DETERMINANTS OF NUTRITIONAL STATUS OF UNDER-FIVE CHILDREN IN TANA RIVER COUNTY IN KENYA

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JUNE 2025

DECLARATION

I thus certify that this thesis is entirely original with no submissions for accolades to any universities or other organizations.

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DEDICATION

This thesis is dedicated to my wonderful family. You have been the pillar of support throughout my academic career, offering advice, love, and encouragement at both high points and low points. May God keep bestowing health and blessings upon you.

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ABSTRACT

The prevalence of acute malnutrition was very high in the counties of Turkana Central, North, and South, Tana River, Kilifi, and Marsabit. Even if there have been some improvements in the food supply since February 2023, the scenario is still one that should be reason for alarm. It is anticipated that the food security situation will become more precarious in most countries during the following several months. According to Ministry of Health projections, there will be 39,068 pregnant and nursing women and 420,674 children who are severely malnourished between the ages of 6 and 59 months in ASAL and urban areas by 2023. Since underweight indicates both low height for age and low weight for age, this study concentrated on underweight stunted growth. Underweight is an immediate sign of both persistent and severe malnutrition. This study's main objective was to identify the factors that contribute to Tana River County infants and toddlers' diminutive stature for age in comparison to other county residents. The particular objectives are as follows: to investigate the role that culture plays in contributing to this issue; to analyze the influence that socioeconomic variables have on contributing to this problem; and to investigate the role that bio demographics play in contributing to this problem. In methodology, this study used a cross-sectional approach. Purposive, systematic, and simple random sampling methods were employed to recruit study respondents in this study. Structured questionnaires were used to obtain quantitative data from the study respondents. The sample size for this study was 385 study participants. Descriptive statistics and inferential statistics were employed in this research. Frequency and percentages were used to describe the data while chi-square and logistics regression were employed to execute statistical association. Statistical significance was set at a $P \leq 0.05$. Ethical clearance was sought from the MKU ethics and review committee as well as NACOSTI. The prevalence of malnutrition in this study was 35.1% which is a public health concern.. In the second objective concerning bio-demographic factors associated with nutrition status, study respondents aged 0-11 months, guardians having no formal education reduced the odds of having a normal nutrition status while having a guardian who had been provided with health education on infant feeding practices increased the odds of having a normal nutrition status. In the third objective concerning social economic factors associated with nutrition status; being food insecure, and lack of access to safe sanitation reduced the odds of having a normal nutrition status while having a small household size of 1-3 members increased the odds of having a normal nutrition status. In the fourth objective concerning social-cultural factors associated with nutrition status while absence of gender roles increased the odds of having a normal nutrition status while the presence of cultural norms and stigma reduced the odds of having a normal nutrition status. The county government of Tana-River, the Ministry of Health, and relevant stakeholders should implement the various recommendations provided by the study to tackle the probem of malnutrition in this region which is a public health menace.

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FGD	Focus Group Discussion
KDHS	Kenya Demographic and Health Survey
NFHS	National Family Health Survey
SDs	Standard Deviations
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The investigation's background, the definition of the problem, the investigation's objectives, and the issues being investigated are all discussed in this chapter. This section covered the following topics: scope, limits, preconceived notions, operational explanations, and key terms.

1.1 Background of the Study

Lack of nourishment has been linked to over a third of all infant deaths worldwide under the age of five (WHO, 2023). The World Health Organization(WHO) (2013) estimates that 178 million children worldwide are undernourished. This count includes people who are obese, underweight, or stunted. A child who suffers from malnutrition has an increased chance of catching and dying from illnesses like pneumonia, diarrhea, and malaria. Lack of nutrition is a leading cause of death for children under five(World Health Organization, 2017). Malnutrition remains a significant global challenge, particularly affecting children under the age of five. In 2022, approximately 148.1 million children in this age group were stunted (too short for their age), 45 million experienced wasting (too thin for their height), and 37 million were overweight or living with obesity(Obasohan et al., 2024).

Malnutrition remains a significant public health challenge for children under five across Africa. The prevalence of stunting impaired growth due to chronic undernutrition is notably high, with an average rate of 30.7%, surpassing the global average of 22.0%. Central Africa experiences the highest stunting rates at 37.4%, while Northern and Southern Africa report rates closer to the global average(Sunday et al., 2024). Wasting, characterized by low weight for height indicating acute malnutrition, affects

approximately 6.0% of children under five in Africa, slightly below the global average of 6.7%. In 14 African countries, the prevalence of wasting is under 4%, with Lesotho, Morocco, Rwanda, and Tunisia reporting rates below 2.5%(Tchuente et al., 2024).

