Children undergo rapid growth and necessitate adequate intake of both micronutrients and macronutrients, which are crucial for their growth and development. Nutrient adequacy involves meeting daily nutrient requirements through the consumption of a variety of foods that contribute to a balanced diet. Malnutrition is linked to adverse health outcomes such as increased mortality rates and impaired physical and cognitive development. Zulu (2019) suggests that nutritional adequacy can be assessed by examining daily food intake using the 24-hour recall method. The quantities of food consumed determine whether household members meet the minimum meal frequency, daily calorie requirements, and nutrient recommendations. According to Ochola and Kimwele (2017), the minimum meal frequency was deemed adequate, with breastfed infants aged 6-8 months needing to be fed twice daily, breastfed infants aged 9-23 months needing three meals daily, and non-breastfed children aged 6-23 months requiring four meals daily (p.18). In Kajiado, however, 76% of households reported consuming less than three meals daily (Chege & Kuria, 2017). Notably, there is a significant association between failure to meet the minimum meal frequency and wasting and underweight (Ochola & Kimwele, 2017).

2.5.1 Minimum Dietary Diversity

A Minimum dietary diversity for children as defined by WHO, 2017 is the consumption of at least four or more food groups in their meals. According to a study conducted in East African countries by Raru et al., 2023, the magnitude of minimum dietary diversity (MDD) among children aged 6-59 months was 10.47%. The adequate MDD was determined by factors such as women's age, mother's occupation, mother's education level, media exposure, wealth index, place of delivery, frequency of meals, residence, and the nation in which the mothers live. The study had similarities to a study conducted in Ethiopia's Gorche District (Dangure et al., 2017). Another study conducted in Ethiopia by (Moga Lencha et al., 2022), found that children from households with monthly food expenditures at or above the mean (measured in Ethiopian Birr) were more likely to meet the minimal dietary diversity standard than those below the mean. This could be explained by the fact that people in low socioeconomic positions have less access to a wide variety of foods, which leads to a diet that is poorer in quantity and quality. As a result, food-insecure households may be unable to meet their nutritional requirements. (Shariff et al., 2015).

2.5.2 Minimum Meal Frequency

Suitable nutrition is crucial for the health and development of children WHO, (2021). Minimum Meal Frequency is a proportion of breastfed and non-breastfed among children 6 to 23 months of age who receive solid, semi-solid, or soft foods but also comprising milk feeds for non-breastfed children the minimum number of times or more (WHO,2021). Appropriate complementary feeding is vital for the growth and development of the child (Aempro et al., 2013). Findings from a study done in Moshi, Tanzania by Masuke et al., (2021) showed that children who received low minimum meal frequency were more likely to be stunted, wasted, and underweight than is the case with their peers. The minimum number of meals per day is required to attain the necessary level of energy and nutritional requirements to prevent deficiencies that could result in under-nutrition (WHO, 2013). The WHO recommends that young children, especially infants should receive a minimum of four out of the ten food groups- namely: grains roots and tubers legumes and nuts; dairy products; flesh foods (meat, fish poultry, and organ meats); eggs; vitamin a – rich fruits and vegetable; and other fruits and vegetables to maintain proper growth and development yet, many children in low –and middle –income countries do not have adequate dietary diversity (WHO, 2013).

2.5.6 Number of Meals per Day

The term "minimum food intake" describes the amount of solid or semi-solid food eaten by children aged 6 to 23- months, or breast milk (for non-breastfed infants), consumed within a specified timeframe or frequency. The frequency of a child's eating habits is assessed by determining how many times they consumed a meal, half a meal, or a soft drink within the 24 hours preceding the assessment. According to studies by Mekonnen et al. (2017) and Bikes et al. (2020), infants aged 6 to 8.9 months who are breastfed should ideally breastfeed three or more times, while those aged 9 to 23.9 months should breastfeed at least four times. Non-breastfed children aged 6 to 59 months should consume at least one to two snacks in addition to their meals to meet the minimum food intake requirements.

2.6 Nutritional Status of Children 6-59 Months

The nutritional status of children is a vital aspect of community nutrition, serving as a key indicator of the overall health of the population (Jubayer A, 2022). DeVita et al. (2019) conducted an assessment of nutrition in informal settlements in Nairobi, revealing global figures where 26% were underweight, 13.16% were wasted, and 6.3% were malnourished among children under five. Under nutrition, along with its various forms, is particularly prevalent in developing nations. According to UNICEF (2020), 4% of children under five worldwide are underweight, 11% are malnourished, and 26% are stunted, with the highest rates observed in West Pokot and Kitui at 46%. A SMART survey conducted in 2013 indicated that 27.9% of children under five years old were stunted, and 12.6% were underweight.

A child is considered wasted if they are excessively thin about their height (WFH), underweight if their weight is insufficient for their age (WFA), and stunted if their height is below the norm for their age (HFA). In Kenya, at least one in four children under the age of five, totaling 2 million, are stunted (UNICEF, 2020), making stunting the most prevalent form of malnutrition among children. Undernutrition has significant adverse effects on children, with stunting particularly associated with long-term consequences such as restricted physical and mental development, adverse maternal reproductive outcomes, and an elevated risk of developing non-communicable diseases (Islam et al., 2018). Importantly, impaired cognitive function in undernourished children may lead to reduced economic productivity in adulthood (Zulu, 2019).

Gaudet et al. (2017) reported a prevalence of stunting ranging from 11.5% to 47% in Nairobi slums, attributing it to chronic undernourishment and exposure to infectious diseases. Slums in Kenya are characterized by heightened food insecurity and inadequate infant feeding practices. Stunting, defined by WHO growth standards as a 2SD in attained height, is influenced by a complex interplay of biological, environmental, and social factors exacerbated by the high poverty levels prevalent in urban slums. Poor households in these areas often face challenges such as limited education and nutritional knowledge, inadequate healthcare utilization and access, as well as insufficient resources, and food insecurity (Islam, 2018). Given the combination of environmental hazards and poverty in urban slums, it is anticipated that malnutrition rates, particularly stunting, are elevated, posing significant risks to children. However, there is limited data available on under nutrition rates in Narok County.

2.6.1 Anthropometric Measurements

Anthropometric measurements are essential tools for evaluating the nutritional status of children aged 6 to 59 months, as they provide insight into body composition and physical proportions. These assessments are critical indicators of overall well-being in children and adolescents, helping to identify potential health issues at an early stage.

The nutritional status of a child is typically expressed as the percentage of deviation from the World Health Organization (WHO) Growth Standards median. Specifically, weight-for-age (WFA) measurements below -2 standard deviations (SD) indicate underweight, height-for-age (HFA) measurements below -2 SD signify stunting, and weight-for-height (WFH) measurements below -2 SD are indicative of wasting (Zulu, 2019). These measurements highlight the various forms of malnutrition that can affect a child’s growth and development.

The assessment procedure involves taking precise measurements, starting with weight and height, followed by calculating the relevant indices. Additionally, the Mid-Upper Arm Circumference (MUAC) is employed as a quick screening tool for malnutrition. A MUAC measurement above 12.5 cm generally indicates normal nutritional status, while measurements ranging from 11.5 to 12.5 cm suggest moderate malnutrition. A MUAC of less than 11.5 cm is classified as severe malnutrition. This method is particularly useful in community settings where resources may be limited, as it is simple to perform and provides immediate insights into a child's nutritional condition.

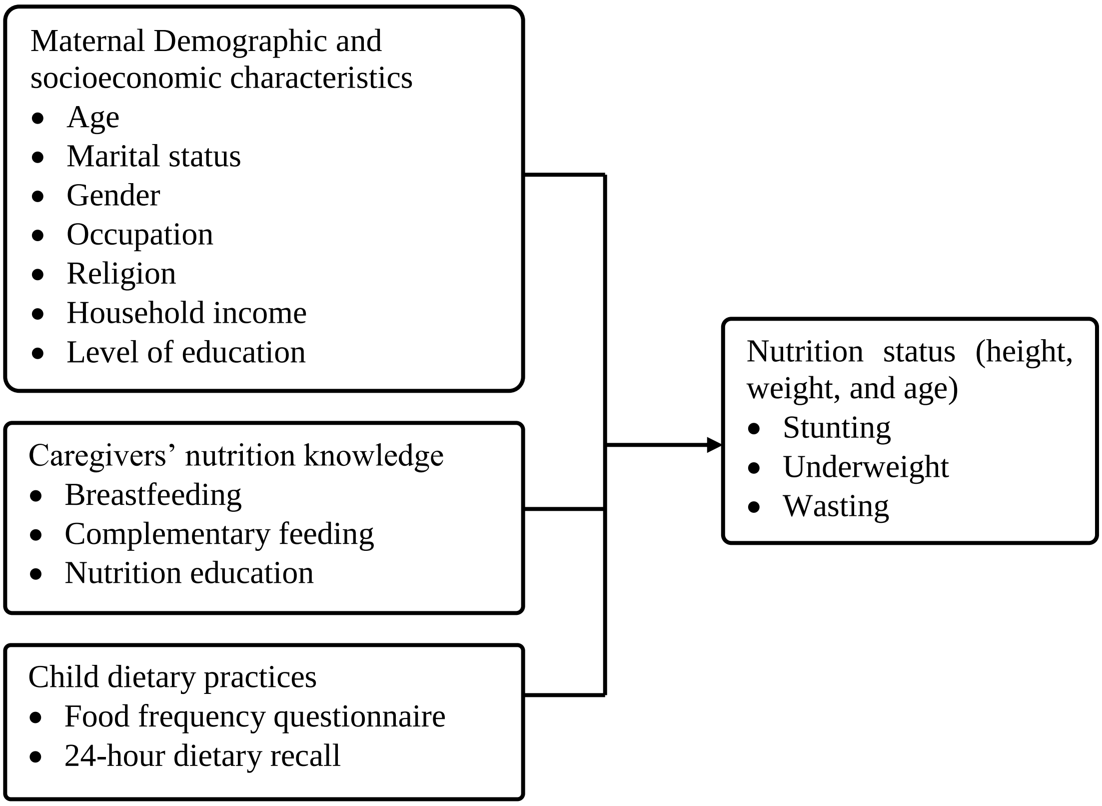
The nutritional status of a child is a reflection of their overall well-being and is influenced by both nutrient intake and utilization. In regions such as informal settlements in Kenya, where nutrient deficiencies are prevalent, children may face significant challenges, resulting in conditions like wasting, stunted growth, and underweight. These issues often arise from inadequate access to nutritious foods, which can severely impact a child’s health and development (Devita et al., 2019). Addressing these nutritional concerns is critical for promoting healthier outcomes for children in vulnerable communities.

