FACTORS INFLUENCING MALNUTRITION AMONG CHILDREN AGED 6-59 MONTHS IN KAMUKUNJI SUB-COUNTY, NAIROBI COUNTY, KENYA

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Factors Influencing Malnutrition among Children Aged 6-59 Months in Kamukunji Sub-county, Nairobi County, Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

Signature……..Date…….

Susan Kathiira Kithinji

This thesis has been submitted for examination with our approval as the University Supervisors

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DEDICATION

I sincerely dedicate this Thesis to my dear mother, Jerika Kungania and my family at large.

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ACRONYMS AND ABBREVIATIONS

CHAs	Community health assistants
CHVs	Community health volunteers
CI	Confidence interval
ENA	Emergency nutrition assessment software
GAM	Global acute malnutrition
GIT	Gastro-intestinal tract
GoK	Government of Kenya
HAZ	Height for Age Z-score
KDHS	Kenya Demographic Health Survey
KNBS	Kenya National Bureau of Statistics
KNMS	Kenya National Micronutrient Survey
MoH	Ministry of Health
MAM	Moderate Acute Malnutrition
MUAC	Mid-Upper Arm Circumference
NACOSTI	National Commission for Science, Technology and Innovation
OR	Odds Ratio
PPS	Probability Proportionate to Size

SDGs	Sustainable Development Goals
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
SMART	Standardized Monitoring and Assessment of Relief and Transitions
SAM	Severe Acute Malnutrition
TDHS	Tanzania Demographic Health Survey
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Programme
WAZ	Weight for Age Z-score
WHZ	Weight for Height Z-score
WHO	World Health Organization

DEFINITION OF OPERATIONAL TERMS

Child wasting An indicator of malnutrition defined as weight for height Z score of < –2 standard deviation (SD) from the median of the World Health Organization (WHO) Child Growth Standards among children under five years of age.

Child stunting An indicator defined as HAZ (height for age z-score) of < -2SD below the WHO child growth standard.

A **caregiver** A person who provides direct assistance, support and supervision to another individual who fails to care for themselves due to age, illness or disability.

Underweight Is designated as Z score of weight for age (WAZ) of < –2 SD of the WHO child growth standard median.

Overweight Weight for height > +2 SD of the WHO Child Growth Standards median

Undernutrition Means inadequacy of nutrients and manifests in 4 forms namely; underweight, wasting, stunting and micronutrient deficiencies.

Global acute malnutrition is the presence of both Moderate Acute Malnutrition (MAM- defined as a weight-for-height z-score (WHZ) between -2 and -3) and Severe Acute Malnutrition (SAM- a weight-for-height z-score (WHZ) of <-3) in a population

Severe acute malnutrition It is a weight-for-height z-score (WHZ) of <-3 standard deviation of WHO growth standard.

Moderate acute malnutrition A weight-for-height z-score (WHZ) of between -2 and -3 SD from the growth standard median.

ABSTRACT

Malnutrition refers to a condition that results from eating a diet with too little nutrients or too much that it causes health problems in children, which can take the form of stunting, wasting, or underweight. Despite the various strategies and policies by government and partners, malnutrition remains a challenge in Kenya as nearly 242,567 children were severely malnourished by July 2022. This study was therefore designed to assess the determinants of malnutrition among children aged 6-59 months in Kamukunji sub-county, Nairobi County. This was purposively selected. A cross-sectional study design was adopted. Multi-Stage Cluster sampling was used to get the sample size. A Semi-Structured interviewer administered questionnaires were used to interview 260 caregivers with children aged 6-59 months where Kamukunji was also purposively selected. The probability proportionate to population size was used to allocate the care givers of children. The data collection utilized anthropometry measurements and questionnaire to establish the socio-demographic economic characteristics, maternal and child characteristics influencing wasting, underweight and stunting. Secondary data including immunization, vitamin A supplementation and previous illnesses were obtained from the mother- child booklet. The collected data was analysed using STATA version 17.0 software. Anthropometry measurements such as height/length, weight and mid upper arm circumference were taken using standard procedures and they were analysed using WHO Anthro software. Wasting prevalence was at 4.8%, underweight prevalence was 12.3% and stunting prevalence was 28.8%. There was an association between income and malnutrition where mothers with medium household income of above Ksh 20,000 had more underweight children compared to low household income mothers who earned below Ksh 10,000 (95% CI: 1.901-9.930). Households with more than 3 children experienced more underweight children compared to less than 3 children (95% CI: 1.830-7.543). Children who weighed between 2.1-3.0 experienced less underweight, wasting and stunting compared to children who weighed between 0.1-1.0(95% CI: 0.075-0.584, 0.010-0.829,0.074-0.553 respectively). In conclusion, child weight, age, the household income and number of children had significant effect on the nutrition status of children. The study recommended capacity building on appropriate feeding programmes as a short-term alternative to address malnutrition. Enhancement of girl child education and development of pro-poor policy interventions to control malnutrion. Household heads to engage in income generating activities to bolster their income and improve the feeding standards of their children. The Ministry of health together with the County government is entrusted with this implementation.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Malnutrition is a condition that results from eating a diet in which nutrients are too little or too much to cause health problems. Globally 148 million children were stunted, 45 million wasted and 37million were overweight (UNICEF, 2023). Diseases hinder absorption of nutrients due to cellular imbalance between the supply of nutrients and the body's demand to maintain specific functions (World Health Organization, 2022) .

Malnutrition among children manifest as low height-for-age (stunting) and is a factor in impairment of human growth development. Stunting is an indicator of early chronic undernutrition, while wasting is an indicator for acute undernutrition. Underweight, is overall indicator of the combination of both stunting and wasting in children (UNICEF, 2020).

Approximately 149.2 million (22.8%) stunted, 20.5 million (14.6%) underweight and 45.4 million (6.7%) children have wasting (UNICEF, 2021; Global Nutrition Report, 2021).

Given the acceleration of the pandemic in many low- and middle-income countries in 2021, lack of health actions may impact negatively to 13.6 million children affected by wasting (moderate, 9.3 million), 3.6 million more stunted children (moderate, 2.6 million) and 283,000 related child deaths (UNICEF, 2021).

In Kenya, stunting and underweight rates of these children stood at 26% and 11% respectively, with stunting rates higher than Global figures of 22.8%. In Kenya, malnutrition contributes to 53% of children’s deaths, and a risk to child growth and development (UNICEF/WHO/World Bank Group, 2022). The prevalence for wasting among Kenyan children under five years stood at 4% .

In developing countries, poor availability of food both in terms of quality and quantity, dietary diversification, high rates of infection, inflation, poverty, low maternal socio-economic status and inappropriate caregiver-feeding behaviors influences child under-nutrition (FAO,, UNICEF, 2020). The study sought to establish the determinants influencing malnutrition among children aged 6-59 months in Kamukunji sub county, Nairobi County and formulate adequate interventions among children.

1.2 Statement of the Problem

Globally, 149 million children under 5 years were stunted, 45 million wasted while 38.9 million were overweight or obese (WHO 2021). In Kenya the prevalence of child stunting standing at 17.6%, wasting at 4.9% and underweight at 10.1% respectively **(**KDHS**,** 2022**)**.

In a nutrition survey conducted in Nairobi, Kamukunji Sub-County had the highest prevalence of wasting at 9.6% and underweight at 21% (Njoroge and Munene, 2017). This is attributed to inadequate diet, poor breastfeeding practices, early introduction of complementary feeding food taboos and personal choices related to diet). Further there is need to explore underlying issues such as level of education, knowledge, information access, social, religious norms, gender issues, access and availability house hold food issues (Kalu and Etim, 2018). This contributes to health and physical consequences, delaying children physical growth and motor development, deficient social and susceptibility to contracting diseases. Child malnutrition may lead to higher levels of chronic illnesses causing negative and unfavorable effects.

There is need to implement Infant and Young Child Feeding (IYCF), antenatal and postnatal strategies to ensure reduction of malnutrition for realization of Sustainable Development Goals (SDGs) 2,3 and 5. There are limited findings in the informal settlements on infant feeding practices hindering the contribution of adequate interventions.

The dimensions and underlying causes of malnutrition are often complex and extremely location specific, differ widely from country to country, and from one location or population group to another, even within the same country (Yahia *et al.,* 2016). The study seeks to establish factors that determine malnutrition among children aged 6-59 months in Kamukunji Sub-County. There is limited data at the informal settlements in Kenya to contribute towards strengthening mitigation measures and interventions to be applied in reducing malnutrition.

1.3 Justification of the Study

In Africa Malnutrition among children aged 6–59 months in Africa is driven by a complex interplay of poverty, poor maternal education, inadequate breastfeeding and inadequate clean water. Key factors include low birth weight, high morbidity (diarrhea infections), inappropriate complementary feeding, and poor sanitation. Kenya has a high burden of Malnutrition among children under five which is a public health challenge, with stunting, wasting and underweight being prevalent. In Kenya 10.1% of the children under five are underweight with 3.2% wasted. More than a quarter of the children under the age of five have stunted growth of 17.6% (KDHS, 2022). These conditions and challenges in the informal settlement contribute significantly to child morbidity and mortality. Understanding determinants in the informal settlement such as Kamukunji Sub county helps target relevant effective feeding interventions for children. Targeting children aged 6–59 months is key for their physical growth, brain development, and immunity to prevent irreversible damage and impaired cognitive development. The findings from household income, maternal education, feeding practices and knowledge level will enhance health care workers design nutrition-sensitive strategies for local realities in Kamukunji. The current study addresses gaps to inform adjustments to reduce illness among children of caretakers to improve development for health outcomes in the informal settlement.

The specific knowledge and understanding of the factors is very crucial for the development of sustainable control measures against malnutrition. This study strengthens existing standards through regular health education to control the burden of malnutrition

in Kamukunji Sub County and the country at large.

The study focused towards achieving SDG 2 which targets stunting and wasting in children under 5 years. The findings serve as a baseline for those who may wish to undertake further research in the informal settlements.

1.4 Research Questions

1. What is the prevalence of malnutrition among children aged 6-59 months in Kamukunji Sub-County?
2. What are the socio demographic and economic characteristics associated with malnutrition among children aged 6-59 months in Kamukunji Sub-County?
3. How are maternal related factors associated with malnutrition among children aged 6 – 59 months in Kamukunji Sub-County?
4. What are the child related factors associated with malnutrition among children aged 6-59 months in Kamukunji Sub-County?

1.5 Objectives of the Study

1.5.1 General Objective

To establish the factors associated with malnutrition among children aged 6-59 months in Kamukunji Sub-County, Nairobi County.

1.5.2 Specific Objectives

i) To determine the prevalence of malnutrition among children aged 6-59 months in Kamukunji Sub-County.
ii) To establish socio demographic and economic characteristics associated with malnutrition among children aged 6-59 months in Kamukunji Sub-County.
iii) To explore maternal related factors associated with malnutrition among children aged 6 – 59 months in Kamukunji Sub-County.

iv) To establish the child related factors associated with malnutrition among children aged 6-59 months in Kamukunji Sub-County.

1.6 Conceptual Framework

The current study adopted the UNICEF conceptual framework of malnutrition to understand the risk factors and causes is multi-factorial among under five children. Figure 2.1 depicts that the framework identifies basic, underlying and immediate causes of undernutrition and interconnectedness. Inadequate dietary intake and disease causes of malnutrition. Socio-economic factors includes household food security, income and household size resulting to malnutrition. Maternal level of education and health seeking characteristics causes inadequate dietary intake and diseases. Child related factors such as feeding practices, birth order, birth weight and immunization status cause disease that result is malnutrition. The study sought to establish the socio-economic, maternal and child related factors influencing malnutrition among children aged 6 – 59 months in Kamukunji Sub-County, Nairobi County, Kenya. The independent variables were socio-economic factors, maternal factors and child related factors. The dependent variables were the malnutrition indicators investigated.