According to a global disease burden study, under-five malnutrition is responsible for more than half (15.9%) of all DALYs lost worldwide(FAO, 2023). Damage-adjusted life years (DALYs) measure the impact of premature death on a person's life. It affects children's cognitive, social, and behavioral growth, which in turn affects their future participation and success, especially in the job. Stunted cognitive growth is the most catastrophic effect of inadequate nutrition in children under five years old. Three of the most common anthropometric characteristics used to report malnutrition in children are stunting, underweight, and wasting. Malnutrition in childhood has been associated with several negative effects, such as delayed cognitive development, a higher likelihood of illness and mortality, and stunted development. Concerns exist over potential negative impacts on upcoming generations as well. Young children under the age of five are some of the most vulnerable people in society(Sunday et al., 2024).

According to data from different organizations in developing countries, the (WHO, 2011)estimated that 178 million youngsters under the age of five have stunted growth and 115 million are underweight. They based their calculations in order on these figures. 26 percent are in South and Central Asia, approximately seventy percent are in Africa, and four percent are in Latin America and the Caribbean. In developing countries, the proportion of underweight children under five years old decreased from 47.1% in 1980 to 20% in 2010(Shipanga, 2023).

Despite the worldwide economic recession, the development of the region continues to be erratic and slow. For instance, in large part due to the continent's rapidly rising birthrate and population, the number of underweight children in Africa rose from 24

million in 1990 to 30 million in 2010. Asia was home to 71 thousand thousand individuals in 2010. In the Caribbean and Latin America, sixteen percent of children and teenagers still live in poverty(Seretew et al., 2024). Although the region produces enough food to feed its entire population, some of the nations within it struggle with excessive consumption. This has something to do with both a general dislike of eating meat and nutritional deficiencies. An unhealthy diet high in carbohydrates, salt, and the amount of saturated fat but low in small-molecule nutrients (iron, phosphorus, zinc, which is as well as vitamin A) is linked to chronic illnesses like obesity(Tchuente et al., 2024).

The Kenyan government's Nutrition Action Plan 2018–2022 states that malnutrition poses a serious risk to the well-being of children, growth and development, and growth in Kenya. A child who suffers from malnutrition during their early years may experience negative effects on their well-being and intellectual performance as adults. A person's productivity is negatively impacted by hunger in infancy just as much as it is by inadequate nutrition in maturity. The proportion of children under the age of five years who are underweight can be used as an instrument for measurement to analyze the goals of sustainable development 2 (Zero Hunger) and 3 (Good Health and Happiness for All Ages) (Ministry of Health Report, 2018). Many factors contribute to the high rates of child starvation that were previously addressed. These factors include but are not limited to, insufficient regulations regarding nutrition for children and teens, poor maternal health, constrained access to nourishing meals, higher rates of infectious illnesses, and other variables (Ministry of Health Report, 2018).

Implementing policies that maximize the "possibility window" between birth and two years of age is a top priority in the National Food Action Plan, as it is a means of demonstrating compliance with the 2010 United Nations Food Summit Resolution. (Smith et al., 2013). A study conducted in 2008 and published in the Lancet Nutrition

Series found that there could be a 25% reduction in newborn mortality, a 20% reduction in death among mothers, and a 30% reduction in persistent malnutrition among children under two if a greater number of individuals had access to the Important Food Measures package (Smith et al., 2013). This study was executed in Africa (National Nutrition Action Plan report 2010).

Data from the Integrated phase classification (IPC) indicated that the county governments of Tana River, Kilifi, and Marsabit, which Turkana central region, the north, and South, had extremely high rates of extreme malnutrition. Global Acute malnutrition (GAM) was most common in South Turkana (37%) while acute malnutrition was common throughout these regions, similar to what occurred during the 2011 Horn of the African continent crisis. The highest recorded rate of serious starvation was found in Laikipia for GAM WHZ 10.0–14.9; similar findings were made in East Pokot (Baringo County), Samburu, Central Pokot, Turkana the West, Garissa, Wajir, and Mandera. For the counties of Moyale and Saku, an alert GAM WHZ 5 to 9.9 hundred million has been issued; for the regions of Narok, Kajiado, Makueni, Mbeere, Kwale, as well as Kilifi, an alert GAM WHZ 5% has been issued (IPC, 2022).

Even though there has been an apparent boost in the availability of food since February 2023, the situation still warrants concern. It is projected that during the next few months, most counties' food security circumstances will worsen. According to the Department of Health projections, there will be 39,068 pregnant and nursing women and 420,674 acutely malnourished children between the ages of 6 and 59 months in ASAL and urban areas by 2023. Since underweight encompasses both low height-for-age and low weight-for-age, this study focused on it as a key indicator of nutritional deficiency. It serves as a clear marker of both chronic and acute malnutrition (Ministry of Health Report, 2017).

1.2 Statement of the Problem

Two million children, or more than 25% of all children under five, in Kenya suffer from stunted growth. The most common type of undernutrition in young children is stunting(Maniragaba et al., 2023). It has terrible long-term effects, such as stunted mental and physical development, if left untreated. Furthermore, four percent of children are wasted and eleven percent are underweight. There is a connection between wasting and severe wasting and a rise in early childhood deaths that are avoidable. In Kenya, non-communicable diseases linked to diet, obesity, and overweight coexist with undernutrition, including deficiencies in certain micronutrients(Sawadogo et al., 2022). Kenya has significantly reduced the percentage of stunted children under five (from 35% in 2008 to 26% in 2014), but there is still a significant gap between the two groups: 26% of stunted children under five and 11% underweight, with roughly 4% overweight or obese(UNICEF, 2023).