2.7 Conceptual Framework Conceptual Framework

Figure 1

Conceptual Framework

Independent Variables   Dependent Variable



Source: UNICEF's Model (2020)

A considerable body of literature examines the factors contributing to child under nutrition in developing countries, often employing empirical and theoretical frameworks. The United Nations Children's Fund (UNICEF, 2020) suggests that factors like resources, socio-cultural contexts, and political and economic structures influence underlying determinants, for example, caregiver knowledge, which subsequently affects immediate factors like dietary practices. Within this framework, the resources accessible to caregivers, including their knowledge and beliefs, assume pivotal roles. Consequently, these underlying determinants indirectly impact a child's nutritional status, with the link between a child's nutrition status and caregiver knowledge mediated by variables such as dietary habits. However, this study did not account for variables like disease prevalence, inadequate food access, healthcare services, and political ideologies, which are fundamental factors affecting both independent and dependent variables.

2.8 Summary of Literature Review

Table 1

Literature Review Summary

Key References	Conclusion/Postulates
Ickes et al. (2015)	The dietary patterns and nutritional status of caregivers are often influenced by their nutritional knowledge. Mothers who give birth at home, have low reading levels, and have little education are particularly vulnerable to poor child feeding and can gain from programs that address their specific vulnerabilities.
Motebejana et al. (2022)	The data show that timing is the main factor influencing diet; Start breastfeeding and find out how long the baby should be breastfed, start complementary foods, and how many meals the baby should eat per day. A balanced diet is a way of ensuring that children receive adequate and good amounts of essential nutrients.
Galgallo (2017)	The qualitative analysis showed that the availability and use of complementary foods for children were significantly hampered by Low household income, a lack of sufficient food, and cultural obstacles. In conclusion, low dietary diversity scores, poor nutritional knowledge, discontinuation of nursing, and Insufficient consumption of fruits and vegetables containing vitamin A deficiency are important and related to the nutritional status of the children studied. The determinants of health, disease, water, and sanitation do not affect the study participants' diet.
Zulu (2019)	Research has shown that children's dietary diversity & dietary intakes, as well as home demographic and socioeconomic variables, influence their nutritional status. Therefore, it is necessary to create programs that encourage a diverse diet and sufficient consumption of nutrients.
Goudet et al. (2017)	Undernutrition seriously threatens children in slums and has lasting effects on their physical and cognitive development. Recommendations should focus on improving maternal health and well-being; (ii) promoting good nutrition for infants and children; (iii) supporting mothers in their work; (iv) increasing access to birth control, sanitation, and hygiene (WASH); (vi) address alcohol issue at each stage, and (vii) talk about street food with nutrition.

However, there is a dearth of studies examining the nutrition knowledge status of caregivers residing in urban informal settlements and its influence on their dietary practices and their children's nutritional status. This study aims to fill this gap by assessing the nutrition knowledge of these caregivers and examining its relationship with their dietary practices and the nutritional status of their children.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section describes how data was gathered, analyzed, and interpreted to meet research goals. The design employed, the actual field of study, subjects, sample size, recruiting process, sampling process, pre-test, validity and reliability, data collection tools, data collection methodologies, and quality are all described in this section, as are techniques for data processing, analysis, and ethical considerations.

3.2 Research Design

This study employed a descriptive cross-sectional design, utilizing a quantitative data collection approach (Creswell, 2005). This design was appropriate as it facilitated the gathering of data at one point in time and allowed for an analysis that accurately depicted the prevailing situation.

3.3 Location of the Study

The study was carried out in Majengo Slums in Narok North Constituency, Narok Town ward, Masikonde sub-location. Its geographical coordinates are -1.081477 latitude and 35.872105 longitude (Narok County Integrated Plan, 2018). The majority of residents in Majengo slum endure extreme poverty, with incomes often falling below $1.00 per day (Supporting COVID-19 Response in Urban Informal Settlements, Kenya, 2020). The area struggles with high unemployment rates and a significant population affected by HIV/AIDS. Additionally, incidents of assault and rape are regrettably common. The community faces severe challenges, including inadequate access to clean water, widespread malnutrition, and diseases that are worsened by poor hygiene. Educational opportunities are limited, with few schools available and many families unable to afford education for their children (UNICEF, 2017). Likewise, basic amenities like electricity, running water, and medical care remain inaccessible to a substantial portion of the populace in Majengo slums.

3.4 Population of the Study

This study targeted caregivers with children aged 6-59 months who resided in the Majengo slums of Narok County.

3.4.1 Inclusion Criteria

Children aged 6 to 59 months who resided in Majengo slums and their caregivers. The inclusion process consisted of children who had begun complementary feeding.

3.4.2 Exclusion Criteria

Children who were sick or chronically ill at the time of the study, and those whose caregivers did not consent.

3.5 Sample Size Determination and Sampling Procedure

3.5.1 Sample Size Determination

The Fischer formula (Fischer et al., 1991) was used to calculate sample size with an accuracy of ≤ 0.05.

$$N = \frac{Z^2pq}{d^2}$$

Where:

n = Estimated sample size

Z = Confidence level value (0.95 α = 0.05=1.96)

P = Proportion of the target population estimated to have the characteristic being measured; the documented prevalence rate is 28% (KDHS, 2014).

q = 1-P (1-0.28 = 0.72)

d^2 = Accuracy required for the estimate normally is 0.05

Therefore:

$$n = \frac{1.962^2 \ x \ 0.28 \ x \ 0.72}{0.05^2}$$

n = 309.78

~310

Adjusting for 10% non-response or missing data yields

$$n = \frac{10}{100} x \ 310$$

n = 31

310+31=341

Therefore, n~341

3.5.2 Sampling Technique

The research employed a two-step sampling technique. The first step involved using stratified sampling, with the villages within the Majengo slums serving as the strata. This approach was chosen due to an imbalance in the characteristics of the population being sampled (Creswell, 2005). Majengo slum comprises eight villages (strata): Barsabra, Nyawera, St. Peters, Masikonde, Mudhurua, Fanaka, and Osotua. Six of these villages (strata) were included in the study, while the remaining two were excluded due to security concerns. A list of households with children under five years of age was obtained from the chief's office. The number of such households within each village (strata) was determined, and the sample was divided proportionally based on the population of households in each village (strata). For example, (150/1286×341=40).

Table 2

Sampling Frame and Households Sampled per Village

Village	Number of households with children under 5 years	Sample Size
Barsabra	150	40
Nyawera	127	34
St. Peter’s	382	101
Masikonde	198	52
Mudhurua	203	54
Fanaka	226	60
Total	1286	341

Source: Majengo Chiefs Office, Narok County (2019)

In the second step, a systematic random sampling technique was employed to select households for participation in the study within each village (strata). To establish the sampling interval, the total number of households was divided by the sample size (1286/341=4). Upon arrival at the village, the first household with eligible participants was identified using a table of random numbers. Subsequently, every fourth household within the same strata was systematically determined. This process continued systematically until the required sample size was reached for each stratum. In households where there were two children within the same age bracket, a lottery sampling method was employed to determine a specific who was enrolled in a study the researcher a coin tossed every child that got the head was enrolled into the study upon meeting other enrollment criteria.

3.6 Data Collection Tools

A pre-tested, semi-structured questionnaire (see Appendix 1) served as the tool for data collection. Interviews with caregivers were conducted by the researcher, who recorded responses directly onto the questionnaire. The variables examined included caregivers' gender, education level, occupation, religion, and monthly household income.

The variables were the food frequency questionnaire and the 24-hour recall of children aged 6 to 59 months.

A food frequency questionnaire was used to assess the frequency of foods consumed from specific food groups by children. According to FAO (2008), the food variety score, traditionally employed to calculate FFQs, reflects the diversity of food intake, with a higher score indicating greater diversity. The FFQ items were categorized into ten groups (Nantel & Kennedy, 2006). The Dietary Diversity Score was employed to evaluate the meals provided to children at home by caregivers. This study preferred the use of 10 food groups to capture all the age groups as opposed to the 7-food group which is thought to leave out children from 23 months to 59 months.

A 24-hour dietary recall was employed to evaluate nutrient intake. It contained details of the meal, food sources, preparation method, and the quantity of food consumed by the child within 24 hours before the visit. Caregivers were tasked with recalling the child's food intake from the preceding day. The researcher estimated the portion size of the food or drink consumed using portion photographs, before reviewing the final summary of the foods and drinks entered. The data collected in intake was exported as a Microsoft Excel spreadsheet to allow for data analysis using SPSS 21 was presented as macro and micronutrients.