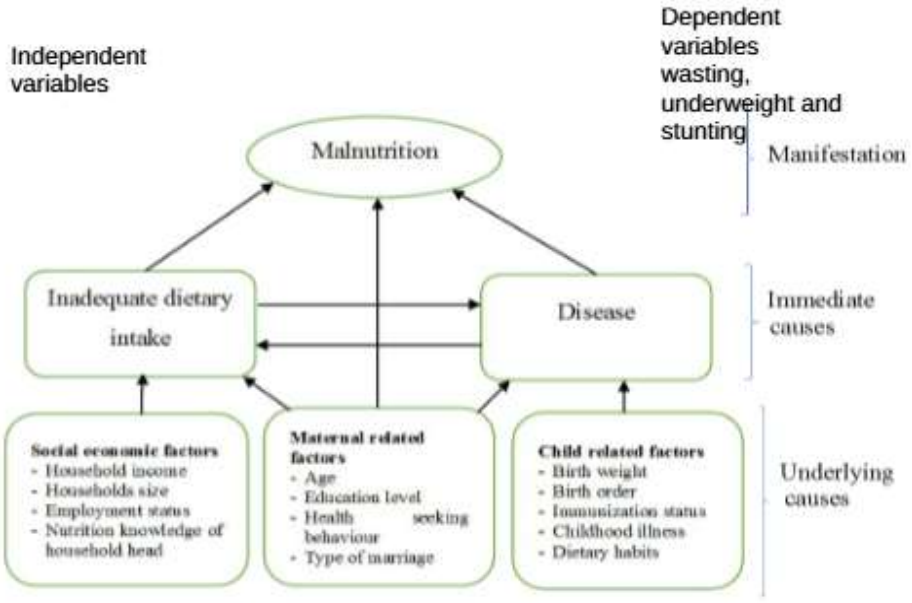

Figure 2.1: Conceptual Framework of Determinants of Undernutrition

Source: Adapted-from (UNICEF, 2016a)

CHAPTER TWO

LITERATURE REVIEW

2.1: The Burden of Undernutrition

2.1.1 Overview and Prevalence of Malnutrition Globally

Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients (WHO, 2020). It covers two broad groups: Undernutrition manifesting as stunting, wasting, under-weight and micronutrient deficiencies, and over nutrition manifesting as overweight/obesity. Over nutrition can also lead to nutrient deficiencies and low blood levels of certain vitamins and minerals compared to those at normal weight.

Recent data reveals an unacceptably large number of people are still affected by malnutrition. Globally, 20.5 million (14.6% of all live births) have a low weight at birth. Of all children under 5 years of age, one in five are stunted (149.2 million) and 45.4 million (6.7%) were wasted by 2020 (UNICEF, 2021).

With the acceleration of the covid-19 pandemic, there is a possibility of a total 13.6 million more children affected by wasting (moderate, 9.3 million; optimistic, 6.4 million), 3.6 million more stunted children (moderate, 2.6 million; optimistic, 1.5 million) and 283,000 more related child deaths (moderate, 168,000; optimistic, 47,000) by 2022 translating into the unnecessary loss of 3 million young lives annually(UNICEF, 2021).

Undernutrition predisposes children to a greater risk of from infections, frequency and severity contributing to high mortality and morbidity due to delayed recovery from illnesses (Kunhipurayil and Srivastav, 2021), causing disability (Kunhipurayil and Srivastav, 2021). Children aged between 6-23 months have a critical window period of growth to prevent malnutrition as they need more energy and nutrient to grow (WHO, 2021).

They require appropriate safe, adequate and frequent child feeding practices for the optimal growth and health (Kunhipurayil and Srivastav, 2021).

2.1.2 Prevalence of Malnutrition among Children in Africa

In Africa, poor nutrition is a critical factor in child mortality, where one in 12 children in sub-Saharan Africa (SSA) dies before five years (UNICEF, 2016a) where 1 in 3 children are stunted (Clark *et al.,* 2020) and 17.6 million children in SSA suffer from acute malnutrition (Amugsi *et al.,* 2017). The effects of stunting are irreversible (Li *et al.,* 2020) as it hampers cognitive ability among children. In Brazil, Guatemala and South Africa stunting was associated with absence of schooling where it was a predictor of impaired cognitive development, growth retardation, compromised educational achievement and low economic productivity(Kunhipurayil and Srivastav, 2021). Despite numerous feeding interventions, malnutrition continues to be a public health concern in sub- Saharan Africa in the informal sector (Li *et al.,* 2020). Malnutrition among children aged 6–59 months in Africa is driven by a complex interplay of poverty, poor maternal education, inadequate breastfeeding, and lack of clean water. Key factors are low birth weight, high morbidity, inappropriate complementary feeding and poor sanitation.

2.1.3 Prevalence of Malnutrition in Kenya

In Kenya, Stunting: 17.6% (a decline from 26% in 2014), Underweight: 10% while Overweight: 3% with stunting of (20%) and underweight at (12%) in rural and urban areas respectively (KDHS 2022). Approximately 90% and 61% of children have ever been breastfed and exclusively breastfed respectively. Complementary foods are generally introduced at the recommended age. About 81 % of breastfed children aged 6-9 months received complementary feeding before the right age (UNICEF, 2017).

In Kenya, complementary feeding has been slow failing to meet targets (Ahoya *et al*., 2019). Findings from a study conducted by the Kenya National Bureau of Statistics (KNBS) and partners provides nutrition indicators such as breastfeeding, complementary

feeding and nutrition diversity. Research findings highlight persistent gaps in complementary feeding practices without diverse foods consumption with reliance on starchy staples and limited animal-source foods, fruits and vegetable (KDHS, 2022).

According to the Kenya national micro-nutrient survey (KNMS) findings 22 % of children adhere to three recommended infant and young child feeding practices. Majority (70%) of children aged 6-59 months received vitamin A supplements.

Malnutrition occurs more in males than females with multiple births being affected (Madiba *et al.,* 2019 and Murarkar *et al.,* 2020). Utilization of public health services especially the modern contraceptives plays a great role in controlling levels of malnutrition (Omondi and Kirabira, 2016). The parental, household and community characteristics suggests the interventions to reduce high levels of malnutrition (KDHS, 2022). The enabling environment can provide quality health care (Njoroge and Munene, 2017). The adequate nutrition is critical to children's growth and development from birth to 2 years for optimal physical, mental, cognitive growth, health and development (Ali *et al.,* 2017). Nutrient deficiencies interfere with growth causing common childhood illnesses such as diarrhoea and respiratory infections.

Weight-for-age is a composite index of height-for-age and weight-for-height considering acute and chronic malnutrition (Abdulla, 2016). For children with minus two standard deviations (-2 SD) and minus three standard deviations (-3 SD) are underweight and severely underweight respectively.

The Kenya Demographic Health Survey report of 2014 reveals that in Nairobi County, the percentage of children whose height-for-age (-2 SD) is 17.2%. The updated county-level nutrition indicators, includes underweight and wasting prevalence among children under five (KDHS, 2022).

Another study conducted in Nairobi County by UNICEF and Concern World Wide in May 2017 indicated a GAM prevalence rate of 4.6%, with a caseload of 23,791 cases while the

prevalence for severe malnutrition was 0.1 % classified as normal malnutrition classification (Njoroge and Munene, 2017). There is need of urgent intervention and concerted efforts to tackle malnutrition considering the 46% disparities on stunting at Kitui and West Pokot; with wasting at >20% in arid/semi-arid counties (UNICEF Kenya & Nutrition International, 2023).

The findings also showed the prevalence of underweight and severely underweight at 11.4 % and 1.7 % respectively. In Nairobi county stunted and severely stunted children was 26.1 % and 7.7 % respectively (Njoroge and Munene, 2017).

Further Kamukunji (Kiambio/ Majengo) and Dagoretti (Kawangware/Gatina had the highest prevalence of malnutrition. Wasting was 9.6% and 9.2% for Kamukunji and Dagoretti respectively. In Ruaraka (Korogocho) stunting was 31.8% while Kamukunji (Kiambio/ Majengo was 21.2% (Njoroge and Munene, 2017).

2.2 Socio- Demographic and Economic Factors Associated with Malnutrition

This may directly or indirectly be associated with health and nutrition outcomes of under five years' children. The national stunting prevalence is 17.6% of children under five being more prevalent among boys than girls, while rural has higher stunting rates than urban children. Stunting peaks in the 18–23 month age group due to weaning and complementary feeding period (KDHS, 2022).

In regard to maternal education, secondary or higher education had 17% of children stunted, while incomplete primary education had 34% stunted and no education had 31% stunted. Maternal education improves knowledge of nutrition, health practices, and healthcare access in reduction of child malnutrition risks. The lowest wealth quintile had 36% stunted growth compared with highest wealth quintile at 14% stunted (KDHS 2022).

Wasting levels were high for the children aged 6-11 months at (7 %) due to poor complementary feeding practices and disease vulnerability. Children whose mothers lacked education had a higher odd of wasting at (10. 7 %) compared with educated ones.

Wasting in children was inversely related to household wealth (KDHS, 2022). Children from the poorest households showed the highest wasting levels than wealthiest households that comprises the lowest reflecting disparities in diets, healthcare and sanitation. The low weight-for-age was common among children 24-35 months higher among boys than girls at 12 % and 10 % respectively, and for rural children (13 %) than urban children (7%). Where poverty and undernutrition coexist, it is important to understand the links between mechanisms that correlate with child nutrition status, for the purpose of giving recommendations on the effective intervention strategies (Kalu and Etim, 2018). The level of wealth at the household was determined as the main indicator for increased risk/ occurrence of undernutrition (Global Nutrition Report, 2021). The proportion of underweight decreases as mother's education level increases or household wealth quintile increases. The underweight prevalence is higher among children in poorest households and declines across wealth quintiles, with lowest levels for wealthy ones (KDHS, 2022). Ghana and Bangladesh revealed an association between household asset index and child nutrition status as children from wealthier households were 57% less likely to be stunted compared to those from poor household one. Wealthier people can purchase food varieties that improve child's nutrition wellbeing.

Studies reveal cultural and economic status as contributors to malnutrition such as mothers' educational, residence, child gender, mother's employment status and birth weight. In Nairobi, findings reveal a significant correlation between stunting and gender of child, mother educational level and birth weight (Mohseni *et al.,* 2018). In Bangladesh low birth weight was a reason for underweight in children due to intrauterine growth retardation. Further, children under five in Indonesia, revealed a significant correlation between stunting and the household income level, the employment status of father, child's gender and age.

Mothers' educational and awareness on complementary foods, preparation methods and initiation of complementary feeding result in underweight and wasting (Mohseni *et al.,* 2018). Study findings from Ethiopia demonstrated that maternal education, birth interval

and residence had significant association with children's nutritional status (Endris *et al.,* 2017).

In Sub-Saharan Africa, study findings highlighted poverty, education levels, family size, poor food access, household income, food insecurity, rapid population growth, conflicts and crisis within countries to cause malnutrition (Kalu and Etim, 2018). In Nigeria secondary education, income of < $20, monthly food expenditure of < $55, residence, birth order and child immunization status was significantly associated with malnutrition (Oganah *et al*., 2022). Therefore, improving socio-economic conditions along with mothers' literacy and personal hygiene improves children nutritional status.

In Ghana, Nigeria, and Ivory Coast, maternal education reduces risks of stunting and wasting due to lliteracy gained through schooling improving mothers' ability to manage childhood illnesses (Yorke, Wahab & Turkson, 2023).