Since 72% of Tana River County's people are thought to be impoverished, they are largely dependent on food assistance programs and contributions from nonprofit groups as they do not have a means of procuring enough food. Numerous individuals are shifting from their previous heavy reliance on pastoralism to farming due to the ongoing restoration of irrigation schemes. Consequently, there is limited knowledge about the extent to which inadequate nutrition affects children in Tana River County, Kenya (Masibo, 2013; Shinsugi, 2015; Singh, 2011; Olodaru, 2016). Fewer research investigations have looked into how children’s eating habits are influenced by their culture, socioeconomic standing, and bio-demographics. A study conducted by Shinsugi et al. (2015) showed the connection between lack of food and stunting in children in rural Southern and Eastern Kenya.

In Tana River County, The number of under-fives at risk of malnutrition is currently at 24.6% compared to the previous year's 25.5%(Ndegwa et al., 2023). Malnutrition among children under five in Tana River County, Kenya, remains a significant public health concern. According to the 2022 Kenya Demographic and Health Survey, 21% of children under five in the county are stunted (too short for their age), 11% are wasted (too thin for their height), and 17% are underweight (too thin for their age). These figures are notably higher than the national averages, which stand at 18% for stunting, 5% for wasting, and 10% for underweight The coping strategy index for households is still high at 13.8% but still below average. Attributed to the lower purchasing power and increasing prices of essential commodities. As a result, this study investigated the determinants of malnutrition among children under 5 years of age in Tana River County.

1.3 Objectives of the Study

1.3.1 General Objective

The study's overall objective is to determine the determinants of malnutrition of under-five children in Tana River County.

1.3.2 Specific Objectives

The specific objectives are:

i. To determine the nutrition status of under-five children in Tana River County.
ii. To determine the socio-economic factors influencing the nutritional status of under-five children in Tana River County.
iii. To determine bio-demographic factors associated with the nutrition status of under-five children in Tana River County.
iv. To determine the social-cultural factors influencing the nutrition status of the under-fives in Tana River County.

1.4 Research Questions

i. What is the nutrition status of under-five children in Tana River County?

ii. What are the socio-economic factors influencing the nutrition status of under-five children in Tana River County?

iii. What are the bio-demographic factors associated with the nutrition status of under-five children in Tana River County?

iv. What are the social-cultural factors influencing the nutrition status of the under-fives in Tana River County?

1.5 Significance of the Study

Tana River County lacks adequate statistics on child malnutrition. Several factors make this study important. The study's conclusions provided the county's health stakeholders with a firm basis for reorganization and the implementation of good improvements. The findings also aided the Ministry of Health in its fight against childhood malnutrition. This study was very useful for donors aiming at funding community development via the delivery of food and other nutrient components.

1.6 Scope of the Study

The thesis was dependent on 2022 KDHS data. Children born in 2019 and after had their height and weight recorded in order to calculate their height and weight-appropriate ages. Beginning in 2006, nutritional status indicators for children were calculated using WHO standards.

This study focused on the determinants of the nutritional status of under-five children in Tana River County, Kenya. It examines key factors influencing child nutrition, including socioeconomic, bio-demographic, and social-cultural factors. The study aimed to assess the prevalence of malnutrition, including stunting, wasting, and underweight, and identify underlying causes contributing to poor child nutrition. The geographical scope was

limited to Tana River County, a region characterized by food insecurity, recurrent droughts, and shifting livelihood patterns from pastoralism to agriculture. The study collected data from households, healthcare facilities, and relevant stakeholders to provide a comprehensive understanding of the issue. Findings from this research contributed to policy recommendations and targeted interventions to improve child nutrition and reduce malnutrition rates in the county.

1.7 Limitations of the Study

It's possible the investigation had many flaws. Caregivers may have provided inaccurate responses regarding child feeding practices and illness history. *Mitigation:* To minimize this, structured interviews with specific timeframes (e.g., past 24-hour dietary recall) were used, and cross-referencing with health facility records was done. Certain communities had dietary and childcare beliefs that could influence responses. *Mitigation:* Trained enumerators from the local area conducted the interviews, ensuring culturally appropriate engagement. Some respondents had missing or incomplete records, which could have affected data accuracy. *Mitigation:* Multiple sources, including health records, caregiver interviews, and anthropometric measurements, were used to validate and supplement missing information.

1.8 Study Delimitation

The study was limited to Tana River County, Kenya, and did not extend to other regions. This allowed for an in-depth analysis of the unique factors affecting child nutrition in this specific setting. The research focused exclusively on children under five years old and their primary caregivers. Other age groups were excluded to maintain relevance to early childhood malnutrition. The study was conducted within a defined period and did not assess long-term trends in malnutrition beyond the study period.