The variable under assessment was the knowledge regarding breastfeeding and the complementary diet of children aged 6 to 59 months. The caregiver's nutrition knowledge was assessed using a semi-structured questionnaire adapted from FAO (2014). The questions were on topics related to breastfeeding and complementary feeding knowledge using Bloom's taxonomy to assess the understanding and application. Anthropometric measurements of the weight and length/height of the child were conducted following the guidelines outlined by NHANES (2017). Weighing and height/length were performed with the child wearing minimal clothing and recorded to the nearest 0.1 cm and 0.1 kg as per outlined (Appendix 3). For children less than 2 years length will be determined while for children 2 years and above weight was determined using seca 767.

Weight will be measured using a digital weighing scale (seca 767) with minimum/light clothes and no shoes. The child will be asked to step on the weighing scale in an upright posture, feet apart and the heading facing front. Calibration will be done before weighing every child by setting it to zero. In case of children below two years, the mother will be weighed alone then with the baby and the baby's weight will be calculated by subtracting the mother's weight from the combined mother/baby weight. The weight will be taken to the nearest 0. 1kg.In determining the nutritional status of the child, world health organization (WHO) child growth standard of 2006 will be used to calculate the Z-scores for anthropometric indicators. Children will be considered wasted, stunted or underweight when their WHZ/WLZ, HAZ/LAZ and WAZ score are less than -2SD.

With the length board placed flat on the ground or on a table or bench space, every child whose height will be 85 cm and below will be made to lie down on the board. By supporting the child's head with one hand and the trunk of the body with the other hand, the child will gradually lower onto the measuring board. With cupped hands over the child ear, the head will be placed against the base of the board to ensure that the child look up straight with line of sight perpendicular to the ground. The assistant will lay the child flat to the center of the board with the knees pressed firmly against the board and foot piece placed firmly against the child's heel. Children whose height will be above 85 cm they will be measured standing on a height scale. The child will stand straight on the board with knees firmly held against the measuring board. The head piece will be lowered until the child head and measurement is taken. All the measurement will be taken to the nearest 0.1 cm.

How to determine the Z Scores

Instructions on how to use the WH-Z-scores for children (0- ≤ 5 years). (MOH reference chart and protocol for nutritional management, 2024).

Step 1: Measurement

First, determine the age of the child in months. Infants and children less than 2 years or if under 87cm, measure the length in "cm" while lying down. Children over 2 years or above 87 cm, measure height in "cm" while standing. Measure the weight in "kg". Record all measurements in your workbook. Children less than 5 years and should be measured without shoes and minimal clothing.

Step 2:

Identify the length/height column at the Centre of the chart. Find where the measured length/height of the child is on the chart and place your finger on this cell. If the child is a boy, read the left side of the chart (WHO coded blue), and if the child is a girl read the right side (WHO coded pink).

Step 3: Identification

Identify the cell with a weight that is equal to or less than the actual recorded weight by moving along the row where the length/ height was identified: then move up to read the Z-score.

Step 4: Classification

From the diagnostic rows at the top of the chart classify and report the child's weight for length Z score corresponding to the identified weight.

Note: Only children with a weight for length/height less than -2 SD (Moderately and Severely Malnourished) are eligible for Nutrition Health Products for Management of Acute Malnutrition. Reading from the length column at the middle of the chart, find the length nearest or equal to 60cm and place your finger on this cell and row.

3.7 Data Collecting Procedure

After obtaining all necessary approvals, data collection was conducted with the help of a research assistant. The research team consisted of the principal investigator and two research assistants holding a Food, Nutrition, and Dietetics Diploma along with a valid practicing license from the Kenya Nutritionist and Dietetic Institute (KNDI). Research assistants underwent a comprehensive two-day training session covering questionnaire administration, interviewing techniques, anthropometric measurements, and research ethics. Upon identifying potential participants, they were taken through the consent process, wherein they were briefed on the purpose of the study, potential benefits, and risks. Participants were assured that their participation was voluntary, and they could withdraw from the study at any time without repercussions. They were also informed that participation incurred no costs. Opportunities were provided for participants to seek clarification on any aspect of the study. Subsequently, written consent was obtained from each participant (see Appendix 1). The privacy and confidentiality of participants were ensured during the study. After completion of the questionnaire, anthropometric measurements of the height/length and weight of the participating child were taken. Upon conclusion of the interview, the researcher reviewed the questionnaires to ensure adherence to protocol procedures.

3.8 Instrumentation

The pre-testing of the questionnaire took place in Salama village, located in the Mongare slum within the Narok South sub-county. This choice was made because the population residing in the Mongare slum shares similar characteristics with those in the Majengo slum. The principal researcher and two assistants conducted the pre-test, involving a population representing 10% of the intended sample size. The results obtained from the pre-test were used to refine the questionnaire, enhancing its reliability and validity. In addition, the pre-testing process served as a valuable practical experience for the research team, providing them with experience in administering questionnaires and conducting anthropometric measurements.

3.8.1 Validity of the Instrument

To ensure validity, the researcher enlisted a panel of nutrition experts to enhance both face and content validity. This panel carefully reviewed the questionnaire to ensure that the questions were clear and easy to understand. This step aimed to augment the questionnaire's effectiveness in accurately apprehending the intended information.

3.8.2 Reliability of the Instrument

Reliability was determined using a test-retest method, which guarantees consistency in response over multiple questions in the administered questionnaire. A Cronbach's coefficient test was also performed, and the results showed a satisfactory level of internal consistency (Cronbach's $\alpha \geq 0.70$).

Reliability is the measure of the degree to which a research instrument yields consistent results or data on repeated trials (Orodho, Abobo, & Osero, 2014). The KCronbach alpha test was used to measure the internal consistency. In respect to pilot results, Cronbach alpha for standardized items for each of the variables was as follows: demographic characteristics had an α of .832, Nutrition knowledge an α of .749, dietary practices an α of .851, nutritional status an α of .825 and nutritional status, dietary practices and nutritional status an α of .781. Therefore, it implied that the instrument was reliable as all variables met the threshold of a minimum α of 0.70.

Table 3

Reliability Test

Variable	No of items	Cronbach's Alpha
Demographic characteristics	9	.832
Nutritional knowledge	19	.749
Dietary practices	11	.851
Nutritional status	6	.825
Nutritional status, dietary practices, and nutritional status	3	.781

3.9 Data Management

Data underwent cleaning, coding, and entry into the Statistical Package for the Social Sciences (SPSS) version 26 for analysis. To minimize errors, the researcher ensured that all data collection tools were thoroughly reviewed at the end of each day to confirm the completeness of the data. Subsequently, upon data entry, the researcher manually inspected the dataset for completeness, legibility, and consistency. This review aimed to identify and rectify any discrepancies, such as age entries exceeding the specified age range for the study. In cases where errors were detected, the collected data underwent a re-entry process to enhance quality and reliability. Errors identified during this process were cross-checked and corrected on the survey copies to ensure accuracy in the final dataset.

The principal investigator conducted daily audits of the collected data to verify its appropriateness, while completed questionnaires underwent daily review to ensure consistency and completeness of responses. Data entry was carried out using SPSS version 26, with two entries made to ensure data cleanliness and accuracy. Likewise, the anthropometric equipment used in the study underwent calibration every morning before measurements were taken. This calibration process involved setting the weighing scale to zero before each weighing session and ensuring that the measuring length board had clear and accurate marks for each use. This careful calibration process helped maintain the accuracy and reliability of the anthropometric measurements throughout the study.

The researcher assumed full responsibility for both data collection and storage. Upon receipt, encoded data was transferred to the computer for subsequent processing. Three copies of each data type were generated and stored in distinct locations on the computer. Besides, an external hard disk capable of backing up data was created, removed from the computer, and securely stored. To safeguard against unauthorized access, data files were password-protected, limiting access solely to the researchers involved in the study. As an additional precaution, a backup of the final dataset was stored using Google Drive software provided by Google, ensuring redundancy and accessibility. All collected data are to be stored for two years before being securely shredded and discarded, adhering to data retention protocols. These measures aimed to uphold the confidentiality, integrity, and longevity of the collected data.

3.8 Data Analysis and Presentation

A descriptive analysis of the demographic and socioeconomic characteristics of the caregiver-child pairs was conducted using SPSS version 26. This analysis was computed based on factors such as the caregivers' gender, education level, occupation, religion, and monthly household income. The results were presented in frequencies and percentages to provide a comprehensive overview of the sample population.

The caregiver's nutrition knowledge was assessed using a semi-structured questionnaire adapted from FAO (2014). The questions were on topics related to breastfeeding and complementary feeding practices, with responses categorized as either "yes" or "no". Subsequently, a scoring system was established, whereby responses were graded as low, medium, or high based on the number of correct answers (e.g., if a caregiver answered 15 out of 18 questions correctly, their knowledge level was graded as high). These scores were then converted into percentages. The percentage scores were further categorized into three groups: high (70-100%), medium (50-69%), and low (0-49%), following the classification outlined by Galgallo (2017). The results of this analysis were presented in frequencies and percentages to provide insights into the distribution of nutrition knowledge levels among the caregivers.

Dietary diversity data was entered and analyzed using SPSS version 26. Children's dietary intake was assessed based on 24-hour recall and food frequency questionnaire data. The food and beverages consumed by children were categorized into ten groups as recommended by Nantel and Kennedy (2006). Each food item was assigned a score of 1 if it belonged to a particular food group and 0 if it did not. Children who consumed foods from at least four food groups were considered to have achieved Minimum Dietary Diversity (MDD). Additionally, children who consumed at least two meals and one snack daily were considered to have met the Minimum Meal Frequency (MMF) criteria, as per UNICEF guidelines (2021). Children who fulfilled both MDD and MMF criteria were deemed to have achieved minimal nutrient intake. Nutritional data was further analyzed using Nutri-Survey software to ascertain the daily nutrient intake of children. The recommended dietary allowances (RDAs) by age, as outlined by the Food and Agriculture Organization (FAO, 2002), were used as benchmarks to evaluate diet adequacy and nutrient intake in children. The results of this analysis were presented in frequencies and percentages to provide insights into the dietary patterns and nutrient intake levels among the study population.