In Kenya, maternal level of education is associated with child's nutritional status. For instance, established that direct knowledge transfers to mother's literacy and numeracy skills acquired from formal education enhances ability of caregivers to recognize illness and take appropriate action in relation to child wellbeing (Abdulrahim, S. 2016).

In sub- Saharan Africa, nations with poor nutrition are affected by child mortality which is a public health concern especially in the informal settlements. Social demographic characteristics such as maternal age, income levels, religion, literacy, maternal education, child's gender influences child nutritional status due to unpredictable environment (Omondi and Kirabira, 2016). Child malnutrition contributes to child mortality and morbidity and determine socio-economic status(Njoroge and Munene, 2017).

Study findings in Kisumu slums revealed an association between socio-demographic factors an nutrition status of children aged between 6-59 months (Omondi and Kirabira, 2016). Indicators such as income and religion predicted stunting both at crude and adjusted level of odds ratios. Income less than Kshs. 5000 was significantly associated

with stunting more likely to decrease underweight. Religion influenced stunting especially for Pentecostals / evangelical category. Other factors such as age of the mother, some religious categories (Like being a member of Catholic, Muslim, Protestant and Hindu), child sex and caregiver level of education had no association with stunting (Omondi and Kirabira; KDHS, 2022). This has led to Kenya continually facing "triple burden" of malnutrition: stunting, wasting, micronutrient deficiencies and rising overweight (KDHS, 2022).

Maternal literacy affects nutritional status of under-five children for the first 6 years of life from the mothers/caregivers as care depends on the mothers' knowledge of health care practices and nutrition (Kalu and Etim, 2018). Literate mothers delay their child bearing that enhances reduction of infant mortality. In Iraq and Bangladesh poorly educated mothers and BMI had a significant negative effect on child malnutrition, where healthier mothers had less risk of malnutrition**.** Undernutrition was higher among unemployed mothers than the employed (Abdulla, 2016). Illiterate or poorly educated mothers are less aware about child feeding, health care seeking practices for the development and child's nutritional status.

Findings from Nigeria among preschool children reported 18.2% of children aged 3–5 years to be underweight. There was association between maternal education level or employment status and malnutrition. (Oganah *et al*., 2022).

In developing countries, women act as children caregivers and generators of household income. Women participate in the labor workforce, pay to household responsibilities to the welfare of children, placing them at risk of malnutrition (Kalu and Etim. 2018). Mothers' occupation can negatively affect children's nutritional health status due to constraints of working-class and children care needs.

In Kweneng West District of Botswana lack of knowledge on malnutrition prevention influenced malnutrition. Lack of caregiver knowledge on malnutrition prevention significantly influenced malnutrition among children under five (UNICEF, 2022).

Findings from several studies indicate association between lower maternal age and prevalence of malnutrition. Children of older women are less likely to suffer from malnutrition and gets better nutritional outcomes while children of older mothers were better. In Ethiopia young there was association between stunting and underweight among under-five children. A trend of introducing complementary feeding and stoppage of breastfeeding were significant risk factors for malnutrition**(**Endris *et al.*, 2017**).** Educated women are more likely to marry later to men with higher income and better paid jobs which influence child survival and health.

A study conducted in Kwale Sub- County in Kenya revealed that 7% of children were wasted, one-third of the study children were underweight and 9% were severely malnourished (Mwaniki *et al.*, 2023). Half of the children were stunted and the proportion of severely stunted children were 22%. Findings established that wasting was strongly associated with mother's low education levels. In the same study, a higher percentage of underweight children belonged to working mothers than children belonging to non-working mothers. The result was attributed to the fact that working mothers were more often away from home than non-working mothers or stay home mothers. In Kenya, a strong linkage between maternal level of education and nutritional status of children was established (UNICEF, 2022). Direct knowledge transfers to mothers, literacy and numeracy skills acquired from formal education enhances caregivers to identify illness and take appropriate measures for child wellbeing.

Increase in family size/ fertility rates is associated with poorer households. An increase in the number of children in a household affects children nutritional status. In addition, children of single parents or in polygamous marriages have been significantly associated with malnutrition in a study carried out in Kisumu slums (Omondi and Kirabira, 2016). Findings from a Nigerian and Ethiopian study revealed that maternal education is associated with child nutritional reducing stunting, wasting and underweight outcome (KDHS 2022; UNICEF, 2022).

2.3 Child Related Factors Influencing Malnutrition

Certain child factors such as sex, age, diseases, breastfeeding and birth order adversely affect the nutritional status. In Iran's under-five year old findings showed age for initiating complementary feeding was a factor in malnutrition as nutrient (Mohseni *et al.*, 2018). The starting point of malnutrition and growth retardation occur from the age of 6 months. In Bangladesh Low birth weight is due to underweight in children, its main cause being intrauterine growth restriction (Mohseni *et al*., 2018; WHO/UNICEF/World Bank Group Joint Child Malnutrition Estimates, 2022). Factors influencing malnutrition in children five years and below contribute to underweight were low birth weight and poor appetite. Indonesia findings revealed a significant correlation between stunting and the masculine gender of child and age of child, with higher birth interval with a lower risk of poor nutritional state in Bangladesh due to programs associated with child health (Frontiers in Nutrition , 2022).

In Sub-Saharan Africa, studies to determine the association between nutritional status of children and gender have been reported among under-five children in Kenya, Ethiopia, Indonesia and Pakistan male children were vulnerable to malnutrition compared with female ones due to a difference in eating frequency, expenditure and health exposure risks (Gebre *et al.*, 2019). In Africa, boys are more vulnerable to health inequalities, nutritional risk and are given more preferences to carry on with the family name (Kalu and Etim, 2018).

In Iraq there was no significant difference in the prevalence of malnutrition rate between males and female (WHO, UNICEF, Global Nutrition Report 2022).

However, underweight children among females and males were (18.9%) and (17.6%) respectively implying that malnutrition affected all children despite their gender. The findings contradicted the findings by Abdulrahim, (2016) who established that child's gender (female) was highly associated with malnutrition had similar findings that child's feminine gender was associated with malnutrition. In Botswana findings established that

low birth weight, lack of immunization, and childhood illnesses caused risks for malnutrition in children (Molebatsi *et al*., 2021).

Similar findings were reported in Ethiopia where non-immunized children were 3.3 and 3.8 times, respectively, more likely to be stunted and underweight than immunized children **(**Shifera *et al*., 2022). Non-immunized children could be at risk of many vaccine preventable diseases such as diarrhoea and respiratory infections which depletes body nutrients. Diarrheal disease is significantly associated with increasing prevalence of wasting as a result of lower appetite, poor digestion, losses weight and malabsorption.

Findings of a study in Garissa County, Kenya established that children's illnesses were associated with malnutrition influencing uptake of interventions to prevent the malnutrition (Abdullahi *et al*., 2022). Children aged 6–12 months formed 52% of the malnourished children due to risk of weaning and poor feeding practices.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Site

This study was done in Kamukunji Sub-County which is located in the eastern part of Nairobi County (Figure 3.1 and Figure 3.2). It boarders Starehe sub county to the west, Makadara to the east and Embakasi to the north (County annual development fund report of 2018). It covers an area of 8.80 square kilometres with a total population of 333,805 and a total population of 42,243 children aged up to 59 months (Njoroge and Munene, 2017). Growth monitoring, plumpy'nuts provision, administration of vaccines, vitamin A supplementation, health education and treatment of illnesses associated with malnutrion were the services offered.

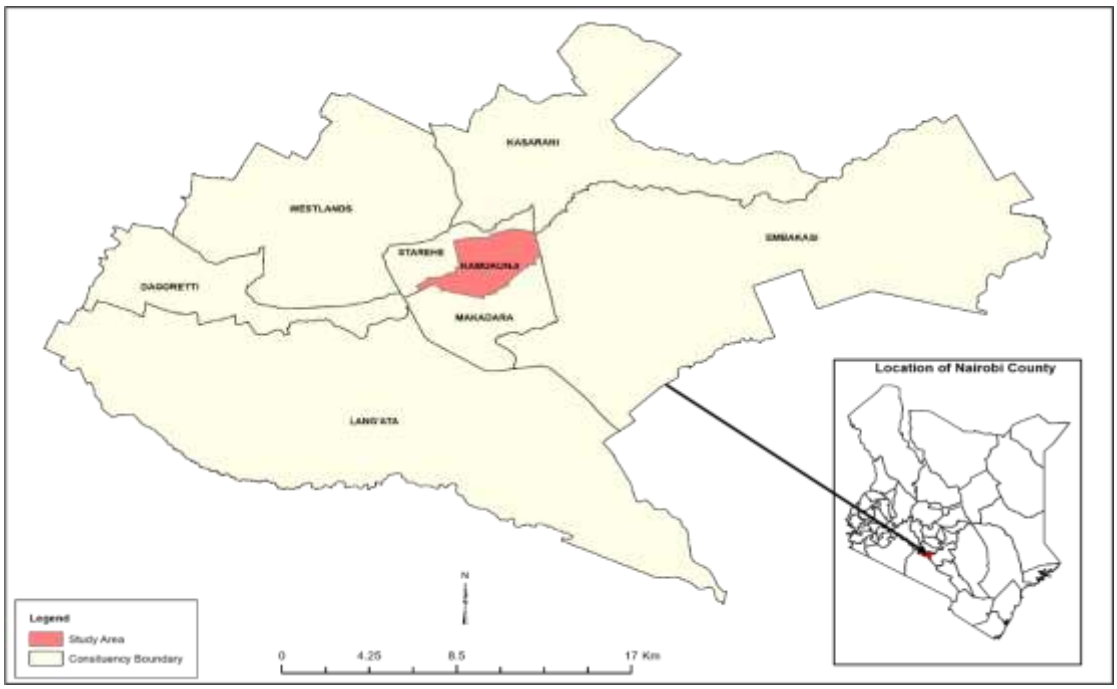

Figure 3.1: Map of Nairobi County Showing the Location of Kamukunji Sub-County

Source: Map Infoteck Geomatik (2018).

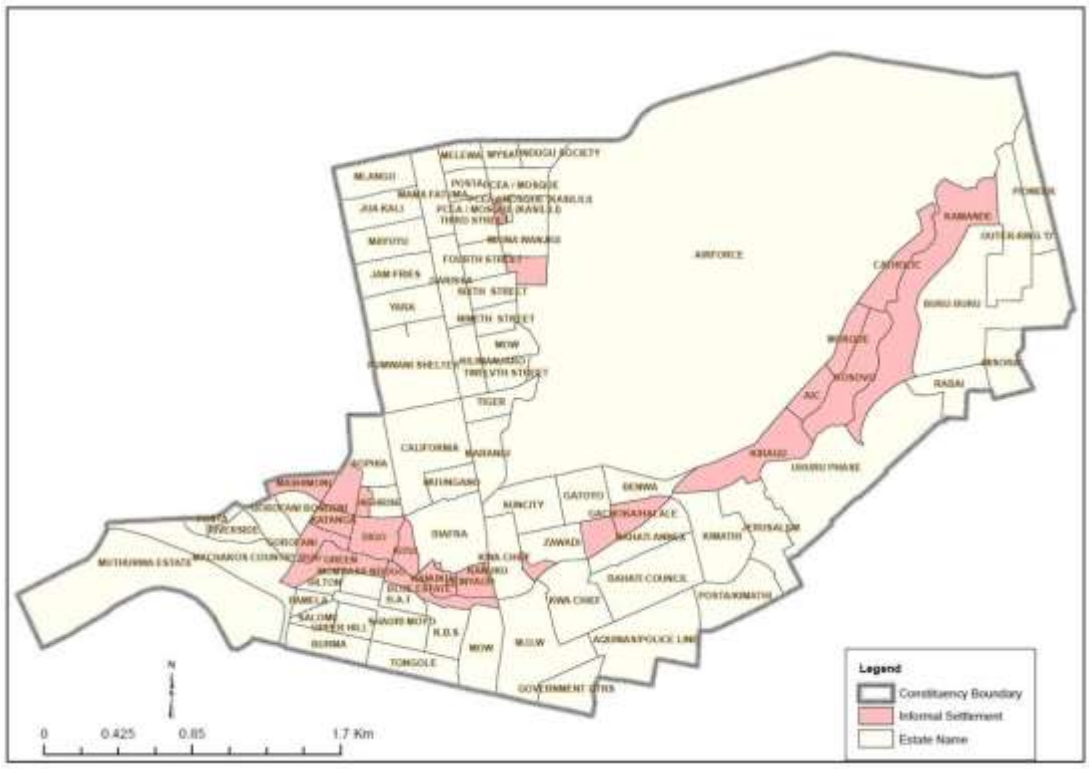

Figure 3.2: Map of Kamukunji Sub-County Showing the Administrative Divisions

Source: Map Infotek Geomatiks (2018)

3.2 Study Design

This study adopted a cross-sectional design approach. An observational design that helps to analyze data in a population's characteristics.