1.9 Assumption of the Study

When taking part in this survey, it was anticipated that all respondents would be completely honest. Entry requirements were uniform, guaranteeing that all participants would experience the same or a similar phenomenon. The people who decided to take part in the research did so because they were interested in doing so, and not for any other reason, such as to seem good in front of their employer.

1.11 Operational Definitions of Terms

The term "under-five nutritional deficiencies" refers to inadequate nutrition among children under the age of five, often resulting in malnutrition, stunted growth, or other health complications..

Height-for-age: The rate at which the rise is becoming slower in pace is indicated by this linear measure. A child is considered short or hampered if their height-for-age is under two standard errors of measurement (-2SD) below the reference population's median height. A child is classified as stunted if their height or weight falls a minimum of three standard deviations (SDs) below the benchmark population's mean. Long-term starvation and the effects of recurring or chronic illnesses are two more potential causes of stunted growth in children. Thus, for an individual cohort over all data times of the year, height-for-age is a reliable indicator of long-term nutritional efficiency. This is so that a person's current age and height can be compared using the height-for-age measure.

Malnutrition: This describes imbalances in essential nutrients or poor nutrient utilization, as well as problems or surpluses in nutrient intake. Malnutrition, obesity, and overweight are all parts of the double economic burden of stunted growth, which also includes illnesses that are not linked to diet.

Nutritional status: This is the outcome of the relationship between the amount of vitamins and minerals consumed and the amount needed, and it ought to allow the use of minerals to preserve reserves and make up for losses.

Under five: Because the initial five years of existence are critical for brain development and a child is entirely dependent on his mom until the age of five, youngsters younger than the age of five are given special attention.

Undernutrition: This indicates that a person is not consuming enough energy and nutrients to meet their needs and stay healthy. Malnutrition and undernutrition are often used interchangeably in the literature. Malnutrition, in its strictest definition, includes either undernutrition or excessive hunger.

Weight-for-age: This is a common way of determining the age and height of adults. Children who are underweight have a height-for-age ratio that is in excess of two standard deviations (-2SD) below the average of the regard populace, while those who are seriously underweight have more than three SD beneath the median. A child who is underweight for their age could be wasted, stunted in some or both (GSS, 2003).

Weight-for-height: These steps can be used to determine the body mass index. A child is considered underweight over their height if their weight-to-height ratio is less than two deviations in standard deviation (-2SD) from the population used as the reference mean. Significant waste is defined as a ratio that is fewer than three standard errors of measurement (-3SD) from the mean.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Socioeconomic, Social-demographic, and social-cultural issues are all discussed in this chapter as potential causes of under-five malnutrition.

2.2 Socio-Economic Factors and Malnutrition among Under-Five Children

Literature research by numerous experts in support of this data revealed a strong association between socioeconomic variables and child malnutrition. A parent's level of schooling has a big influence on how well their children understand socioeconomic issues and health-related subjects. This has led to a growing number of parents wondering what role breastfeeding plays in guaranteeing the optimal growth of their offspring. Seretew et al., (2024) state that a person's reproductive wellness can be influenced by a variety of variables, such as their educational background, knowledge of well-being and nutrition, socioeconomic status, perspective on modern healthcare, sense of autonomy, how they reproduce, and even where they live.

There has been a significant amount of study conducted on maternal education, and the findings have been extensively debated. Obasohan et al., (2024) outlined three potential channels via which students may be influenced by classroom discourse on maternal health. To begin, prospective moms received an education in a conventional setting to get firsthand knowledge of medical topics. Second, a mother's degree of literacy and numeracy is a benefit in recognizing and treating health issues in her unborn children at an early stage. This is because a child's brain is still developing throughout pregnancy. Thirdly, women are more responsive to novel medical techniques than males because they have a larger familiarity with the current culture as a consequence of their higher levels of formal education. This is because women are more likely than men to participate in

higher education. Health education ought to start in kindergarten, according to Hung (2015), because it appears that mothers' health literacy is the single most significant variable for enhancing the well-being of their children. An increasing amount of research indicates that a mother's level of education has a big impact on her child's growth and overall well-being. There is a lower likelihood of hunger symptoms in children whose mothers have gone through some additional schooling, such as being underweight, dehydrated, or abnormally short to earn their age.

It has been demonstrated that a mother's academic achievement and socioeconomic standing are related to the nutritional well-being of her children. Children of enlightened women are far more likely to survive and succeed in life because they are more likely to grow up in stable, lucrative professions, marry affluent, educated men, and live in neighborhoods that promote safety and health. Low-educated mothers typically give their children less nutritious food and growth (Abuya et al., 2012).

According to the 2022 KDHS, mothers' educational attainment had an important impact on their children's dietary habits before reaching the age of five. Compared with children created to moms with only a high school education, children of college graduates had a lower likelihood of malnourishment. Formally educated women are more inclined to hold positions of power in their homes and communities. In many parts of the world, women are the primary caregivers, which means that they bear the responsibility for devoting an excessive amount of family resources to child care (KNBS and ICF Macro, 2015). For this reason, improving women's agency is linked to improving the dietary requirements of offspring.