Anthropometric data was analyzed using ENA for Smart software. Nutritional measurements for children were compared against WHO (2006) reference data for weight-for-age, height-for-age, and weight-for-height. Children were classified as stunted, wasted, and underweight if their nutritional status fell below -2SD from the

WHO, reference median. The data was presented and explained using descriptive statistics, including mean, maximum, minimum, standard deviation, and percentage. These metrics provided a comprehensive overview of the distribution and variability of anthropometric measurements within the study population, allowing for a clear understanding of the nutritional status of the children under investigation.

Inferential statistics, including the Chi-square test and logistic regression, were employed to assess the relationship between dietary practices, caregiver nutrition knowledge, and children's nutritional status. Both unadjusted and adjusted models were utilized, with odds ratios (ORs), 95% confidence intervals (CIs), and significance levels presented for each model. Results were presented as frequencies and percentages, providing a clear depiction of the associations between dietary practices, caregiver nutrition knowledge, and children's nutritional status. These statistical analyses allowed for the identification of significant relationships and potential predictors of nutritional outcomes among the study population.

Table 4

Summary Data Analysis

Objectives	Variables	Indicator	Statistical analyses
Independent variables			
To describe the socio-demographic characteristic of mother-child pair in Majengo slum, Narok County, Kenya.	Demographic and socioeconomic factors	1. Age of caregiver 2. Marital status 3. Level of education 4. Occupation of mother/caregiver 5. Household income 6. Religion	Descriptive statistics, Frequencies and percentages
To assess the nutritional knowledge of the mothers of children 6-59 months in Majengo slum, Narok County, Kenya	Caregivers' Nutrition Knowledge	1. Breastfeeding 2. Complementary Feeding 3. Nutrition education	Descriptive statistics Frequencies and percentages
To assess the dietary practices of children 6-59 months in Majengo slum, Narok County, Kenya	Child dietary practices	1. Food frequency questionnaire 2. 24-hour dietary recall	Descriptive statistics Frequencies, and percentages
Dependent variable			
To establish the nutritional status of children 6-59 months in Majengo slum, Narok county	Nutritional status of children 6-59 months.	1. Stunting 2. Underweight 3. Wasting	ENA for smart Mean, maximum, minimum, standard deviation, and percentages
To determine the relationship between caregivers' nutrition knowledge dietary practices and the nutritional status of children 6-59 months in Majengo slum, Narok county		Caregiver's nutrition knowledge. Dietary practices and nutritional status	Chi-square test, Logistic regression.

3.10 Ethical Considerations

Ethical approval was obtained from the Kabarak University Research Ethics Committee (KUREC) and a Research permit from the National Council for Science, Technology, and Innovation (NACOSTI) with additional authorization from Narok County Health Department before data collection. An informed consent was also sought from participants, with assurance provided regarding the encryption of all collected information to safeguard their identity and privacy. Participants were informed that the study was solely for academic purposes, ensuring transparency and clarity regarding the research objectives and intentions.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter presents results on factors influencing caregivers' nutritional knowledge, dietary practices, and nutritional status of children aged 6-59 months in Majengo Slum, Narok County, using the methodology described in Chapter Three.It includes the respondents' demographic characteristics as well as descriptive and inferential statistics. A total of 341 respondents were sampled, with data gathered from 297 households, representing an 87.10% response rate.

4.2 Socio-Demographic Characteristics of Caregiver-Child Pairs

The study focused on the socio-demographic characteristics including gender, age, marital status, age of the child, religion, education level, occupation, household income, and place of childbirth. Results in Table 4.1, indicate that the majority of caregivers were female (92.9%). About 34.7% of caregivers fell within the age range of 30 to 39, with a similar proportion (34.0%) being married. Moreover, 33.0% of the children were aged between 12 and 24 months, and the majority of caregivers identified as Christians (79.5%). Approximately 40.7% of caregivers had completed primary education, while 25.6% were engaged in small to medium businesses, with an average monthly income of less than Kshs 10,000. Furthermore, the results reveal that a significant portion of children (71%) were born at a health facility.

Table 5

Demographic Characteristics

Variables	Categories	Frequency	Percentage
Gender	Female	276	92.9
	Male	21	7.1
Age of the caregiver	20 years and above	37	12.5
	21-29 Years	91	30.6
	30-39 Years	103	34.7
	40-49 Years	37	12.5
	50-59 Years	18	6.1
	60 years and above	11	3.7
Marital status	Living together	56	18.9
	Married	101	34.0
	Separated	41	13.8
	Single	69	23.2
	Widowed	30	10.1
Age of the child	6-11	30	10.1
	12-24	98	33.0
	25-36	66	22.2
	37-48	58	19.5
	49-59	45	15.2
Religion	Christian	236	79.5
	Islam	13	4.4
	Others	48	16.2
Level of Education	None	51	17.2
	Primary	121	40.7
	Secondary	96	32.3
	Tertiary	29	9.8
Caregivers' occupation	Housewife	40	13.5
	Small and medium Business	76	25.6
	Formal Employment	51	17.2
	Farmer	62	20.9
	Casual Laborer	68	22.9
Household income	Kshs <10,000	233	78.5
	Kshs 10,000-19,999	51	17.2
	Kshs 20,000-29,999	13	4.4
Place of child delivery	Home	86	29.0
	Hospital	211	71.0

4.3 Nutritional Knowledge of the Caregivers of Children 6-59 Months

4.3.1 Classification of the Caregiver's Nutritional Knowledge

Following the study findings, caregivers' knowledge levels were categorized based on their understanding of breastfeeding and complementary feeding practices, as shown in Table 4.2. Results indicated that 28.6% of caregiver's demonstrated average nutritional knowledge, 11.8% had high nutritional knowledge, and a majority (59.6%) exhibited a low level of nutrition knowledge, especially on the knowledge of exclusive breastfeeding and when to initiate complementary feeding.

Table 6

Classification of the Caregiver's Nutritional Knowledge

Classification	Frequency	Percentage
High nutrition knowledge	35	11.8
Average nutrition knowledge	85	28.6
Low nutrition knowledge	177	59.6

4.3.2 Breastfeeding Knowledge of the Caregivers

According to the data presented in Table 4.3, findings reveal that 53.9% of caregivers believed that breast milk should be the first food given to a newborn child, 52.2% were unaware of exclusive breastfeeding, while 60.3% did not adhere to exclusive breastfeeding knowledge. Besides, 38% did not have an idea on the knowledge of when a baby should receive only breast milk. Similarly, more than half of the caregivers (52.9%) did not consider breast milk as the sole recommended food for a child up to six months. Additionally, 47.1% were uncertain whether breast milk provides all necessary nutrients and fluids during the first six months. A majority of caregivers (63.6%) held the belief that infants under six months should be breastfed on demand, while 58.2% doubted the protective role of breast milk against diarrhea, infections, and chronic diseases.

Table 7

Breastfeeding Knowledge of Caregivers

Variables	Categories	Frequency	Percentage
What is the first food a newborn baby should receive	Breast milk	160	53.9
	Water	41	13.8
	Others	33	21.2
	I don't know	63	11.1
Have you heard about exclusive breastfeeding	Yes	142	47.8
	No	155	52.2
Do you know about exclusive breastfeeding?	Yes	118	39.7
	No	179	60.3
How long should a baby receive nothing more than breast milk?	From birth to six months	96	32.3
	Other	113	38.0
	I don't know	88	29.7
Do you think that breastmilk is the only recommended food for up to six months?	Yes	140	47.1
	No	157	52.9
Does breast milk provide all the nutrients and liquids a baby needs in its first six months?	Yes	104	35.0
	No	53	17.8
	I don't know	140	47.1
How often should a baby younger than six months be breastfed or fed with breastmilk?	on demand, whenever the baby wants	189	63.6
	Others	31	10.4
	I don't know	77	26.0
Do you think that breastmilk can Protect the baby from diarrhea and other infections and chronic diseases?	Yes	124	41.8
	No	173	58.2

4.3.2 Complementary Feeding Knowledge of the Caregivers

According to the survey on caregivers' nutritional knowledge about complementary feeding, 37.7% of them believed that babies should start consuming foods in addition to breast milk at the age of six months. Moreover, 92.3% of the caregivers acknowledged the importance of providing foods other than breast milk to babies by the age of six months. However, 60.3% of them did not believe that babies could survive solely on breast milk without water. The study also revealed that 74.4% of the caregivers offered their children a variety of foods, while 88.6% recognized the importance of encouraging children to eat (Table 4.4). Out of the 297 households surveyed, 67% of the children were found to be attending school. Moreover, 67.7% of the caregivers reported that they included animal-sourced food in their children's diet. Additionally, 45.8% of the caregivers confirmed that they received most of the teaching on child feeding knowledge from the hospital or MCH. Out of all the caregivers, 62.6% had received some form of nutrition education message, and 50.2% of them found the nutrition education message to be helpful (Table 8).