3.3 Study Variables

3.3.1 Dependent Variable

Were the three forms of malnutrition i.e. underweight (weight for age <-2SD), wasting (weight for height <-2SD) or stunting (height for age < -2SD).

3.3.2 Independent Variables

These were the socio-demographic and economic factors of the households, maternal and the children characteristics. These included; income of the household, household size, and occupation status of parents. Maternal related factors included; age of the mother, education level, and parity, health seeking behaviour when the child is sick or adherence to clinic appointments. Also, maternal age at birth, breastfeeding duration and type of marriage (polygamous or monogamous). Finally, child related factors included; gender, birth weight, birth order, childhood illnesses, immunization status, vitamin A supplementation and child feeding practices.

3.4 Study Population

The study population included children aged 6-59 months in Kamukunji Sub County where their caregivers were the respondents.

3.4.1 Inclusion Criteria of the Study

All caregivers with children aged 6-59 months participated in the study.

Only those children whose caregivers gave consent were included in the study.

3.4.2 Exclusion Criteria of the Study

Sick children were exempted to avoid limited accuracy due to measurement error and bias association with the site of the measurement. The disabled were also excluded from the study since some disabilities/disorder tend to alter the growth pattern thus this group will need specialized equipment to obtain meaningful results.

3.5 Sample Size Determination

The sample calculation was based on prevalence of stunting among Kenyan children standing at 26% (KDHS, 2014)

$$\boldsymbol{n} = \left[\boldsymbol{Z^2} \times \frac{\boldsymbol{p} \times \boldsymbol{q}}{\boldsymbol{d^2}}\right]$$

Where: n = sample size

z = linked to 95% confidence interval (use 1.96)

p = expected prevalence 26% (0.26) (KDHS, 2014)

q = 1- p (expected non-prevalence)

d = relative desired precision (0.05)

Computation: n= 1.96*1.96* [0.26*0.74] / 0.05^2

n=3.84*0.26*0.74/ 0.0025= 295.6

n =296

Response rate for the study

260/296 x 100% = 87.8%

3.6 Sampling Procedure

The study used multi-stage cluster sampling method. Nairobi County and Kamukunji Sub County were purposively selected. This was because malnutrition cases were higher in the area compared to other sub counties in Nairobi County. The population of interest (children aged 6-59 months) were divided into villages, then approximation of population size for each village was done. 31 clusters were assigned to villages using probability proportional to population size (PPS) method in ENA software. Selection of households within each cluster was done. A list of households in each village with children under five was obtained from the Kamukunji Sub County Community health Coordinator and volunteers. From a total of 9176 households which was divided with 296 to achieve 31 clusters. Random sampling procedure was used to select households with children under five years. The clusters yielded the total of 310 children where respondents were obtained. The final primary respondents (Caregivers with children aged 6-59 months) were selected using simple random sampling where 10 children from each cluster were selected for assessment until the required sample size was achieved. It was noted that some of the

children who were part of the sample fell ill a week before they were reached for assessment. They were 36 of them, therefore they were excluded leaving 260 children.

3.7 Pre-Testing of the Questionnaire

The tools were pre-tested for accuracy and clarity prior to the main study on a selected sample of 29 children aged 6-59 months with their caregivers as respondents from the same Sub-County where the study was being carried out. In the pre-test, 29 caregivers consented to participate in the exercise. This was done to check on the validity of the research instruments, consistency and the time required for the administration of the structured questionnaires. Ten (10) trained research assistants were involved in the activity and feedback from the pretest was included in the final version of the questionnaire.

3.8 Research Instruments

The study used four types of instruments to collect data. They included researcher-administered structured questionnaire, anthropometric tools, mother child booklet and the 24-hour dietary recall interview. The data collection instrument was an interviewer-administered structured questionnaire. It was used to collect socio-demographic and economic information of the households, maternal and the children characteristics (Appendix 1). The socio-demographic and economic factors include; income of the household, household size, and occupation status of parents. Maternal related factors included; age of the mother, education level, and parity, health seeking behaviour when the child is sick or adherence to clinic appointments. Also, maternal age at birth, breastfeeding duration and the type of marriage (polygamous or monogamous) of the caregiver. Finally, child related factors included; gender, birth weight, birth order, childhood illnesses, immunization status, vitamin A supplementation and child feeding practices.

The study also used anthropometry equipment. They included a weighing scale. The weight was measured in Kilograms using SECCA scale with accuracy of 0.1kgs.

Heights/lengths measurements were carried out using length boards and were recorded in centimetres (cm) to the nearest 0.1 cm. A children's MUAC tape was used to measure the circumference of the mid-upper arm (MUAC). The screening was based on MUAC< 11.5cm for severe acute malnutrition and <12.5cm for moderate acute malnutrition.

Mother-Child booklets was the other tool which was used to collect information from the respondents regarding child's development and health history. They were used to collect data on birth weight, immunization status, childhood illnesses, birth order and maternal age. Finally, the 24-hour dietary recall interview was done to capture information about all foods and beverages given to each child in the past 24 hours.

3.9 Data Collection Procedures

Researcher administered structured questionnaire was used to collect socio-demographic and economic information of the households, maternal characteristics of the caregivers and the children characteristics who participated in the study. Community Health Assistants (CHAs) served as guides to identify and enumerate all households in Kamukunji area. Four research assistants and four community health volunteers (CHVs) were recruited and trained differently on specific roles. The research assistants to aid in administration of the questionnaires and community health volunteers to aid in accessing the deeper parts of the community, respectively. The questionnaires were administered to the consenting participants.

Anthropometric measurements were taken and recorded on the questionnaires. Anthropometric data for the children (6-59 months of age) was collected using standard procedures as stipulated in the Ministry of health guidelines. The weight was measured in Kilograms using Salter scale with accuracy of 0.1kgs. The children were weighed twice in the nude or with minimum clothing. The mean of the two weights was computed (so long as the difference between them was not more than 0.1 kg). Testing of the scale with known weight was also done before the exercise. During the exercise calibration was done by ensuring that the scale pointers were at zero before measurements were taken.

The height/Length of the children was measured in centimetres using height/length board with a headstand to the nearest 0.1 centimetre accuracy. Children below 2 years or those below 87cm were measured lying on their back while the rest were measured while standing. Children above 2 years or above 87cm who could not stand upright had (- 0.7cm) adjustments done on the obtained length measurements to determine their height. This was done because in general, standing height is about 0.7 cm less than recumbent length. Before taking the reading, the researcher ensured that the child was barefooted and that the heels, buttocks, shoulders and the back of the head touched the board. The height/length readings were taken twice and a mean of the two was computed to get the child's length/height which was recorded in the questionnaire**.** An assessment of bilateral oedema was done. The researcher gently applied pressure on the both feet of the children for three seconds using the thumbs. Children showing the print of the thumbs after three seconds were considered to have oedema. Mid-upper arm circumference (MUAC) measurements were taken using a MUAC tape. The measurement was taken mid-way from the tip of the shoulder joint of the left upper arm to the tip of elbow joint and recorded to the nearest 1 millimetre. All measurements were taken and recorded in triplicate.

The mothers/ caregivers were also asked to provide the child's clinic card to enable obtain the health history, immunization and vitamin A status. The filled questionnaires were assessed for completeness and accuracy by the researcher.

3.10 Data Management and Analysis

Each questionnaire had a unique identifier and was coded to allow validation and avoid duplication. All the data that was not captured during the initial stages of data coding process was coded into computers as variables after which all the data was entered, cleaned and analysed using STATA version 14.0 software. The anthropometric data was analysed using the WHO Anthro software. The height and weight data were used to compute three summary indices of nutritional status: height-for-age, weight-for-height, and weight- for-age. These three indices were expressed as standardised scores (z-scores) or standard deviation units from the median for the child growth standards recommended

by the World Health Organisation. Children who fall more than two standard deviations below the reference median are regarded as undernourished, while those who fall more than three standard deviations below the reference median are to be considered severely undernourished. Descriptive statistics such as frequencies were used in describing the socio-demographic and economic characteristics of the caregivers, and maternal and child characteristics of the study respondents. Logistic regression analysis was used to identify the determinants of underweight, stunting and wasting among children aged 6-59 months. Fishers exact test was performed to test the association of socio-demographic and economic characteristics, maternal characteristics, child characteristics and child nutritional status. Statistical significance level was set at $p<0.05$.

3.11 Ethical Considerations

Ethical clearance was obtained from the University of Eastern Africa Baraton Review Board (IERC/18/08/2019, Appendix 5). The study permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI/P/21/10673, Appendix 6). Permission to conduct the study was also obtained from the Sub-County medical supervisor in the Ministry of Health (MoH). Mothers/ caregivers who were the primary respondents also gave assent for minor to be involved in the current study and be interviewed (Appendix IV). To ensure authenticity of the results, the respondents were assured of confidentiality of all the information given. Also, to ensure confidentiality, the filled questionnaires were collected from the research assistants and stored in locked cabinets until all the data was collected. Access of computer with gathered information from the respondents was also restricted by password protection. The researcher also respected the cultural values and beliefs, traditions and taboos valued by the informants in order to obtain correct and relevant information. However, refusal from some respondents was also respected since participation in the study was voluntary. Participation was purely voluntary from caregivers of the children without inducement of any kind was applied to encourage an individual to participate in the research.

CHAPTER FOUR

RESULTS

4.1 Prevalence of Malnutrition

A total of 296 respondents as caregivers of children were recruited to participate in the study while 260 caregivers of children were interviewed. This resulted to a response rate of 88%.

4.2 Socio-Demographic and Economic Characteristics of the Study Respondents

Most of the respondents were aged 18-24 years comprising of 43.1% while participants above 36 years were the least 3.1%. Majority of the respondents were in the monogamous marriages 74.2% while only 6.9% were in polygamous marriage. Slightly above half of the participants 56.2% had primary level of education while only 0.8% had university degree. More than half of the respondents 70.8% were employed while only 29.2% were unemployed. More than half of the respondents 140 (53.8%) were aged between 18-24 years while only 1.5% were aged between 36 and 40 years. On household income, majority of the respondents 77.3% have a household income less than Ksh 10000 while the least 9 3.5% earn between Ksh 30001-40000. More than half of the respondents 86.5% have a parity of less than 3 children and the least 35 (13.5%) have 3 children and above (Table 4.1).