Shipanga, (2023) investigated the impact of a mother's level of schooling on the dietary habits of her children who were raised in impoverished environments. The Nairobi Urban Health and Demographic Surveillance System (NUHDSS) contains a health of mothers

and children project, which is the source of the data. The children in the study range in age from 0 to 42 months. Information on the nutritional status of the participants was gathered from October 2009 to January 2010. To determine the impact on educational attainment in the univariable and multivariable models, correspondingly, they employed binomial and multiple logistic regression. The results of the investigation indicate that nearly 40% of the children were stunted. Stunting in children is significantly predicted by maternal education, with the relationship being somewhat mitigated by additional variables at the mother, family members, and group levels. Additional factors that are independently but substantially linked to stunting include those at the children level, such as sexual orientation and birth pounds; at the mother level, factors such as relationship status, the same level, desire to become pregnant, and seeking medical care behavior; and at the level of the family, including socioeconomic position.

In Jammu and Kashmir, the incidence of severe hunger (stunting) among children under five years old was examined by Tariq, Khan, and Malik (2023) in connection to the disparity in mother learning. Stunting, or low height for age, is measured in children using the most recent round of the National Family Health Survey (NFHS-5), taking into account the mothers' literacy status and other control variables. To investigate the relationship and pinpoint risk variables, bivariate and multivariable techniques are used. In addition, the achievement disparity in factors linked to stunting in children is analyzed using the Oaxaca breaking down method. The findings show that children of illiterate mothers were more likely to be stunted (29%) than children of mothers with college degrees (25%). The results show that children with mothers who are literate have a lower risk of stunted development (OR 0.89). Based on the mother's educational background, there is a statistically noteworthy variance in stunting between the children according to

the Oaxaca breakdown analysis. These findings demonstrate the significant differences in severe starvation among children caused by differences in mother education.

A review of the literature was conducted by Prasetyo, Permatasari, and Susanti (2023) to examine the impact of mothers' dietary knowledge and education on the dietary needs of their children. Embase, ProQuest, PubMed, and the Google Scholar database are four of the databases used to examine the research included in this review. The impact of education about nutrition on mother understanding and children's dietary habits was covered in the studies. Mothers' understandings, mindsets, and abilities were impacted by learning about nutrition (with a $p<0.001$). Maternal knowledge about nutrition has an impact on the dietary needs of their offspring, as evidenced by changes in the median gestational weight of the offspring, which increased by 0.257 kg/0.26 kg relative to the control group's weight ($\beta = 0.257$, $p < 0.001$). Maternal understanding and children's dietary habits are positively impacted by nutrition education. Rallies, discussions about ideas, and instruction on nutrition are ways to share different strategies.

In various settings, the term "empowerment" may have quite diverse connotations. Improving one's own political, cultural, or economic power and sense of competence is a common definition of empowerment. Several studies have revealed that when mothers are given more agency, child health improves (Rugema et al., 2022). Although measures of empowerment vary between studies, it is generally agreed that women's increased autonomy and capacity benefit their children's diets (Obasohan et al., 2024). Indirectly, psychological abuse disempowers moms, which contributes to an already precarious situation when it comes to their children's nutrition.

What characteristics does the KDHS of 2022 attribute to a woman who is considered powerful and independent? Self-determination requires believing in one's own worth, seizing opportunities, making choices after gathering relevant information, taking

responsibility of one's own life, and influencing the trajectory of change in society. Women who are in a better position to financially sustain themselves on their own are more likely to participate in supplementary nutrition programs, which may assist them in providing a healthier diet for their children. Researchers from Asia, Sub-Saharan Africa, and South America examined four aspects of women's empowerment, one of which was mobility, which was defined as the capacity to visit a health institution without being accompanied.

Evidence suggests that without accompaniment medical appointments while pregnant are advantageous for the expectant mother as well as her unborn child, as reported by Jouzi et al. (2024). Women who have more independence in their daily affairs have a greater capacity to make decisions about themselves as well as their family's healthcare with out first talking to their spouses or collaborators, under Bhagowalia et al. (2012).

A woman's decision-making role may be defined as exclusive decision-making authority or shared decision-making authority with her spouse. As Amoah et al., (2024) point out, when women make decisions, their status in the home improves, and they have more say over their children's upbringing, including what they eat and how they are cared for. Women's perspectives on domestic abuse have been linked to differences in child feeding. Research looking at the impact of women's empowerment on stunting and dietary variety. Kipng'eno et al. (2024) found a substantial correlation between stunting and mothers' opinions of child abuse and health. The research indicated that a mother's socioeconomic level and the reason she struck her children both had an effect on the child's long-term nutritional result.