Table 8

Complementary Feeding Knowledge of Caregivers

Variables	Categories	Frequency	Percentage
At what age should babies start eating foods in addition to breast milk?	At six months	112	37.7
	Others	84	28.3
	I don't know	101	34.0
Is it important to give foods in addition to breastmilk to babies from the age of six months?	Yes	274	92.3
	No	23	7.7
Do you believe that a child can survive on breast milk alone without water?	Yes	118	39.7
	No	179	60.3
Do you give your child a variety of food?	Yes	221	74.4
	No	76	25.6
Is it important to encourage children to eat?	Yes	263	88.6
	No	34	11.4
Is your child going to school?	Yes	98	33.0
	No	199	67.0
Do you include animal-source food in your Child's diet	Yes	201	67.7
	No	96	32.3
Is most of the teaching on child feeding knowledge obtained from the hospital/MCH?	Yes	136	45.8
	No	105	35.3
	Others	56	18.9
Have you received any nutrition education messages?	Yes	186	62.6
	No	111	37.4
Was the nutrition education message helpful?	Yes	149	50.2
	No	148	49.8

4.4 Dietary Practices of Children 6-59 Months

In general, less than 30% of the children met their recommended daily allowance (RDA) for protein and energy. However, more than half (54%) met their RDA for vitamin A, while 61% met their RDA for calcium. Nearly all children met their RDAs for iron and zinc (refer to Table 4.5). The study area being a pastoralist community majority of the population utilized mostly animal sources of protein which are high in iron and zinc. Animal sources of iron are considered to be hem which is easily utilized by the gut.

Table 9

24-Hour Recall of Children 6-59 Months

Nutrients	Minimum	Maximum	Recommended intake	RDA Allowance
Energy	335.3 kcal	2036.3 kcal	1600 kcal	26%
Water	48.0 g	680.0 g	2700 g	7%
Protein	6.5 g (8%)	60.1 g (12%)	71 g	11%
Fat	20.6 g (54%)	69.1 g (<30 %)	69.1 g	30%
Carbohydrate	31.2 g (38%)	290.7 g (>55 %)	290.7 g	11%
Dietary fibre	3.2 g	-	30 g	-
Alcohol	0.0 g	-	-	-
PUFA	9.4 g	3.0 g	10 g	312%
Cholesterol	10.5 mg	-	-	-
Vit. A	268.3 µg	500.0 µg	770 µg	54%
Carotene	0.0 mg	-	-	-
Vit. E (eq.)	3.0 mg	3.0 mg	15 mg	101%
Vit. B1	0.2 mg	0.2 mg	1.2 mg	94%
Vit. B2	0.2 mg	0.3 mg	1.5 mg	72%
Vit. B6	0.6 mg	0.1 mg	1.9 mg	603%
Tot. fol. acid	25.6 µg	60.0 µg	600 µg	43%
Vit. C	23.3 mg	50.0 mg	85 mg	47%
Sodium	249.3 mg	-	2000 mg	-
Potassium	802.8 mg	-	3500 mg	-
Calcium	134.3 mg	220.0 mg	1000 mg	61%
Magnesium	52.1 mg	24.0 mg	300 mg	217%
Phosphorus	168.3 mg	120.0 mg	700 mg	140%
Iron	1.6 mg	0.5 mg	27 mg	316%
Zinc	1.0 mg	1.0 mg	11 mg	97%

4.4.1 Minimum Dietary Diversity

Table 4.6 shows the percentages of 10 food groups consumed by 297 children aged 6 to 59 months. From the study, the 297 children [(76.86%); (52.86-76.86) at 95% CI] met the minimum dietary diversity. Cereals, starchy tubers, root crops, plantains, pulses, dairy products, green leafy vegetables, and fruits were all widely consumed. However, less than 20% of the children regularly consumed foods from the remainder of the food groups. In addition, fruits and vegetables were not consumed daily based on the assessment reported by the caregivers. Even though the caregivers reported the additional fruits and vegetables, the findings may not be generalized based on dietary diversity scores.

4.4.2 Minimum Meal Frequency

Children residing in households where caregivers held formal employment exhibited a minimum meal frequency of 40% [(0.6%); (0.4-0.9)] at 95% Cl. Conversely, the likelihood of meeting the minimum meal frequency was reduced by 50% if the child was under the care of illiterate mothers/caregivers compared to those with higher education levels [(0.5%); (0.2-0.9)] at 95% Cl (Table 10).

Table 10

Food Frequency

Food Groups	Frequency				
	Once a week	2-4 days a week	5-6 days a week	Every day	Never
Cereals, starchy tubers, root crops, plantain (Rice, potatoes, matoke, chapati)	15	89	85	98	10
Pulses (beans, peas, lentils)	65	131	76	3	22
Nuts and seeds (sesame, ground nuts)	61	46	7	1	182
Dairy products (fresh milk, mala, yogurt)	119	74	35	23	46
Meat, fish, eggs (chicken, beef, pork, tilapia chicken eggs)	137	25	10	3	123
Green leafy vegetables (Sukuma wiki, managuu, terere, melange, tomatoes)	27	54	119	83	14
Fruits (banana, mangoes, oranges, papaya)	169	58	32	6	32
Oils and fat (ghee, butter)	144	107	26	15	5
Beverages (tea, coffee)	16	35	67	149	30
Others	28	67	89	75	38

4.5 Nutritional Status of Children 6-59 Months

Data on the nutritional status, as presented in Table 10, shows that the average birth weight of the children involved in the study was 2.5 kg, as obtained from their immunization cards. A child’s birth weight is an important of their vulnerability to childhood illnesses and diseases, which in turn predicts future health, physical growth, psychosocial development, and chances of survival (Wubetu, Amare, Haile, & Degu, 2021). The average weight and height/length were 10.4 kg and 85.36 cm, respectively. The findings also show that 33.3% of the children were stunted (too short for age), 23.2% were wasted (too lean for height), and 19.9% were underweight. The nutritional status was based on weight-for-age z-score (for underweight), height-for-age z-score (for stunting), and weight-for-height z-score (for wasting). Each of these status categories was then classified as normal, moderate, or severe. Although the global acute malnutrition rates are higher in the findings, the affected children may miss out on the intervention because the County government focuses on routine data in the clinic without targeted interventions which is driven by the recent data. This gap increases the risk of morbidity and mortality which is often reported by the health facilities. The reported high rates of malnutrition in the current study could be associated with inadequate food intake coupled with high alcoholism among mothers of childbearing age. In addition, the rates of unemployment have been witnessed among the mothers as reported in the social economic status.

Table 11

Nutritional Status of Children

Variables	Mean	Std. Deviation	Variable	-1SD (100%)	<-2SD (100%)	≥-3SD (100%)
Birth weight	2.51	0.58				
Weight (Kg)	10.40	3.60	WHZ-score	23.2	43.1	17.2
Height (Cm)	85.36	17.68	WAZ-score	19.9	46.1	12.8

Stunting, wasting, and underweight were categorized as < -2 of HAZ, WHZ, and WAZ respectively. Therefore, represents moderate and severe under nutrition for each category. Overweight or obese were categorized as WAZ ≥ 1. (WHO, 2007).

4.6 Relationship between Nutritional Knowledge, Dietary Practices, and Nutrition Status of Children 6-59 Months

The relationships between the study variables are presented in Tables 4.8a and 4.8b. Statistical significance was set at $p < 0.05$, indicating less than a 5% probability that the results were random.

4.6.1 Relationship between Nutrition Knowledge and Nutrition Status

In evaluating the relationship between nutrition knowledge and the nutritional status of children aged 6-59 months (Table 4.8a), the odds ratio was employed. After adjusting for all other variables, children under the care of caregivers with higher nutrition knowledge were 0.25 (95% CI: 0.72 - 0.85; $p < 0.05$) times less likely to experience malnutrition.

Table 12a

Relationship between Nutrition Knowledge and Nutrition Status of Children 6-59 Months

Variables	Odds ratio (95% Confidence interval)	
	Unadjusted	Adjusted
Nutrition knowledge		
Low nutrition knowledge	1	1
Medium nutrition knowledge	0.68 (0.35, 1.31)	0.26 (0.33, 1.12)
High nutrition knowledge	0.44 (0.50, 1.64)	0.25 (0.72, 0.85) *

*Significant Difference Tested at ($p < 0.05$)

4.6.2 Relationship between Dietary Practices and Nutrition Status

Table 4.8b shows the unadjusted and adjusted odds for the relationship between dietary practices and nutritional status of children aged 6-59 months. The odds ratio suggested that children with greater dietary diversity were 0.35 times less likely (95% CI: 0.15-0.78; $p < 0.05$) to experience malnutrition before adjusting for all variables. Following adjustments, this likelihood decreased to 0.32 (95% CI: 0.13 - 0.76; $p < 0.05$).

Table 12b

Relationship between Dietary Practices and Nutrition Status of Children 6-59 Months

Variables	Odds ratio (95% Confidence interval)	
	Unadjusted	Adjusted
Dietary practices		
Never	1	1
Once a week	0.17 (0.02, 1.49)	0.16 (0.19, 1.38)
Twice or more times a week	0.35 (0.15, 0.78)	0.32 (0.13, 0.76) *

*Significant difference tested at ($p < 0.05$)

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENTATIONS

5.1 Introduction

This study focused on children aged 6-59 months residing in the Majengo slums of Narok County, Kenya. The research assessed the nutritional knowledge of caregivers, their dietary practices, and the nutritional status of children within this age group.

5.2 Socio-Demographic Characteristics of Caregiver-Child Pairs

The study focused on the socio-demographic factors of gender, age of the caregivers, marital status, age of the child, religion, level of education, caregiver occupation, household income, and place of childbirth (Table 4.1). A larger majority of the caregivers (92.2%) were female, which is consistent with our socio-cultural norms of females as primary caregivers (Lungu, Darker, & Biesma, 2020). A majority of the caregivers were in the age bracket between 30 and 39 years. These results are in line with the findings of Clark, De Almada, Kabiru, Muthuri, and Wanjohi (2021), who reported an average mean of 35 years for most caregivers. Exactly 34% of the caregivers were married; these results concur with those earlier reported by Forh et al. (2022). This is integral to the provision of appropriate care for children.