Table 4.1: Socio-Demographic and Economic Characteristics of the Study Respondents

Characteristics	Frequency (n=260)	Percentage (100%)
Age of the respondent		
15-19 Years	62	21.1
20-24 Years	84	32.3
25-29 Years	56	21.5
30-34 Years	60	22.0
36 Years and above	8	3.1
Marital Status		
Single	25	9.6
Married	194	74.6
Divorced	41	15.8
Type of marriage		
Polygamous	18	6.9
Monogamous	193	74.2
Single	49	18.9
Level of education		
No formal education	19	7.3
Primary	146	56.2
Secondary	91	35.0
Tertiary	4	1.5
Occupation		
Employed	184	70.8
Unemployed	76	29.2
Age when giving birth		
15-19 years	68	26.7
20-24 years	89	34.2
25-29 years	27	10.4
30-34 Years	72	27.3
36 years and above	4	1.5
Household Income		
< Ksh 10000	201	77.3
Ksh 10001-20000	42	16.2
Above Ksh 20000	17	6.5
Parity		
Less than 3	221	85.0
3 and above	39	15.0

4.3 Distribution of Characteristics for Study Respondents

More than half of the respondents 218 (53.1%) introduced the child to complementary feeding when they were aged 0-6 months while only 16 (6.2%) introduced the child to complementary feeding when aged above 24 months. Less than half of the respondents 107 (41.2%) have a 24-hour nutrition uptake recall of breast milk while only 17 (6.5%) have a 24-hour recall nutrition uptake of matoke/potatoes. More than half of the respondents 185 (71.2%) indicated that their children had no chronic disease while only 75 (28.8%) indicated that they have no chronic disease. On the age of the child, 85 (32.7%) of the children were aged 13-24 months while only 12 (4.6%) were aged 49-59 months. Slightly above half of the children 149 (57.3%) were females while only 111 (42.7%) were male. On child immunization more than half 158 (60.8%) of the respondents were fully immunized while 102 (39.2%) were not fully immunized. On breastfeeding status only 154 (59.2%) indicated that they were currently breastfeeding.

Table 4.2: Respondent Characteristics

Children characteristics	Frequency (n=260)	Percent (100%)
Age child introduced to complementary feeding		
0-6 months	219	84.2
7-24 months	16	6.2
>24 months	25	9.6
Have chronic disease		
Yes	75	28.8
No	185	71.2
Age of child		
6-24 months	167	64.2
25-48 months	78	30.0
49-59 months	15	5.8
Gender of child		
Female	149	57.3
Male	111	42.7
Child immunized		
Yes	158	60.8
No	102	39.2
Currently breastfeeding		
Yes	154	59.2
No	106	40.8
Getting Vitamin A supplement		
Yes	194	74.6
No	66	25.4

4.4 Distribution of Malnutrition among Children of Respondents

The prevalence of malnutrition among study children is shown in table 4.3. The prevalence of wasting was 4.8%. About 15.4 % of the children were underweight with 3.1% of them were found to be severely underweight. On the other hand, childhood obesity stands at 1.5%. With regards to stunting, more than half 185 (71.2%) of the children had normal height-for-their age, 61 (23.4%) had moderate stunting while only 14 (5.4%) had severe stunting.

Table 4.3: Distribution of Malnutrition Status among Children of Study Respondents

Cut-off points	Description	N=260	Percent (100%)
Weight for height Z-scores (n=260)			
<-3	Severe	7	0.9
-3 to <-2	Moderate	10	3.9
≥-2	Normal	243	95.2
Weight for age Z-scores (n=260)			
<-3	Severe	8	3.1
-3 to <-2	Moderate	32	12.3
≥-2	Normal	196	75.4
>+1SD	Overweight	20	7.7
>+2SD	Obesity	4	1.5
Height for age Z-scores (n=260)			
<-3Z	Severe	14	5.4
-3 to <-2	Moderate	61	23.4
≥-2	Normal	185	71.2

4.5 Inferential Statistics

4.5.1 Socio-Demographic and Economic Factors Associated with Malnutrition

The participants' level of household income and age were significantly associated with infant underweight and stunting status. Number of children in a family were significantly associated with underweight, wasting and stunting. Infant wasting status was however not influenced by the mother's occupation or level of household income or age or marital

status or level of education of the mother. Mothers' occupation, marital status, type of marriage and level of education did not influence child stunting, wasting and underweight status (Table 4.7).

Table 4.4: Association between Socio-Demographic Economic Characteristics and Malnutrition among Children of Caretakers

	Underweight					Wasting					Stunting				
Maternal characteristics	**No**		**Yes**		**Fisher exact p-value**	**No**		**Yes**		**Fisher exact p-value**	**No**		**Yes**		**Fisher exact p-value**
Occupation											120	65%	57	76%	0.106
Unemployed	129	65 %	48	75%	0.217	168	69%	9	53%	0.184	65	35%	18	24%	
Employed	67	35%	16	25%		75	31%	8	47%						
Household Income															
< Ksh 10000	151	77%	49	77%	**0.001**	187	77%	13	76%	0.528	143	77%	57	76%	**0.001**
Ksh 10001-20000	39	20%	4	6%		41	17%	2	12%		38	21%	5	7%	
Above 20000	6	3%	11	17%		15	6%	2	12%		4	2%	13	17%	
Age															
18-24 Years	92	47%	19	30%	**0.026**	104	43%	7	41%	0.070	89	48%	22	29%	**0.002**
25-30 Years	63	32%	21	33%		80	33%	4	24%		61	33%	23	31%	
31-35 Years	34	17%	21	33%		53	21%	3	18%		29	16%	26	35%	
36-40 Years	7	6%	3	5%		7	3%	3	18%		6	3%	4	5%	
Marital Status															
Single	16	8%	8	13%	0.068	21	9%	3	17%	0.393	16	9%	8	11%	0.065
Married	143	73%	51	80%		182	75%	12	71%		133	72%	61	81%	
Divorced	37	19%	5	9%		40	16%	2	12%		36	19%	6	8%	
Level of education															
None	14	7%	5	8%	0.892	18	7%	1	6%	0.940	13	7%	6	8%	0.641
Primary	110	56%	36	56%		137	56%	8	47%		101	55%	45	60%	
Secondary	68	35%	23	36%		84	35%	7	41%		67	36%	24	32%	
College Diploma	4	2%	1	2%		4	2%	1	6%		4	2%	1	1%	
Age when giving birth															
15-24 Years	180	91%	61	95%	0.422	226	93%	15	88%	0.358	171	92%	70	93%	1.000
25-30 Years	16	8%	3	5%		17	7%	2	12%		14	8%	5	7%	

Maternal characteristics	Underweight					Wasting					Stunting				
	No		Yes		Fisher exact p-value	No		Yes		Fisher exact p-value	No		Yes		Fisher exact p-value
Number of children															
Less than 3	176	90%	45	70%	**0.001**	213	88%	8	47%	**0.001**	167	90%	54	72%	**0.001**
3 and above	20	10%	19	30%		30	12%	9	53%		18	10%	21	28%	
Type of Marriage															
Polygamous	16	8%	2	3%	0.254	18	7%	1	6%	0.353	16	9%	2	3%	0.102
Monogamous	141	72%	52	81%		181	74%	11	65%		131	70%	62	83%	
Single	39	20%	10	16%		44	18%	5	29%		38	21%	11	15%	

4.5.2 Child Related Factors Associated with Child Malnutrition Status

The child's age was significantly associated with stunting. Child weight was significantly associated with child underweight, wasting and stunting. Age of child, gender of the child, child's previous history of illness, child immunization and child's Vitamin supplementation were not significantly associated with underweight, wasting and stunting (Table 4.8).

Table 4.5: Association between Child Related Factors and Malnutrition among Children of Caretakers

	Underweight			Wasting			Stunting		
Child characteristics	**No**	**Yes**	**Fisher exact p-value**	**No**	**Yes**	**Fisher exact p-value**	**No**	**Yes**	**Fisher exact p-value**
Age of child									
6-24 Months	134	33	0.052	157	10	0.765	131	36	**0.002**
25-48 Months	52	26		72	6		46	32	
49-59 Months	10	5		14	1		8	7	
Gender									
Male	100	37	0.388	126	11	0.329	94	43	0.411
Female	96	27		117	6		91	32	
Child Illness									
Yes	96	27	0.388	117	6	0.329	90	33	0.584
No	100	37		126	11		95	42	
Child Immunized									
Yes	119	39	1.000	147	11	0.802	113	45	0.889
No	77	25		97	6		72	30	
Child on supplements									
Yes	150	44	0.247	181	13	1.000	142	52	0.213
No	46	20		62	4		42	23	
Child Weight									
0.0-1.0	27	13	**0.001**	35	5	**0.065**	26	14	**0.001**
1.1-2.0	29	10		36	3		28	11	
2.1-3.0	69	7		75	1		68	8	
3.1-4	52	18		66	4		47	23	
5.0 and above	19	16		31	4		16	19	

4.6 Socio-Demographic and Economic Factors Influencing Malnutrition

4.6.1 Social-Demographic and Economic Factor Influencing Underweight

Participants whose household income was Above Ksh 20000 were 5.873 times more likely to have underweight children compared to households with less than Ksh 10000 household income. Mothers who were aged 31-35 years were 2.192 times more likely to have underweight children compared to mothers aged 18-24 years (Table 4.9).

Table 4.6: Association between Socio-Demographic and Economic Factors and Underweight

Underweight	OR	95% CI	p-value
Household Income			
< Ksh 10000 (*Ref)*	1		
Ksh 10001-20000	0.378	(0.125,1.140)	0.084
Above Ksh 20000	**5.873**	**(1.901,9.930)**	0.002
Age			
18-24 years (*Ref*)	1		
25-30 years	1.066	(0.501,2.264)	0.869
31-35 years	**2.192**	**(1.018,4.719)**	0.045
36-40 years	1.006	(0.192, 5.275)	0.994
Constant	0.255	(0.150,0.433)	0.000

4.6.2 Social-Demographic and Economic Factor Influencing Stunting

Participants whose household income was Above Ksh 20000 were 8.668 times more likely to have stunted children compared to households with less than Ksh 10000 household income. Mothers who were aged 31-35 years were 2.686 times more likely to have stunted children compared to mothers aged 18-24 years (Table 4.10).

Table 4.7: Association between Socio-Demographic Economic Factor and Stunting

Underweight	OR	95% CI	p-value
Household Income			
< Ksh 10000 (*Ref)*	1		
Ksh 10001-20000	0.403	(0.146, 1.110)	0.079
Above Ksh 20000	**8.668**	**(2.522, 29.786)**	0.001
Age			
18-24 years (*Ref*)	1		
25-30 years	0.967	(0.466, 2.007)	0.930
31-35 years	**2.686**	**(1.287, 5.609)**	0.008
36-40 years	1.293	(0.264, 6.326)	0.751
Constant	0.303	(0.183, 0.501)	0.000

4.7 Maternal Factors Influencing Malnutrition

4.7.1 Maternal Factors Influencing Underweight

Participants who had more than 3 children were 3.716 times more likely to have an underweight child compared to participants who had less than 3 children (Table 4.11).

Table 4.8: Association between Number of Children and Underweight

Underweight	**OR**	**P>z**	**95% CI**
Number of Children			
Less than 3 (Ref)	1		
3 and Above	3.716	0.001	(1.830,7.543)
_cons	0.256	0.001	(0.184,0.354)

4.7.2 Maternal Factors Influencing Wasting

Participants who had more than 3 children were 7.897 times more likely to have a wasted child compared to participants who had less than 3 children (Table 4.12).

Table 4.9: Association between Children Numbers and Wasting

Wasting	OR	P>z	95% CI
Number of Children			
Less than 3 (Ref)	1		
3 and Above	7.897	0.001	(2.862,22.289)
_cons	0.037	0.001	(0.018,0.076)

4.7.3 Maternal Factors Influencing Stunting

Participants who had more than 3 children were 3.608 times more likely to have a stunted child compared to participants who had less than 3 children (Table 4.13).