Mothers with jobs who system with other women in their place of work may experience a boost in confidence and gain knowledge on topics such as broad trust, morality, and childcare (Srivavastava & Austin, 2012). Nonetheless, the goal of many microcredit

groups is to provide financial support to women. This goal is achieved in Kenya through "Table Financial Services and The term voluntary Savings and Financial assistance Associations," which give women the opportunity for credit as well as cash (Charity, 2017). As an outcome of this, mothers now possess more flexibility to influence the way their children behave diets, and physical activity routines for the better. A relationship has been observed between women's participation in community life as well as the growing amount of information shared about issues like parenting, money management, as well as medical care.

In KDHS 2022, the rate of death for infants was projected to be 39 per one thousand live births, whereas the rate for childrens under five was projected to be 52 per one thousand deliveries. Based on information gathered in five years leading up to the the year 2014 KDHS, both of those predicts were made. A single children in every 19 in Kenya has yet to be five years old. One person out of every 26 is predicted to not live to be 26 years old. For every thousand live births, there are 22 casualties, and for every 1,000 infants in their first twelve months of existence, there are 16 passing away. The nations with the smallest incomes also have the greatest rates of deaths. About 56% of newborn fatalities in Kenya happen in the very first month to live on of a baby's life, based on Charity's 2017 investigation. Numerous studies have shown a correlation between improved child health and nutrition and the empowerment of mothers. Smith et al. (2013) found that improved nutrition for children statistics are a direct result of female empowerment based on an examination of data from multiple countries.

Tesfaw and Woya's (2022) goal was to pinpoint any plausible intermediaries in the relationship between malnourishment and an elevated wealth index. Based on information from the 2019 Ethiopia Miniature Demographic and Wellness Survey (EMDHS), which included 3,918 childrens under the age of five overall, a cross-sectional

approach to research was used in this investigation. The study employed a mediation approach using structural equation modeling (SEM) to ascertain and quantify the impact of putative intermediaries in the relationship between the measure of wealth and under-five hunger among children. Twenty.2% of the 3,918 under-five children who participated in the present investigation were from cities, and 51.4% of their parents were male. Most mothers delivered their babies at home (56.1%), and most children came from the lowest-income families (36.4%). Female children were less likely than children of men to experience stunting, as indicated by the projected impact of height-for-age (1.31:95% CI = 0.45, 0.200). Children in rural areas had a higher chance of stunting (-0.269; 95%CI = -0.388, -0.135) than children who lived in urban areas. The financial status index's calculated total negative impacts on stunting and underweight were statistically significant (with a p-value of <0.05) at 0.69 (95 percent = 0.045, 0.094) and 0.036 (95 percent = 0.013, 0.054), respectively.

In Burkina Faso, a research investigation was conducted to evaluate the risk factors for starvation in children under five. In addition, analysis of longitudinal population-level information from the 2010 Burkina Faso demographic information Wellness Surveys served as the foundation for this investigation. The investigation was done in the West African nation of Burkina Faso. 6337 children under the age of five and their moms participated in the study. Of the 6337 children under the age of five, 51.0% were males, while 57.8% had been average in size at being born. The percentage of children who had vomiting, a high temperature, or a severe respiratory condition in the past three months was 15.6, 21.5, and 10.6%, respectively. Malnutrition among young people under five years old in Burkina Faso was significantly correlated with factors such as youngster gender, chronological age, birth size, child morbidity, mother's schooling, height and weight, and financial status of the household index (Poda, Hsu, and Chao (2017)

Mother's and pediatric malnutrition, which includes both underweight and inadequate nutrition, have a detrimental influence on academic performance, revenue generation, disease incidence, longevity, and impairment rates. According to Kapungwe (2015), inadequate nutrition during pregnancy has been linked to several health problems in the offspring, such as being overweight, severe deficiency in vitamins and minerals, and stunting. Due to variations in their dwellings, economic standing, schooling, and reproductive processes, women have a greater tendency than men to be dehydrated. According to Jang and Manish (2015), women's inadequate nourishment may be caused by unequal household labor patterns as well as social and cultural standards.

KDHS (2022) found that eating enough of specific micronutrients throughout pregnancy was very beneficial for both moms and their infants. Breast milk contains supplemental micronutrients, most notably vitamin A, which provides infants a nutritional head start. Supplemental iron during pregnancy lowers the incidence of maternal and newborn anemia, a major global killer. Preterm delivery and low birth weight are also associated with this condition. Last but not least, a lack of iodine is linked to unfavorable effects for the mother, including fetal brain impairment, birth abnormalities, and premature death (Ahenda et al., 2023).

54% of moms took vitamin A after giving birth, according to the KDHS (2022). Afterward, vitamin A is more common in urban women than in rural ones (58% versus 51%). After giving birth, women living in the Midwestern region are much more inclined compared to those in the upper Midwest to take the antioxidant vitamin A (65% vs. 27% vs. 25%). After giving birth, women who have received additional instruction are more inclined to take folic acid supplements. After giving birth, women in the lowest bracket of income are more inclined to utilize supplements containing vitamin A (38% vs. 54% or more).