The education level of caregivers plays a crucial role in providing proper care to children. According to the study, a majority of caregivers (40.7%) had only completed primary education. These findings were consistent with those reported by Kemboi (2021), where the majority (42.5%) of caregivers had completed primary education. Caregivers with a low level of education may tend to pay less attention to nutrition information as they may not be exposed to learning resources or comprehend the information provided (Forh, Apprey, & Agyapong, 2022). The level of education has a positive association with caregivers' nutrition knowledge (Fadare, Amare, Mavrotas, Akerele, & Ogunniyi, 2019). A significant number of caregivers (25.6%) had small to medium businesses with an average monthly household income of less than Kshs 10,000 (Table 4.1). Income plays an important role in child health determination. For instance, children living in households with a higher per capita income are less likely to be malnourished (Fakir & Khan, 2015).

5.2.1 Nutritional Knowledge of Caregivers

Based on the survey results, 53.9% of caregivers believe that breastmilk should be the first food given to newborns; 47.8% of them had heard about exclusive breastfeeding; and 39.7% practice exclusive breastfeeding (Table 4.3). However, the percentage of exclusive breastfeeding reported in the survey falls below the recommended rate of 61% by the United Nations Children's Fund and the World Health Organization (UNICEF/WHO, 2019). According to the survey, 32.2% of caregivers believe that babies should not be given anything except breast milk from birth to six months. 47.1% of caregivers stated that breast milk is the only recommended food for babies up to six months old. However, 47.1% of caregivers did not know that breast milk provides all the necessary nutrients and fluids for a baby in the first six months of life (Table 4.3). Earlier, Debela, Demmler, Rischke, and Qaim (2017), and Forh et al. (2022), found that caregivers had an average nutrition awareness level of 59% and 61.5%, respectively. The present study suggests that the low education level of caregivers may have been a contributing factor to poor nutrition knowledge regarding exclusive breastfeeding.

When asked about the meaning of exclusive breastfeeding, most of the respondents stated that "*it involves feeding a child with breast milk only"*. However, when asked about the duration of breastfeeding their children, "*the majority of them reported less than six months."* They attributed their inability to practice exclusive breastfeeding to "*attending to fending for their families or getting pregnant again"*. When asked if they think that breastmilk is the only recommended food for infants up to six months, some of the caregivers answered yes, "*stating that it provides all the necessary nutrients for the child's growth and development.*" However, others answered no, "*Pointing out that breast milk alone may not be sufficient, as they noticed their children feeling hungry immediately after breastfeeding.* "When asked if breastmilk protects babies from diarrhea, infections, and chronic diseases, some caregivers responded with 'yes'. "*They explained that breastmilk provides immunity to their babies.*" On the other hand, those who responded with 'no' "*mentioned that their children still experience diarrhea even after being breastfed.*" Moreover, many caregivers agree that exclusive breastfeeding is crucial for effective child growth and development.

Table 4.4, indicates that 37.7% of caregivers believed that babies should start consuming foods in addition to breast milk at the age of six months and another majority of caregivers (92.3%) agreed that providing foods other than breastmilk is important for children older than six months. This is because, from the age of 6 months, children need more energy and nutrients than can be provided by breast milk alone. This is because, at the age of six months, children require more energy and nutrients than breast milk alone can offer. UNICEF (2020) stated that the quality of a child's diet is more important before the age of two than at any other time in life and that complementary foods and feeding practices contribute to child survival, growth, and development; they can also prevent micronutrient deficiencies, morbidity, and obesity later in life.

In addition, 97.6% of the caregivers considered hygiene when preparing meals for children. Appropriate food hygiene is critical for reducing the prevalence of foodborne infections in children. In their study, Teshome, Yallew, Mulualem, Engdaw, and Zeleke (2022) indicated that characteristics such as hand-washing and a separate space to store raw and prepared meals were important predictors of sanitary supplementary food feeding habits.

The study also revealed that 74.4% of the caregivers offered their children a balanced diet, while 88.6% recognized the importance of encouraging children to eat. Moreover, 67.7% of the caregivers reported that they included animal-source food in their children's diet (Table 4.4). Healthy diets with a focus on dairy products, vegetables, fruits, and whole grains are required to meet the nutritional needs of children to ensure appropriate growth and have a good impact not only on weight but also on height (Acosta et al., 2023). Understanding which specific foods and nutrients are linked to children's growth is essential for implementing food-based intervention programs aimed at caregivers to improve children's health and nutritional outcomes.

The majority of caregivers believe that it is important to introduce other foods to babies by the age of six months in addition to breast milk. *"They state that this helps meet the growing needs for energy and nutrient requirements as the baby shows interest in food and readiness."* On the other hand, a small number of caregivers believe that it is not important to introduce other foods in addition to breast milk after six months because *"Once a baby's nutritional needs surpass the needs for breast milk, they should be fed solid foods."* Over half of caregivers believed that not giving water to children can lead to constipation due to dehydration. On the question of caregivers providing a balanced diet to their children, many of them indicated they provide diluted porridge or fruit juices as well as milk and soups made from meat stock, and sometimes fat and blood.

5.2.3 Dietary Practice of Children 6-59 Months

According to the findings in Table 4.5, almost all of the children aged 6–59 months who participated in the study did not meet the Recommended Dietary Allowance (RDA) for energy and protein. The 24-hour dietary recall revealed that the majority of the children were only provided cereal porridge with sugar, which is a poor source of vitamins, minerals, and protein. Similarly, nutritional status evaluation during the study revealed that children (6–59 months) in the study area had a greater prevalence of stunted growth. This suggests that simply having healthy food available does not ensure that it will be consumed; as a result, nutrition education is crucial to making informed food choices. Mrema, Nyaruhucha, and Mwangi (2023) reported diets provided to children are cereal- or starch-based, with limited inclusion of other nutrient-dense foods.

The food types were organized into ten groups, and the percentages of each group consumed are presented in Table 4.6. This study measured the dietary diversity of 297 children between the ages of 6-59 months. Children who did not meet their minimal dietary diversity were at a higher risk of malnourishment. The intake of nutrients plays a crucial role in eruption, growth, development, and protection from infections (Yang, Yang, Zeng, Chen, & Zeng, 2021). Education of the caregivers, age of the child, and area of residence have been associated with the provision of minimum dietary diversity. For instance, a study by Beyene, Worku, and Wassie (2015) established that children from families with caregivers with higher education had greater odds of being fed diversified foods. Similarly, Senarath and Dibley (2012) reported that caregivers' education is a significant determinant of appropriate, diversified infant feeding.

The proportion of children aged 6–59 months who received food items from four or more food groups indicates a presence of nutritional diversification. This may be related to the age of the child, as those aged between 12-24 months had almost twice the chance of having a higher dietary diversity compared to children aged 6–11 months. This is in line with a study conducted by Beyene et al. (2015) that reported similar results for their study conducted in Northwest Ethiopia. This indicates the association between various food groups and age groups, implying that food groups decrease as the child's age declines. In this study, complementary feeding began early for some children, and they only included milk or cereal gruel.

5.2.4 Nutritional Status of Children 6-59 Months

Table 4.7 shows that just 23.2% of the 297 children had normal nutrition, 43.1% were moderately undernourished, and 17.2% were severely undernourished. The prevalence of malnutrition was higher than 26.3% of stunted children, 6.3% wasted, and 13.16% underweight, as reported by De Vita et al. (2019). This may be due to a lack of proper nutrition, which is identical to prolonged insufficient consumption of food, or by sickness episodes that result in a low weight for age. Undernutrition in children could be linked to the earlier introduction of complementary diets as well as the poor quality of complementary diets and feeding habits to meet a child's dietary requirements (Forh et al., 2022). Likewise, complementary foods being too dilute, not fed often enough or in too small amounts, or replacing breast milk while being of inferior quality were mentioned as the challenges of complementary feeding (Mrema et al., 2023).The reported high rates of malnutrition in the current study could be associated with inadequate food intake coupled with high alcoholism among mothers of childbearing age. In addition, the rates of unemployment have been witnessed among the mothers as reported in the social economic status. Because nutrition routine assessment is not done in the community.

5.2.5 Relationship between Nutritional Knowledge, Dietary Practices, and Nutritional Status of Children 6-59 Months

The nutritional status of children is conditioned by different factors, including knowledge and dietary practices (Tables 4.8a and b). Nutritional knowledge is necessary to promote health and prevent malnutrition in children. Improving caregivers' nutritional knowledge is a critical component of nutrition-promoting interventions. Earlier, Fadare et al. (2019) demonstrated that caregivers with higher education had better nutritional knowledge, resulting in better height-for-age and weight-for-age z-scores in children. Similar results were reported by Negash, Whiting, Henry, Belachew, and Hailemariam (2015) for the relationship between weight-for-height z-score and caregivers' level of education. As a result, the level of nutritional education of a caregiver has a direct effect on the type and quality of food offered to children, which affects their nutritional status (Chege & Kuria, 2017).

The study also found an association between dietary practices and the nutritional status of children aged 6-59 months in Majengo slums, Narok Country (Table 4.7b). These findings are consistent with those previously reported by Mwangi, Oyore, and Njogu (2019), who indicated that dietary practices are related to the nutritional status of children. Inadequate feeding practices increase the risk of undernutrition and mortality among children under 5 years old (Beyene et al., 2015). Likewise, Jones, Hammond, Reid, and Leatherdale (2015) concluded that diet has a significant influence on the dietary practices of children.