Table 4.10: Maternal Factors Influencing Stunting

Stunting	OR	P>z	95% CI
Number of Children			
Less than 3 (Ref)	1		
3 and Above	3.608	0.001	(1.791,7.268)
_cons	0.323	0.001	(0.237,0.439)

4.8 Child Related Factors Influencing Malnutrition

4.8.1 Child Related Factors Influencing Underweight

Children who had weight between 2.1-3.0 are 0.211 times less likely to be underweight compared to children weighing between 0.1 and 1.0.

Table 4.11: Association between Child Related Factors and Underweight

Underweight	OR	P>z	95% CI
Weight at birth			
0.0-1.0(Ref)	1		
1.1-2.0	0.716	0.503	(0.269,1.902)
2.1-3.0	0.211	**0.003**	**(0.075,0.584)**
3.1-4.0	0.718	0.448	(0.306,1.684)
4.0 and above	1.749	0.243	(0.684,4.468)
Constant	0.481	0.030	(0.248,0.933)

4.8.2 Child Related Factors Influencing Wasting

Children who have a weight between 2.1-3.0 are 0.093 times less likely to have wasting compared to children weighing between 0.1 and 1.0.

Table 4.12: Association between Child Related Factors and Wasting

Wasting	OR	P>z	95% CI
Weight at birth			
0.0-1.0(Ref)	1		
1.1-2.0	0.583	0.483	(0.129,2.627)
2.1-3.0	0.093	**0.033**	**(0.010,0.829)**
3.1-4.0	0.424	0.222	(0.107,1.684)
4.0 and above	0.903	0.887	(0.224,3.665)
Constant	0.142	0.001	(0.059,0.364)

4.8.3 Child Related Factors Influencing Stunting

Children who had weight between 2.1-3.0 are 0.203 times less likely to have stunting compared to children weighing between 0.1 and 1.0. Children aged 25-48 Months are 3.406 times more likely to have stunting compared to children aged 6-24 Months.

Table 4.13: Association between Child Related Factors and Stunting

Stunting	OR	P>z	95% CI
Weight at birth			
0.1-1.0(Ref)	1		
1.1-2.0	0.333	0.050	(0.111,1.000)
2.1-3.0	0.203	**0.002**	**(0.074,0.553)**
3.1-4.0	0.565	0.215	(0.229,1.392)
4.0 and above	2.465	0.099	(0.844,7.194)
Age of child			
6-24 Months (Ref)	1		
25-48 Months	3.406	**0.001**	**(1.641,7.071)**
49-59 Months	0.985	0.983	(0.259,3.742)
Constant	0.455	0.022	(0.232,0.891)

CHAPTER FIVE

DISCUSSION

5.1 Discussion

5.1.1 Prevalence of Malnutrition among Children Aged 6-59months in Kamukunji Sub County

Global Acute Malnutrition (GAM) is the presence of both Moderate Acute Malnutrition (MAM- defined as a weight-for-height z-score (WHZ) between -2 and -3) and Severe Acute Malnutrition (SAM- a weight-for-height z-score (WHZ) of <-3) in a population. A GAM value of more than 10 % indicates an emergency and are particular cause for concern (Abdulla, 2016).The prevalence of child undernutrition in this setting is higher than Kenya's national prevalence. According to the WHO malnutrition classification, the rates of SAM (2.3%) and MAM (3.8%) in this study are not within the critical category that requires an emergency action (Abdulla, 2016). This study highlights the burden of more than one coexisting undernutrition conditions among children aged 6-59 months in Kamukunji sub-county, Nairobi County. Furthermore, results showed a high prevalence of underweight (12.3%), stunting (28.8%) and wasting (4.8%). These results are high compared with the national stunting of 26% for children under five (KDHS, 2022).

The KDHS 2022 findings and the Kenya nutrition profile report stated the rates of underweight, stunting and wasting among children under 5 years in Kenya to be 11%, 26% and 4% respectively (KDHS, 2022). However, the prevalence reported in the current study is lower compared to the Tanzania Demographic and Health Survey 2015/2016 where stunting, underweight and wasting was 38%, 22% and 5% respectively (Tanzania Ministry of Health, 2016). The current study results for stunting and wasting are lower compared to Global prevalence of stunting and wasting at 37% and 27% respectively (UNICEF, 2021). The world prevalence for underweight stands at 6% lower than the current results (15.4%).

Underweight is reported to increase the risk of under-five death, as well as result in a greater risk of infection and a slow recovery from illness (UNICEF, 2021).

The global stunting rate is aimed to be reduced by 40% by the year 2025 (Mgongo *et al.*, 2017). This is because children exposed to the long term effects of stunting may not reach their full growth potential. Also, stunting is reversible during the first 1000 days of an infant's life but beyond that, it is irreversible (Tanzania Ministry of Health, 2016). Children who are both stunted and underweight have higher risk of delayed development and cognitive performance, poor school performance in life due to poor socio-economic status and nutrition(Mgongo *et al*,. 2017).

5.1.2 Socio-Demographic and Economic Characteristics of the Respondents in Kamukunji Sub County

Mother's age affects child health interventions such as breastfeeding, immunization, supplementation and complementary feeding of the children. In the current study, majority (75.4%) of the women interviewed were aged between 18-30 years. This is consistent with the report that stated women aged 18 years up to 39 years comprised the highest proportion of females of reproductive age (KDHS, 2022). Thus, most (88%) women in this study stated that they had their first child while they were between the ages of 18-30 years. Marital status has long been associated with various demographic behaviours. Previous study findings have shown that marriage is an established structure of information that include health information (KDHS, 2022).

In the current study, majority (74.6%) of the respondents were married, with about 74.2% having stated that they were in monogamous type of marriages. Similar findings are observed where by 75% of the Kenyan population were married (KNMS, 2022). Formal education enhance the ability of caregivers to recognize illness and take appropriate action for example seeking appropriate treatment. Education level of caregivers has a strong linkage with the quality of life including the nutritional status of children. Also, educational attainment has a strong effect on health behaviors and attitudes (KDHS,

2022). In this study, more than half (56.2%) of the caregivers had attained primary education level with only 2.3% of the caregivers had post-secondary education as the highest level of education. This characteristic might have influenced 45.4% and 29.2% of the caregivers to engage in business and/or stay unemployed respectively. Low educational attainment is likely to translate to low household income. Moreover, household income stands out as a key proxy predictor of nutritional status which means it has underlying mediators.

Low income has been identified as a key factor determining HAZ (Height for Age Z score), WHZ (Weight for height Z score) and WAZ (Weight for age Z score) (Omondi and Kirabira, 2016). It is associated with growth retardation leading to achievements in growth below the potential. Most (77%) respondents in this study stated to be earning less than Ksh. 10,000. This socio-economic finding corroborates the results of a study done on socio-demographic factors influencing nutritional status of children (6-59 Months) in Obunga slums, Kisumu, Kenya where the majority (61%) of the respondents earned less than Ksh.10000 (Omondi and Kirabira, 2022). Household composition have a strong influence on food consumption pattern that influence the dependent's nutritional status (KDHS, 2022).

Smaller households have sufficient distribution of food compared to larger households. Most households (94.3%) in the current study had less than 5 dependents compared with average household size of 4.2 persons which aligns closely with the KDHS national average (KDHS, 2022).

5.1.3 Characteristics of Children among the Respondents in Kamukunji Sub-County

More than half (57.3%) of the children were female. Previous studies have demonstrated that whether a child is male or female, the nutritional status would remain the same when other factors are held constant (Omondi and Kirabira, 2016).

The outcome of this study may join the debate of many authors where gender/sex is a possible direct or proxy determinant of nutritional status. In some situations gender is ruled out completely while in other situations, it is proved as a key factor in nutritional status aetiology. More than half (59.2%) of the children in this study were reported to be breastfeeding as per the WHO recommendation for breastfeeding whereby infants are required to breastfeed exclusively up to six months.

Breastfeeding with complementary feeding is supposed to be continued to 2 years or more for protective effects on child health (WHO, 2022). In the current study (64.2%) of the children were aged 6-24 months. Several research findings show an increase in risk of undernutrition. Child's age increased, the odds ratio of being underweight compared with the Tanzania Demographic Health Survey (TDHS) where Marriot reported a higher prevalence of undernutrition among children aged 12–23 months (WHO, 2022).

Immunization and supplementation reduce the chances of a child being ill. About 60.8% and 74.6% of the children were reported to be immunized and receiving supplements respectively. This could have attributed to the 71.2% of the children not having any form of illnesses. Several studies have shown that child illness has a negative effect on child growth. A study done in Tanzania on underweight, stunting and wasting among children in Kilimanjaro region found that 80.6% of the children had no illnesses as a result of proper health care practices. In the same study, child illness increased the odds ratio of the child being underweight, wasted and/or stunted (WHO, 2022). Child illness affects dietary intake, absorption and utilization of nutrients, and hence negatively influences the child's nutritional status.

In this study, more than half (53.1%) of the children were introduced to complementary feeding aged between 0-6 months. Furthermore, almost half (41.2%) of the children were commonly fed with porridge in the lapse of 24 hours. A previous study has linked chronic malnutrition to the timing and type of complementary foods introduced in infants' and toddlers' diets . Introduction of complementary foods to a toddler below 6 months can

lead to diarrhoea due to poor absorption as a result of weak/immature gastrointestinal tract (GIT) to digest more complex and solid food substances (Li et *al*., 2020).

5.1.4 Socio-Demographic and Economic Factors Influencing Child Wasting among Children Aged 6-59 Months in Kamukunji Sub-County

There were no significant influence of socio-demographic and economic factors on child wasting. However, occupation and household income have been shown to be important predictors of child under-nutrition. Children from households with an income of above Ksh.20000 were 0.9 times less likely to be wasted compared to those from households earning Ksh. 10000. Our results are consistent with a previous study done in Pakistan where low household income was directly linked to malnutrition since income is a highly important factor for access to education, healthcare, and nutritional facilities and thus among the factors precipitating malnutrition (Qureshi *et al*., 2019).

In this study, households with about 5 dependents were 1.2 times more likely to be wasted compared to children who came from families where they were the only child in their households. A systematic review done on stunting, underweight and wasting in Sub-Saharan Africa revealed that the most consistent factors associated with child undernutrition were low socio-economic status (poor households), large family size, geographical region, multiple births, short birth interval, high child parity, lack of immunization/vaccination, family type (polygamous), no health care use, lack of health insurance and inappropriate child feeding practices (Akombi, 2017).

5.1.5 Socio-Demographic and Economic Factors Influencing Child Stunting among Children Aged 6-59 Months in Kamukunji Sub-County

Findings from the current study reveal that parents who were unemployed were significantly associated (p=0.01) with child stunting. Unemployment translates to little or no income. A study done by Omondi and Kirabira, 2016 in Obunga slums of Kisumu city identified low income as a key factor determining HAZ, WHZ and WAZ. It is

associated with growth retardation leading to achievements in growth below the potential. Household income stands out a key proxy predictor of nutritional status which means it has underlying mediators (Omondi and Kirabira, 2016). The study further revealed household income component associated with the mothers had strong benefit to the child's nutritional status within a peri-urban environment.

Several studies have found that the lower the socioeconomic status the higher is the risk of chronic malnutrition (Qureshi *et al.,* 2019;Chowdhury *et al.,* 2020). Further findings from India and Africa reveals that economic status of families have no association with chronic malnutrition. In the current study households earning more than Ksh.20000 were 6 times more likely to have a stunted children compared to a household earning less than Ksh. 10000. This could be attributed to parent's education level that directly influences knowledge of child nutrition and healthy feeding practices (Murarkar *et al.,* 2020)..