Nutritional deficiencies, such as anemia, tend to worsen throughout pregnancy and delivery due to the increased vitamin requirements of the developing fetus. By increasing the amount of iron in women's meals, parasite and malaria infections may be avoided. Pregnant women have heightened iron requirements that cannot be met by diet alone, making supplementation essential. A combination of folic acid and iron supplements are recommended for pregnant women in Kenya from the time of conception until delivery. Iron supplements that aren't mixed with other medications may still be used by women (Charity, 2017).

Nyamasege et al. (2021) sought to ascertain whether there were any differences in the incidence of stunted development among both the control and intervention groups, as well as to pinpoint variables linked to the children's linear development. A controlled experiment was conducted at random. To simulate children's gradual development and determine the factors influencing it, linear combined effect models were run. Two Nairobi slums served as the investigation's locations. Throughout their pregnancy and early years of life, the therapy group obtained monthly counseling and education on nutrition (NEC). A cohort of 1004 births was monitored every three months until the thirteenth month following delivery. Nevertheless, 438 mother-child pairs took part in the 55-month follow-up as a consequence of abandonment. There was no difference between the features encompassed for analysis and the loss at the subsequent beginning of the study Z-scores for length relative to age showed a decline from conception to the 13th month, with a mean of -1·42 (sd 2·04). The control group disclosed a considerably greater incidence of stunting (33·5%) compared to the treatment group (28·6%). In contrast, the 55th month showed an upsurge in scores, mean -0·89 (sd 1·04), with a considerably greater number of males (16·5%) in the nonintervention group and 8·3% in the treatment group experiencing stunting. Children's chronological development was negatively

correlated with early weaning, mother's stature of less than 154 cm, being a male child, frequently vomiting or repeating food, and participation in the control group.

The effect of maternal schooling, work, and the size of the family on the dietary requirements of children has been examined by Iftikhar, Bari, Bano, and Masood (2017). A case-control investigation was carried out at the Children's Hospital Lahore's Outpatient Department between September 2015 and April 2017. There were 340 overall young ones—170 cases and 170 controls—whose ages ranged from six months to five years of age, as well as their mothers. Plotting measurement data against WHO growth charts was done. 170 controls (≥ -2 SD) and 170 wasted (<-2 SD) were matched. The cases and control groups' maternal levels of education, job status, and size of family were contrasted. Confounding factors were identified and classified. To investigate the relationship between each factor, univariate analysis was performed for the factors that were being considered, such as maternal schooling, job experience, and the size of the family. To investigate the independent organization, logistic regression modeling was utilized. Growth parameters and mother's education were significantly correlated; the OR was 1.32 with a range of confidence of (CI= 1.1 to 1.623). The OR for mothers' job performance was 1.132, with a non-significant range of confidence (CI=0.725 to 1.768). With a non-significant confidence interval (CI=0.8–1.21), the number of families had an OR of one. Following the application of bivariate logistic regression analysis, the relationship persisted.

Although urban youth tend to be more nutritious than those in rural areas, recent studies indicate that urban levels of poverty are rising. Living in a city has far more benefits than drawbacks. These consist of financial opportunities, interpersonal and familial support networks, and access to medical care. To develop effective programs and policy approaches to reduce stunted growth, we must comprehend the importance of the various

factors contributing to hunger among children in rural as well as urban environments, especially as they differ. Programs for school lunches and nutritional support are two examples of these strategies.

Since they are not as inclined to understand the importance of good sanitation and dietary habits, women in the countryside are less likely than those living in cities to eat nutritiously. In contrast to their urban parallels, mothers in rural areas tend to breastfeed for longer periods. Additionally, most of our food originates outside of cities. As a result, children born to rural mothers tend to be healthier and live longer than children born to urban mothers. According to Zulu et al. (2011), this disparity might result from conventional beliefs about feeding habits that are insufficient to prevent stunting in children.

Studies on childhood malnutrition have mostly ignored urban slums and their residents. As deprivation and environmental dangers are expected to have synergistic harmful effects on children, we expect this group to have low rates of child undernourishment and other indices of child health. Therefore, knowing how children develop in these groups is crucial for interventions aimed at ensuring their survival. Slum people have the same setting, yet there is wide variation in the types and levels of hardships they face (Zulu et al., 2011). Zulu found that there were large differences in poverty across slums, between male and female-headed families, and between those who had lived in slums for short and long periods. The poverty rate in two Nairobi shantytowns, Korogocho and Viwandani, varied from 42 percent to 78 percent over 14 communities.

Das and Gulshan (2017) used data from the 2014 Bangladesh demographic information Health Survey of Universities to examine the prevalence of inadequate nutrition and indicators of risk for inadequate nutrition in children from birth to 59 months old in Bangladesh. We utilized weight-for-age, height-for-age, and weight-for-age to assess the

level of inadequate nourishment among Bangladesh's children under the age of five. The models of logistic regression were fitted for each of the three indices in order to evaluate the relationship between those variables that were chosen and the condition of nutrition. Three-quarters of children are underweight, 15% are discarded, and 36.2% are stunted than other. The incidence of stunted growth or underweight is highest between the ages of 18 and 23 months (slowed 48% as well as underweight 37%), with the smallest percentage occurring among childrens 0–6 months. Spending peaks between 0 and 6 months. In contrast with other divisions, the odds of being stunted are 30% to 50% greater in the Sylhet in division.