5.3 Conclusions

From the study results, the following conclusions were made:

The socioeconomic characteristics and nutritional analysis of caregiver-child pairs in the Majengo slum reveal significant nutritional deficiencies and disparities influenced by socioeconomic factors. The predominance of female caregivers, limited educational attainment, and low household incomes contributed to suboptimal dietary practices, impacting children's growth, development, and overall health. There was a considerable number of participants who had low nutritional knowledge, while caregivers with greater levels of education had better nutritional knowledge. The majority of children do not meet their minimum dietary diversity requirements by consuming foods from less than four of the ten food groups provided. Wasting level is above the national level and this is classified under critical conditions using the global acute malnutrition rates. There was a significant relationship between nutrition knowledge, dietary practices, and the nutrition status of children 6-59 months in Majengo slums, Narok County.

5.4 Recommendations

The following are recommendations made based on the study findings:

5.4.1 Policy Recommendations

To address these challenges, it is recommended to implement targeted nutrition education programs for caregivers focusing on the importance of a balanced diet, meal frequency, and the inclusion of diverse food groups. Additionally, initiatives to improve economic opportunities for women and access to affordable, nutritious foods should be prioritized to enhance the overall nutritional status of children in urban mango slum settings.

The Ministry of Health Services ought to provide funding to strengthen the capacities of nutrition advocates and community health promoters, through the office of the county nutrition coordinators. To promote nutrition knowledge locally, these people should be entrusted with disseminating important nutrition knowledge during community visits and dialogue days at the community level. The community health promoters and nutrition champions also need to be capacity for nutrition screening and assessment for early identification and referral of malnutrition cases at the community level. Building capacity for nutrition screening and assessment is also necessary for community health promoters and nutrition champions to identify and refer instances of malnutrition early on at the community level. Nutrition education needs to emphasize the benefits of exclusive breastfeeding, introduction to complementary feeding, types of complementary foods, and the need for a diverse diet to enhance children's nutrition.

5.4.2 Suggestions for Further Research

The study recommends similar studies be done in urban and rural settings to provide a comparison with the current study. Further research is needed to investigate the association between caregivers' nutrition knowledge, attitude, practices, and nutritional status among children under 5 years old.

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APPENDICES

Appendix I: Informed Consent Form

Dear Participant,

My name is Asenath Sinantei, a student from the Department of Human, Nutrition, and Dietetics at Kabarak University carrying out a study on **Caregivers' Nutrition Knowledge, Dietary Practices, And Nutritional Status Of Children Aged 6-59 Months In Majengo Slum, Narok County.**

I am seeking your consent to participate in the study whose findings might be beneficial to your child and other children. Your participation is optional and any assistance will be highly appreciated. The data collected will be treated with the utmost confidentiality and your response will remain confidential. No physical or psychological harm is involved in this study. Data will be used for educational purposes only. There will be no direct reference to your name nor will your contact information be published at the end of the study.

There are no financial or other personal benefits from participation. You will be referred to the nearest facility if your child is moderately or severely malnourished. Your participation is voluntary and it will be highly appreciated.

When you sign or thumbprint below, it shows that you have understood the purpose of the study and you have agreed to participate.

Signature /thumbprint of the participant…………………..

Date ………………………………………………………...

Signature of the study coordinator ……………………….

Date ……………………………………………………..

Appendix II: Questionnaire

Caregivers' Nutrition Knowledge, Dietary Practices, and Nutrition Status of Children Aged 6-59 Months, Majengo Slum, Narok County

Date:	Household number
Questionnaire number:	Team leader:
Team number:	Questionnaire checked by:
Village number :	

Section A. Demographic and socio-economic status

1.Age of the caregiver /mother	
2.Marital Status	☐ Single ☐ Married ☐ Living together ☐ Separated ☐ Widowed
3.Gender	☐ Female ☐ Male
4.Occupation of the caregiver/mother	
5.Religion	☐ Christian ☐ Islam ☐ Hindu ☐ Others (specify)
6.Household Income	☐ Kshs <10,000 ☐ Kshs 10,000-19,999 ☐ Kshs 20,000-29,999 ☐ Kshs 30,000-39,999 ☐ Kshs >40,000
7. level of education of the caregiver/mother	☐ None ☐ Primary ☐ Secondary ☐ Post-secondary

Section B. Dietary Intake- 24-hour dietary recall.

Please describe the foods and drinks taken during the last 24- hours whether at home or outside the home. (*Research to list all foods mentioned, where composite meals are mentioned probe for the ingredients when the respondent is through probe for any meal that might not have been mentioned.)*

Sex (1=male 2= female)

Date of birth:

Let's now talk about what your child ate yesterday.

Child (6-59 months)

Time	**Name of Food, Drink, or Dish**	**Source of Food**	**Form of preparation**	**Measurements**
				Amount (quantity)

Time	Source Of Food:	Form of preparation:
1 = Morning *(00:01-12.00)* 2 = Afternoon *(12.01-17:00)* 3 = Evening *(17:01-19:00)* 4 = Night *(19:01-00:00)*	1 = Home-prepared 2 = Meal/snack prepared outside the home, e.g. chips, take-away) 3 = Local production / wild/raw foods (e.g. banana) 4 = Processed, manufactured food (e.g. bread, biscuits) 5 = Food aid or exchange for work 6= Other (Specify) 0= Don't know	1 = Raw 2= No pre-prep 3 = Boiled, not drained 4=Boiled, drained 5= steamed 6= Stir-fried in oil 7 =deep fried in oil 8= roasted /toasted 9= baked 10=others 11= don't know

Food Frequency Questionnaire

No	Food groups	Specific foods	Form of prep	Amount usually eaten	No of time food consumed per day/week						
					1	2	3	4	5	6	7
1.	**Cereals, starchy tubers, root crops, plantain** (Rice, potatoes, matoke, chapati)										
2.	**Pulses** (beans, peas, len										
3.	**Nuts and seeds** (sesame, ground nuts)										
4.	**Dairy product**s (fresh milk, mala, yoghurt)										
5.	**Meat, fish, eggs** (chicken, beef, pork, til										
6.	**Green leafy vegetables** (sukumawiki, managuu, terere, malengee, tomatoes)										
7.	**Fruits** (banana, mangoes, oranges, papaya)										
8.	**Oils and fat** (ghee, butter)										
9.	**Beverages (**tea, coffee,)										
10.	**Others**										

Adapted from FAO 2014 (modified to local setting)

Section C. Caregivers' Nutrition Knowledge

Breastfeeding

1. What is the first food a newborn baby should receive?

1= Only breast milk

2= Water

3= Other

4= Don't Know

2. Have you heard about exclusive breastfeeding? Yes ☐ No ☐

(a) What does exclusive breastfeeding mean ……………

(b) Did you practice exclusive breastfeeding? Yes ☐ No ☐

(c) If yes, for how long did you practice………………

(d) If NO (give reason) ……………………… …..

3. How long should a baby receive nothing more than breast milk? ....

a) (Probe) until what age is it recommended that a mother feeds nothing more than breast milk? From birth to six months ☐ Other ☐ Don't know ☐

4. Do you think that breast milk is the only recommended food for up to six months?

Yes ☐ No ☐

a. If yes (give reasons) …………………………………………..

b. If no (give reasons) ………………………………………………..

5. Does breast milk provide all the nutrients and liquids a baby needs in its first six months?

Yes ☐ No ☐ don't know ☐

6. How often should a baby younger than six months be breastfed or fed with breast milk?

On demand, whenever the baby wants ☐ Other ☐ Don't know ☐

7. Do you think that breast milk can protect the baby from diarrhea other infections and chronic diseases? Yes ☐ No ☐

(a) If yes (give reasons) ………………………………………………….

(b) If no (give reasons) ……………………………………………………

8. What are the benefits of exclusive breasting to the child? ....

Complementary Feeding

1. At what age should babies start eating foods in addition to breast milk?

   Six months ☐ Other ☐ don't know ☐

2. Is it important to give foods in addition to breast milk to babies from the age of six months?

   Yes ☐ No ☐

   (a) If yes, why is it important ………………….

   (b) If no (give reason) ………………………

3. Do you believe that a child can survive on breast milk alone without water? 1.

   Yes ☐ No ☐

   (a) If YES, for how long? (Indicate in months) ……………………………

   (b) If NO, why? ……………………………………………………….

4. Do you give your variety? Yes ☐ No ☐

   a. If yes, what do you give to the child to make it balanced ………………

   b. If no, (give reason) …………………………………………………..

5. Why is it important to encourage to eat? Yes ☐ No ☐

   a.If yes, why? ....

   If no, (give reason) ………………………………

6. Is your child going to school? Yes ☐ No ☐

7. Do you include animal-source food in your child's diet? Yes ☐ No☐

8. Do most of the teaching on child feeding practices obtained from the hospital/MCH? Yes ☐ No ☐ Other ☐

9. Have you received any nutrition education messages?

   ☐Yes

   ☐ No

10. How was it helpful? ………………………………………………………

Section D. Nutritional status of the child child's anthropometric assessment

Name of child…………………………..

Date of Birth………………Age in months …….

Gender……. Child ID……. ………….

Birth Weight……………….

The child delivered at? Hospital ☐ Home ☐

Relationship to the child……………………

Measurement	**First reading**	**Second reading**	**Average**
Height/length			
Weight			

Thank You.