Household size is also an important determinant of chronic malnutrition. In this study, children from households with about 5 and 6 dependents were 2 and 3 times respectively more likely to be stunted than those who came from families where they were the only child. A study carried out in Kisumu informal settlements in Kenya by Omondi and Kirabira reported that increase in family size was associated with poorer households. An increase in household number of children results to a constrained monthly household food expenditure that decreases the food allocated to children resulting to child stunting(Omondi and Kirabira, 2016).

5.1.6 Socio-Demographic and Economic Factors Influencing Child Underweight among Children Aged 6-59 Months in Kamukunji Sub-County

Findings from the current study reveal that, children of unemployed parents ($p<0.03$) significantly influenced underweight while households with an income above Ksh. 20000 significantly influenced ($p<0.01$) a child to be underweight. In addition, children from the households were 5 times likely to be underweight compared to children from households with an income of less than Ksh. 10000. The current study concurs with a previous study

at Kwale sub county where prevalence of underweight children belonged to working mothers. The attribution was due to working mothers being away from home thus time and care given to children was therefore not comparable with non-working mothers (Okutsem& Athiany, 2025).

Children from larger households with 5 and 6 dependents were 2 and 3 times respectively more likely to be underweight compared to those who had one child. This finding coincides with the results of Akombi who reported that larger households have a wider budget thus spend less on proper nutrition, lacks adequate food quality and adequate feeding leading to undernutrition (Akombi, 2017).

5.1.7 Maternal Related Factors Influencing Child Wasting among Children Aged 6-59 Months in Kamukunji Sub County

The findings of the study revealed that maternal age of 31-35 years at first birth has a significant influence ($p<0.04$) on child wasting. Mothers who had their first child aged between 31-35 years were 74 times more likely to have a wasted child compared to those aged 18-24 years. The finding are inconsistent to those of Tanzania study where maternal age of 18-24 years is a factor for child health interventions to alleviate child wasting (Akombi, 2017). This contradicts the Ethiopia study by Endris where young mothers introduced complementary foods at an early age and stopping breastfeeding early which were significant risk factors for malnutrition (Endris *et al*., 2017). Also, another study carried out in Tanzania and Ghana reported that children of older mothers are less likely to be malnourished than those of young mothers (Tanzania Ministry of Health, 2016; Tette *et al.*, 2015). The above links were established on the basis that educated women are more likely to marry later and marry men with higher income, live in better neighborhood, and get higher paid jobs which directly or indirectly influence child survival and health.

Mothers level of secondary education influenced child wasting ($P<0.05$) where children of educated mothers were 0.1 times less likely to be wasted compared to mothers with no formal education. Maternal education is protective against child undernutrition (Omondi

and Kirabira, 2016 ; Mgongo *et al.,* 2017; Endris *et al.,* 2017 ; Chowdhury *et al.,* 2020). Educated mothers are presumed to have a better income and are well informed about nutritional and child health needs. This appears to be consistent with a Kwale study where wasting was strongly associated with mother's low education level (Mgongo, 2017).

Children from households with 2 and more than 3 dependents had greater odds of being wasted compared to those with one child. According to larger households increased the risk of child undernutrition compared to smaller households (Abdalla, 2016). The attribution was due to insufficient distribution of food within the household leading to wasting. Children to single parents were 0.6 times less likely to be impacted with wasting compared to those from parents in polygamous type of marriages. This finding seems to concur with the findings of Akombo where there was linkage between child underweight and polygamous family types in sub Saharan Africa (Akombi, 2017). This was attributed to the overburdened responsibilities by polygamous fathers to fully support their families including good nutrition for their children.

5.1.8 Maternal Related Factors Influencing Child Stunting among Children Aged 6-59 Months in Kamukunji Sub County

Maternal age had no significant influence on child stunting. However, mothers aged 31-35years were 3 times more likely to have a stunted child. In addition mothers who had their first child aged 25-30 years and 31-35 years were 3 and 38 times more likely to have a stunted child respectively compared to their counterparts aged 18-24 years. This is unlikely since older mothers are expected to be knowledgeable of better child care practices than the younger ones. The result of the current study is consistent with Kalu and Etim. (2018) who reported that older mothers are more likely to be in the work force. The more they participate in the labor workforce, the less attention they pay to household responsibilities especially as it relates to the welfare of children, thereby placing younger children at risk of malnutrition. The previous study further elaborated that mothers' occupation outside child rearing can negatively affect children's nutrition and health status. This is so because time constraints may prevent working-class mothers from

providing the need care to their children unlike the younger mothers (Kalu and Etim, 2018). The results are attributed to mother's knowledge of malnutrition.

Mothers with 5 dependents influenced the child's status of being stunted($p<0.01$), consistent with Uganda findings where quality child care such as proper nutrition in larger households, food insecurity and income is a challenge compared to smaller household increasing the risk of chronic malnutrition. (Madiba *et al.,* 2019).

5.1.9 Maternal Related Factors Influencing Child Underweight among Children Aged 6-59 Months in Kamukunji Sub County

Child underweight was 2 times more likely to occur among children whose mothers were aged 31-35 years. In addition, mothers who had their child while aged between 25-30 years ($p=0.03$) and 31-35 years ($p=0.00$) had a significant influence on child underweight. In fact, their children were 3 and 34 times more likely to have an underweight child compared to younger mothers. The results are inconsistent with findings of another study reveal that mothers aged 18 years and below was one of the important predictors of underweight, stunting and wasting. Thus, mothers should utilize health care services during antenatal visits irrespective of their age (Akombi, 2017).

Mothers with more than 2 dependents were 2 times more likely to have an underweight child compared to their counterparts with only one child. This finding confirms Akombi. (2017) results which reported that smaller households tend to have access to essential food groups that ensure supply of nutrients is essential in improving child nutrition compared to larger households where undernutrition is likely to occur due to inadequate dietary intake. Also, a study done in Pakistan significantly linked family size and poor feeding practices leading to severe malnutrition cases (Qureshi *et al*., 2019).

5.1.10 Child Related Factors Influencing Child Stunting among Children Aged 6-59 Months in Kamukunji Sub County

Whereas the risks of chronic malnutrition are multifaceted, several studies have shown that the gender of child (males) and increased child's age increases the risk of chronic malnutrition (Mohseni *et al.,* 2018; Murarkar *et al.,* 2020 and Mgongo *et al.,* 2017). These studies are consistent with our findings where female children were 0.7 times less likely to be stunted compared to male children. However, another study done in Zambia found that female children are likely to be underweight and stunted since they prefer to stay at home around their mothers whereby they'll eat the little that is available unlike male children who play widely where they are likely to find varied foods (Monday *et a*l., 2018). Also, children aged 25-36 months were 3 times more likely to be stunted compared to their counterparts aged 6-12 months. This could be attributed to the fact that at this stage, mothers/ caregivers don't give that critical care and proper hygiene practices observed when handling younger infants.

With regards to birth order, second, third, fourth and sixth born were more likely to be stunted compared to firstborns? This is inconsistent with a review study done in urban slums of Maharashtra in India and Sub-Saharan Africa where children with birth order less than two were more likely to be stunted as a result of rampant teenage marriages with girls who were likely to be stunted influencing their first child to be stunted as well (Murarkar *et al.,* 2020). The report further stated that teenage marriages are common. Thus, it triggers the link of early childbearing, low birthweight babies which results in developing long term undernutrition condition of the child. The findings could be attributed to short birth intervals which is likely to have a significant influence on the children's nutritional status.

Children with a birthweight of above 1.1kg were less likely to be affected with chronic malnutrition. Children with normal birth weight have shown reduced risk of being stunted. Other studies have reported the protective effect of normal birthweight on child nutritional status. Low birth weight children can reach normal height for their age if immediate

intervention is taken before the child turns 2 years. In Zambia findings revealed that the prevalence of malnutrition was higher among birth weight children than those normal birth weight ones. Low birth weight is associated with diseases that affect child's normal growth hence micronutrient supplementation interventions among pregnant women reduces the risk during the antenatal period (Ogechi and Chilezie, 2017).

5.1.11 Child Related Factors Influencing Child Underweight among Children Aged 6-59 Months in Kamukunji Sub County

Findings from the current study reveal that underweight was significantly determined (p=0.05) among children aged 13-24 months where those 25-36 months were 2 times more likely to be underweight compared to children who were aged between 6-12 months. As the age of the child increases the risk of being underweight increases. This concurs with findings of a study in rural Ethiopia where children less than 24months were less likely to be underweight due to critical care and proper hygiene practices observed by caregivers during that period compared to their counterparts with older children(Endris *et al.,* 2017). The previous study also attributed the finding to a large portion of guardians in the informal settlement areas tend to neglect to fulfilling optimal food requirements of their children as the child's age increases, which is a similar setting with the current study which was conducted in an informal settlement of Nairobi County.

Birth order has always been an important determinant of undernutrition (Murarkar *et al.,* 2020). Second, third, fourth and sixth borns were more likely to be underweight compared to first borns. This could be attributed to short preceding birth interval that results into poor child care and little time allocation for the nutrition and wellbeing of the children by their caregivers.

From the current study findings, children with a birth weight of more than 1.0kg were less likely to be underweight. Children born with low birth weight tend to take a longer period of time to reach the normal weight for their age. A study done in Zambia also found children who were underweight at birth were 30.83 times more likely to develop

malnutrition as compared to those who were of normal weight at birth (Monday *et al*., 2018). The prevalence of wasting and underweight were remarkably high among low birth weight children. This was attributed to the fact that children born with a low birth weight might from the time of their birth lack certain nutrients that are essential for their future normal growth and development. Thus, maternal lack of nutrients such as vitamin $B_{12,}$ folate and essential fatty acids were associated with low birth weight. Hence, antenatal visits should be encouraged among pregnant mothers since it plays a key role in health and disease.

In the current study, the prevalence of underweight was less likely among girls than boys. This finding is similar to a study finding in India where the prevalence of underweight was more among boys. Several studies explain that the exact reason is not known but it was attributed to the well-known fact that the male child is more affected by environmental stress than a female child (Murarkar *et al.,* 2020).

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

1. The prevalence of malnutrition were relatively higher than the national prevalence among children aged 6-59 months in Kamukunji sub county where stunting, underweight and wasting were 28.8%, 12.3% and 4.8% respectively. Stunting was the most prevalent form of undernutrition in the study setting. The prevalence of stunting was of great public health concern, as it indicates chronic malnutrition.
2. Socio-demographic and economic factors contributed to low underweight with occupation, and average household income being the big contributors to child malnutrition status.
3. Maternal age, number of children in the family and age when giving birth were significant determinants of underweight, wasting and stunting.
4. The child related factors influencing underweight and stunting were age of the child, birth order of the child, weight of child at birth and gender of child.

6.2 Recommendations

1. Capacity building of mothers and care givers on appropriate feeding programmes as short-term alternative to address malnutrition in Kamukunji sub-county.
2. Development of pro-poor policy interventions to prevent and control malnutrion in the sub-county.
3. Household heads to engage in income generating activities to bolster their income in order to improve the feeding practices of their children.

REFERENCES

Abdulla, A. (2016). Socio-economic determinants of undernutrition among under-five children: Evidence from maternal employment status. *International Journal of Nutrition and Food Sciences*, ***5***(4), 276–283.

Abdulrahim, S. (2016). Maternal education and child health: The role of literacy and numeracy skills in caregiving practices. *Journal of Public Health and Epidemiology*, 8(6), 123–131.

Abdullahi, A., Hassan, M., & Noor, F. (2022). Determinants of malnutrition among under-five children in Garissa County, Kenya. *International Journal of Nutrition and Food Sciences, 11*(3), 45-53.

Ahoya, B., Kavle, J. A., Straubinger, S., and Gathi, C. M. (2019). Accelerating progress for complementary feeding in Kenya: Key government actions and the way forward. *Maternal and Child Nutrition*, *15*, 1–8.