Appendix III: Anthropometric Measurements

i. Height Procedures

Every child whose height is 85 cm or below was made to lie down on the length board, which was laid flat on the ground or a table or bench. The child was placed on the measuring board with one hand holding the head and the other hand on the body trunk. The head was put on the bottom of the board with cupped hands over the ears to ensure that they look straight up and their line of sight is parallel to the ground. The helper positioned the child flat on the board in the middle, with their knees against it and their foot piece gently on it. Children taller than 85 cm were measured standing on a height scale. The child was to stand on the board with their knees firmly against it. The hood was lowered until the child's head was measured. All measurements were accurate to the nearest 0.1 cm.

ii. Length Procedure

Children under two years of age and those who are unable to stand stably enough to be measured in the standing position should be measured in the supine position on a measuring board. If the child is >2 years old and able to stand, standing height should be measured. Ensure the measuring board has been checked and validated using metal rods of known length. Ensure that the equipment is wiped clean before use. Wash your hands and explain the procedure to the child and their parent or guardian. Explain that you will be making measurements of their length. Undo or adjust hairstyles and remove hair accessories that interfere with measurement. Ensure that infant measuring board is placed on a hard, flat surface. Make sure the child's nappy is removed. The child must either be naked or in a vest or thin T-shirt. The child must lie flat in the Centre of the measuring table. The head must be resting against the base of the measuring table.

Measurer 1 must position the head in “Frankfort plane”, an imaginary line from the Centre of the ear hole to the lower boarder of the eye socket. This is a midline position. The head must not be tucked in against the child’s chest or stretched too far back. Measurer 2 must be told when the child’s head is in the correct position. Measurer 2 must position the child such that their shoulders, back and buttocks are flat along the Centre of the board. Measurer 2 must then place one hand on the child’s shins or on their knees and press carefully but firmly against the board. With the other hand, they must move the foot piece until it is firmly against the child’s heels and the toes are pointing directly to the ceiling. Once the child’s position has been checked the length must be recorded. Three measurements should be recorded and the average taken as the correct measurement. The precision between measurements must be within 1 mm between readings. Record the measurement, plot on growth chart and sign. If it is available this must also be entered into the parent child health record, plotting in pencil and recording measurement.

iii. Weighing Procedure

A digital weighing scale (Seca 767) was used to determine the weight, and only minimum or light clothing and no shoes were allowed. The child was asked to stand on the weighing scale upright, feet open, and the heading facing front. Before weighing each child, the scale was calibrated to zero. For children under two years old, the mother or caregiver was first weighed alone and later with the child, and the baby's weight was determined by subtracting the mother's weight from the total mother/child ratio. The weights were determined at the nearest 0.1kg.

Appendix IV: KUREC Approval Letter

KABARAK UNIVERSITY RESEARCH ETHICS COMMITTEE

Private Bag - 20157
KABARAK, KENYA
Email: kurec@kabarak.ac.ke

Tel: 254-51-343234/5
Fax: 254-051-343529
www.kabarak.ac.ke

OUR REF: KABU01/KUREC/001/01/05/23

Date: 29th May, 2023

Asenath Sinantei Kotonto,
Reg. No: GMND/N/1154/09/20
Kabarak University,

Dear Asenath,

RE: CAREGIVERS' NUTRITION KNOWLEDGE, DIETARY PRACTICES, AND NUTRITIONAL STATUS OF CHILDREN AGED 6- 59 MONTHS IN MAJENGO SLUM, NAROK COUNTY

This is to inform you that ***KUREC*** has reviewed and approved your above research proposal. Your application approval number is ***KUREC-010523.*** The approval period is ***29/05/2023 – 29/05/ 2024.***

This approval is subject to compliance with the following requirements:

i. All researchers shall obtain an introduction letter to NACOSTI from the relevant head of institutions (Institute of postgraduate, School dean or Directorate of research)
ii. The researcher shall further obtain a RESEARCH PERMIT from NACOSTI before commencement of data collection & submit a copy of the permit to **KUREC.**
iii. Only approved documents including (informed consents, study instruments, MTA Material Transfer Agreement) will be used
iv. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KUREC***;
v. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KUREC*** within 72 hours of notification;
vi. Any changes, anticipated or otherwise that may increase the risk(s) or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KUREC*** within 72 hours;
vii. Clearance for export of biological specimens must be obtained from relevant institutions and submit a copy of the permit to KUREC;
viii. 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 and;
ix. Submission of an executive summary report within 90 days upon completion of the study to ***KUREC***

Sincerely,

Prof. Jackson Kitetu PhD.
KUREC-Chairman

KABARAK UNIVERSITY
INSTITUTIONAL RESEARCH ETHICS COMMITTEE
3 1 MAY 2023
APPROVED
P. O. PRIVATE BAG - 20157, KABARAK

Cc Vice Chancellor
DVC-Academic & Research
Registrar-Academic & Research
Director-Research Innovation & Outreach
Institute of Post Graduate Studies

As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)

Kabarak University is ISO 9001:2015 Certified

Appendix V: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **952176**

Date of Issue: **02/July/2023**

RESEARCH LICENSE

This is to Certify that Miss.. Asenath sinantei kotonto of Kabarak University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Narok on the topic: caregivers\' nutrition knowledge, dietary practices, and nutritional status of children aged 6-59 months in Majengo slum, Narok county. for the period ending : 02/July/2024.

License No: **NACOSTI/P/23/26828**

952176

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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

See overleaf for conditions

Appendix VI: Approval Form- Narok County

ASENATH SINANTEI KOTONTO

P.O. BOX 493-20500

NAROK

Cell phone: 0703173380

Email: asenathsinantei5@gmail.com

3rd July, 2023

TO THE COUNTY SECRETARY

NAROK COUNTY GOVERNMENT

P.O. BOX 898-20500

NAROK

NAROK COUNTY GOVERNMENT
COUNTY SECRETARY
03 JUL 2023
Received
P.O. Box 898-20500, NAROK

Approved
demographics
3rd July, 2023

REF: REQUEST FOR CLEARANCE TO COLLECT DATA FOR MASTER IN NUTRITION RESEARCH PROJECT

My name is Asenath Sinantei Kotonto, ID No .32819033; I reside in Naroosura, Narok South sub county. I am currently pursuing Master in clinical nutrition in Kabarak University, Department of Nutrition and Dietetics.

I'm writing to kindly request for clearance to collect data on caregiver's nutrition knowledge and dietary practices from randomly selected household in Majengo, Narok Township Ward, Narok North Sub County.

The title of my research project is "**Caregiver's Nutrition Knowledge, Dietary Practice, and Nutritional status of children aged 6-59 months in Majengo slum, Narok County.**"

I have been cleared by kabarak university research ethic committee and National Commission for science, technology and Innovation (certificate attached) and now I'm planning to start collecting data from 10th July to 31st July 2023

Awaiting your positive feedback, thank you in advance

Yours faithfully

Asenath Sinantei Kotonto

Approval VII: Evidence of Conference Participation

TENP/RPND/2023/016

The Eldoret National Polytechnic
P. O. BOX 4461 - 30100 Eldoret Tel: 0738092126/0797222666
Email: info@tenp.ac.ke

Certificate of Participation

is awarded to

Asenath Sinantei Kotonto

for presenting a paper entitled: -

Caregivers' Nutritional Knowledge and Dietary Practices on Nutritional Status of Children 6-59 Months in Majengo Slums, Narok County, Kenya

During the Twelfth Annual International Conference on ***'Competences In Applied Research, Science And Innovation For Sustainable Development'*** Held at The Eldoret National Polytechnic on **13th to 14th September 2023**

Principal

Chairman Governing Council

This certificate is issued without any alteration whatsoever

Appendix VIII: List of Publication

AFRICAN JOURNAL OF NUTRITION AND DIETETICS

https://doi.org/10.58460/ajnd.v3i1.95

Open Access

ORIGINAL ARTICLE

MJ&M BIOLABS

Dietary Intake Among Children Aged 6-59 Months in Majengo Slum, Narok County, Kenya: A Descriptive Study

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[1] Department of Nutrition and Dietetics, School of Medicine and Health Sciences, Kabarak University

*Corresponding Author: asenathsinantei5@gmail.com

Article History
Submitted: 16th May 2024
Accepted: 12th July 2024
Published Online: 9th September 2024

To read this paper online, please scan the QR code below:

ABSTRACT

Understanding the dietary intake of children aged 6-59 months is critical globally, regionally, and locally, given its profound impact on child health and development. Breastfeeding and complementary feeding are fundamental for optimal nutrition during early childhood, with persistent challenges, such as suboptimal feeding practices and inadequate dietary diversity, observed, especially in urban slum settings. However, there remains a notable gap in understanding these practices within Kenya, particularly in marginalized communities such as Majengo Slum. This descriptive study aimed to examine the dietary intake among children aged 6-59 months in Majengo Slum, Narok County, Kenya. A descriptive cross-sectional design was employed, with data collected through semi-structured questionnaires, food frequency questionnaires, 24-hour dietary recalls, and anthropometric measurements. A sample size of 341 caregiver-child pairs was determined using the Fischer formula, with systematic random sampling conducted in villages within Majengo Slums. Socio-demographic characteristics revealed a predominance of female caregivers, with a significant proportion having completed primary education and engaged in small to medium businesses. Notably, 71% of children were born at health facilities. Analysis of nutrient intake indicated disparities between observed and recommended levels. Energy intake was below the recommended 1600 kcal/day for 74% of children, while protein intake was below the recommended 71 grams/day for 89% of children. Excesses were observed in certain micronutrients, such as sodium and saturated fat. Dietary diversity assessment revealed that 76.86% of children achieved Minimum Dietary Diversity (MDD), while only 20% regularly consumed fruits and vegetables. Minimum Meal Frequency (MMF) was associated with caregivers' education and employment status. Children in households with formally employed caregivers were more likely to achieve a higher MMF compared to those with illiterate mothers/caregivers. Targeted interventions focusing on improving dietary diversity, promoting breastfeeding and complementary feeding, and enhancing meal frequency are essential for improving child nutrition and health outcomes in marginalized communities.

Keywords: Majengo Slum, child nutrition, breastfeeding, complementary feeding, meal frequency.