Akombi, B. J. (2017). Stunting , Wasting and Underweight in Sub-Saharan Africa *: A Systematic Review*; 1–18.

Amugsi, D. A., Dimbuene, Z. T., Mberu, B., Muthuri, S., and Ezeh, A. C. (2017). Childhood malnutrition in Sub-Saharan Africa: Evidence from demographic and health surveys. *Global Health Action*; 10(1), 131–142.

Clark, S., Coll-Seck, A. M., Banerjee, A., Peterson, S., Dalglish, S. L., Ameratunga, S., and Costello, A. (2020). A future for the world's children? A WHO–UNICEF.*Lancet Commission;* The Lancet.

Endris, N., Asefa, H., & Dube, L. (2017). Prevalence of Malnutrition and Associated Factors among Children in Rural Ethiopia. *2017*, 8–10

Gebre, A., Reddy, P. S., Mulugeta, A., Sedik, Y., & Kahssay, M. (2019). Prevalence of Malnutrition and Associated Factors among Under-Five Children in Pastoral Communities of Afar Regional State, Northeast Ethiopia: A Community-Based Cross-Sectional Study. 2019.

Kalu, R. E., and Etim, K. D. (2018). *Factors associated with malnutrition among under-five children in developing countries: A review.* Biomedicine and Nursing; 4(1), 32–37.

Kenya Demographic and Health Survey (2022) Nutrition International Country Brief. Nairobi, Kenya.

Kenya National Bureau of Statistics (KNBS), Ministry of Health (MoH), National Council for Population and Development (NCPD), Kenya Medical Research Institute (KEMRI), & ICF. (2022). *Kenya Demographic and Health Survey 2022*. Nairobi, Kenya: KNBS.

Kunhipurayil, A., and Srivastav, S. (2021). Child feeding practices and their impact on nutritional status and health outcomes among under-five children: A review. *International Journal of Nutrition and Food Sciences;* 10(2), 45–52

Kenya National Micronutrient Survey (2022). Nairobi, Kenya.

Li, Z., Kim, R., Vollmer, S., & Subramanian, S. V. (2020). Factors associated with child stunting, wasting, and underweight in 35 low- and middle-income countries. *JAMA Network Open;* 3(4).

Madiba, S., Chelule, P., & Mokgatle, M. (2019). Determinants of malnutrition among children under five years in informal settlements in South Africa. *Italian Journal of Pediatrics;* 45(12), 1-9.

Mgongo, M., Chotta, N. A. S., Hashim, T. H., Uriyo, J. G., Damian, D. J., Stray-pedersen, B., Msuya, S. E., Wandel, M., & Vangen, S. (2017). Underweight , Stunting and Wasting among Children in Kilimanjaro Region , Tanzania.

Mohseni, M., Aryankhesal, A., & Kalantari, N. (2018). *Prevalence of Malnutrition Among Iran ' s Under Five-Year-Old Children and the Related Factors : A Systematic Review; 28*(1), 1–9.

Murarkar, S., Gothankar, J., Doke, P., Pore, P., Lalwani, S., Dhumale, G., Quraishi, S., Patil, R., Waghachavare, V., Dhobale, R., Rasote, K., Palkar, S., & Malshe, N. (2020). Prevalence and determinants of undernutrition among under-five children residing in urban slums and rural areas of Maharashtra, India: A community-based cross-sectional study. *BMC Public Health;* 20(1559), 1–11.

Njoroge, P., & Munene, M. (2017). *Malnutrition and its impact on child morbidity, mortality, and socio-economic status in Kenya*. *Pan African Medical Journal*; 28(265), 1–8.

Oganah-Ikujenyo, B.C., Adeyemi, G., Emmanuel, A.A., and Okezue, S.E. (2022). Household Income and Feeding Practices among Under-5 Children: A Situation Analysis of Food Insecurity in Nigeria. *Journal of Educational Review*; 16(1).

Omondi, R., & Kirabira, J. (2022). Socio-demographic determinants of stunting among under-five children: Evidence from East Africa. *International Journal of Nutrition and Food Sciences;* 11(4), 112-120.

Qureshi, R., Kazi, H., Memon, A., & Khan, H. S. (2019). Socio-Demographic Factors Associated with Malnutrition Among Children Less Than Five Years. *Apmc*, *13*(2), 181–184

Shifera, N., Endale, A., Debela, D., and Yosef, T. (2022). Acute malnutrition and its contributing factors among children under-five years in rural kebeles of Shashemene, Oromia, Ethiopia. *Frontiers in Nutrition*; 9, 105392.

Global Nutrition Report – Bangladesh Country Profile (2022). Frontiers in Nutrition, 2022 – Determinants of Malnutrition in South Asia.

Okutse, A. O., & Athiany, H. (2025). Socioeconomic disparities in child malnutrition: Trends, determinants, and policy implications from the Kenya Demographic and Health Survey (2014–2022). *BMC Public Health;* 25(295).

Tanzania Ministry of Health. (2016). Tanzania Demorgraphic and Health Survey Indicator Survey (TDHS-MIS) 2015-2016. Dar Es Salaam, Tanzania, and Rockville, Maryland, USA: MoHCDGEC, MoH, NBS, OCGS, and ICF, 1(1), 1–630.

United Nations Children's Fund (UNICEF). (2017). Infant and young child feeding: Global nutrition report and practices. New York: UNICEF.

United Nations Children's Fund (UNICEF). (2021). *Impact of COVID-19 on child malnutrition and mortality: A modelling exercise.* New York: UNICEF

UNICEF Kenya, & Nutrition International. (2023). *UNICEF Kenya Annual Report 2023: Nutrition and child wellbeing.* Nairobi, Kenya: UNICEF Kenya & Nutrition International.

UNICEF (2016a): United Nations Children's Fund (UNICEF). (2016). The State of the World's Children 2016: A fair chance for every child. New York: UNICEF.

World Health Organization (2020). *Malnutrition.* Geneva: World Health Organization

World Health Organization. (2022). *Child malnutrition facts and statistics 2022.* Washington, DC: World Hunger Organization.

World Health Organization (2022). World Health Organization. (2022). *Infant and young child feeding.* Geneva: WHO.

WHO, UNICEF and the Global Nutrition Report (2022). Geneva, WHO.

WHO/UNICEF/World Bank Group Joint Child Malnutrition Estimates, 2022.

Yahia, N., Brown, C. A., Rapley, M., & Chung, M. (2016). Level of nutrition knowledge and its association with fat consumption among college students. *BMC Public Health*, 1–10. Yorke, F. R., Wahab, S., & Turkson, D. (2023). Maternal education and child malnutrition: Evidence from selected West African countries. *Discover Sustainability;* 3(1), 92.

APPENDICES

Appendix I: Questionnaire

Please tick [√] or answer appropriately.

ANTHROPOMETRY.

Weight (kg)……. Height/Length (cm)…… Left mid upper arm circumference (cm)…….

Weight for Height (WHZ) score …….

Weight for Age Z score ……

Height for Age Z score …….

SOCIO-DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS.

1. How old are you? _____years.
2. What was your age when you got the first born? _____years.
3. Marital status?

□ Never Married □ Married □ Divorced/Separated □ Widowed □Widowed

□Cohabiting □ Other (Specify) _____

4. What type of marriage are you in?

Polygamous [ ]

Monogamous [ ]

Not in a marriage [ ]

Window [ ]

5. What is the highest level of education you attained?

□ None □ Primary □ Secondary □Tertiary □Post Tertiary

6. Did you attend all the prenatal clinic visits that had been recommended for you when you were pregnant with this child?

Yes [ ] No [ ]

7. Child's gender? Male [ ] Female [ ]
8. How many people live in your household? _____
9. How many children aged less than five years live in your household? _____
10. What is your occupation?

□ Peasant □ Driver □ House servant □ Artisan □ Business person □Unemployed
□ Other (Specify) _____

11. Can you read in either in (Swahili, English or any other language)?

□ Yes □No

12. Can you write in (Swahili, English or any other language)? [ ]Yes [ ]No
13. What is the total income of the household per month?

Less than KES 10,000 per month [ ]

KES 10001 - 20000 per month [ ]

KES 20001 – 30000 per month [ ]

KES 30001 – 40000 per month [ ]

KES 40001 – 50000 per month [ ]

Above KES 50000 per month [ ]

MATERNAL RELATED FACTORS.

14. How many children do you have? _____
15. What was your age when you gave birth to this child? _____years.
16. How old was the child when you introduced complementary feeding apart from breast milk? _____months.
17. How do you feed your child? Please mention how you fed the child for the last 24 hours_____.
18. Do you have a chronic disease? _____ [ ] Yes [ ] No
19. If you have more than one child, what is the age difference between the children? _____ Years. _____ Months.

CHILD DEMOGRAPHIC CHARACTERISTICS

20. What is the age of the child in years and months _____ years _____ months
21. What is the birth order of the child/ children? _____
22. What was the weight of the child/children at birth? _____ kgs
23. What is the gender of the child?

    Male [ ]

    Female [ ]

24. Has the child been affected by any sickness in the past 2-4 weeks in the past? If yes, what type of illness? How many times? _____.
25. Is there any other illness that affects your child? Yes [ ] No [ ]
    if yes which one? _____
26. Has the child been fully immunized with all the appropriate immunizations? If no, why? Yes [ ] No [ ]
27. Is the child currently breastfeeding? [ ] Yes [ ] No

If no, why? _____

28. Does the child get vitamin A supplementation during child welfare clinics?

[ ] Yes [ ] No

29. Who takes care of the child or children daily? _____.

Appendix II: Informed Consent Form

I am Susan Kathiira Kithinji, a student at Jomo Kenyatta University of Agriculture and Technology. I am undertaking a course on Master of Science in public health.

I am conducting a study on factors influencing malnutrition in children aged between 6-59 months in Kamukunji Sub-County, Nairobi County. The information which will be obtained from the study will remain anonymous.

Please sign the consent if you agree to participate in the study.

Signature…….

Appendix III: University of Eastern Africa Baraton Ethical Clearance Form

OFFICE OF THE DIRECTOR OF GRADUATE STUDIES AND RESEARCH
UNIVERSITY OF EASTERN AFRICA, BARATON
P.O. BOX 2500-30100, Eldoret, Kenya, East Africa

B1/810/2019

September 25, 2020

TO: SUSAN KATHIIRA KITHINJI
REG. NO: HSH/M1-3947/2016
JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY
SCHOOL OF PUBLIC HEALTH

Dear Susan,

RE: Factors Influencing Malnutrition Among Children Aged 6 – 59 Months in Kamukunji Sub-County, Nairobi County, Kenya

This is to inform you that the Research Ethics Committee (REC) of the University of Eastern Africa Baraton has reviewed and approved your above research proposal. Your application approval number is (ERC/18/08/2019. The approval period is 25th September, 2020-24th September, 2021.

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by the Research Ethics Committee (REC) of the University of Eastern Africa Baraton.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to the Research Ethics Committee (REC) of the University of Eastern Africa Baraton within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to the Research Ethics Committee (REC) of the University of Eastern Africa Baraton within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to the Research Ethics Committee (REC) of the University of Eastern Africa Baraton.

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

Yours sincerely,

Secretary, Research Ethics Committee

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Appendix IV: Research Permit from NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **997676**

Date of Issue: **25/May/2021**

RESEARCH LICENSE

This is to Certify that Ms.. SUSAN Kathiira KITHINJI of Jomo Kenyatta University of Agriculture and Technology, has been licensed to conduct research in Nairobi on the topic: FACTORS INFLUENCING MALNUTRITION AMONG CHILDREN AGED 6-59 MONTHS IN KAMUKUNJI SUB-COUNTY, NAIROBI COUNTY , KENYA for the period ending : 25/May/2022.

License No: **NACOSTI/P/21/10673**

997676

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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