The impact of under- and excessive hunger, its causes, and the tactics needed to combat inadequate nutrition among children under five in India were evaluated by Sahu et al. (2015). Current information was gathered from Medline, Google, and other sources. The data that was obtained was examined and contrasted. According to available data, starvation was common among youngsters under five and varied greatly depending on the evaluation methodology used (underweight: 39-75%, stunting: 15.4-74%, wasting: 10.6-42.3%). There have been few studies evaluating the overeating social standing among children under five. The geographic distribution of various risk variables and how they affect childrens' nutritional status in a particular setup should be examined to plan preventative measures(Ahenda et al., 2023). The conditions needed for addressing inadequate nutrition among younger than five children in India include enhancing health care programs for mild cases of inadequate nutrition as well as those who are most vulnerable, implementing and evaluating strategies at the regional level effectively, conducting research on overweight and obesity and its causes, and taking steps to improve the country's socioeconomic standing.

In Maharashtra, India, Murarkar, Gothankar, and Doke (2020) evaluated the incidence and contributing factors of malnutrition among children under five. In two districts of the Indian state of Maharashtra, 16 randomly chosen clusters participated in a neighborhood-based cross-sectional investigation. Through a home-to-home survey, mothers of children under five were interviewed to gather data. We covered a total of 2929 mothers and their 3671 children under the age of five. Using multivariate regression logistical analysis, the factors influencing children's nutritional status in both rural and urban settings were independently determined. The mothers' mean age was 24.25 years (± SD 6.37) and the children's mean age was 2.38 years (±SD 1.36). 35.4% of those aged under five were underweight, 17.1% were wastefulness, and 45.9% of children were stunted overall. A downtown slum had a greater incidence of stunting, underweight, and wasting than a rural one. Acute diarrhea ($p = 0.001$) and solely breastfeeding ($p < 0.001$) were linked to wasting in the countryside; stunted development was linked to children with a birth order of 2 or less; underweight was linked to low parental education and exclusive lactation ($p < 0.05$) (Ahenda et al., 2023). In contrast, in the urban poor neighborhoods, being underweight was linked to low relative earnings ($p < 0.05$), stunting was linked to the child's sex ($p < 0.05$), and utilizing was linked to limited breastfeeding ($p < 0.05$) (Tesema et al., 2021).

2.3 Bio- Demographic Factors and Malnutrition among Under-Five Children

Bio-demography is a multidisciplinary method of demography that studies how biological variables (such as longevity, reproductive wellness, aging, and lifespan) impact trends in demographics (like the number of people and structure). The ways that changes in the cycle of reproduction affect the health and survival of infants are caused by a variety of factors, such as differences in the mother's age at shipment, the order of birth, and/or the

time between births. This analysis includes the order of birth, conception period, and mother age birth as bio-demographic parameters (Sathiya, Hamisi, & Nagarajan, 2016). The purpose of Ntambara et al.'s (2023) study was to assess the association between birth spacing and nutrition status. We assess the association between various timing of birth groups and nutritional outcomes, such as underweight, wasting, as well as stunting, in this numerical meta-analysis. In total, 898,860 children from 46 studies have been included in the analysis. The optimal birth interval group of 36–48 months produced the greatest benefit in terms of protection when compared to a short conception interval of <24 months, their conception interval of ≥24 a few months, and the risk of developing underweight (OR = 0.54, 95% CI = 0.32–0.89). Furthermore, when compared to a gestation period of less than 24 months, a time of birth interval of ≥24 years was significantly correlated with a lower likelihood of wasting (OR = 0.63, 95% confidence interval (= 0.50–0.79) and stunted development (OR = 0.61, 95 percent confidence interval = 0.55–0.67).

The association between the measure of a child's dietary habits and child spacing in Kakuzi, Thika East Sub-County, was reported by Kiome, Kimiywe, and Njogu (2019). The Kakuzi division's 212 families with children aged 6-59 months were included in the investigation. An analytical longitudinal design of the research was used in the investigation. When the village served as the cluster section and the family's home served as a measurement unit, a cluster sampling method was employed. In order to uncover additional confounded variables on the nutritional status of children and the attitudes regarding child birth intervals. This is data was gathered through a focus group debate and a well-organized survey administered by the researcher. In addition, data from the Focus Group Discussion, also known as the FGD, and the questionnaire were validated through a Key informant Interview (KII). Version 16 of the Statistical Package for Social

Sciences (SPSS) was used to analyze the data and means as well as frequencies were used to assess descriptive statistics. The purpose of the test known as the chi-square test was to look for any correlation between the variables in question. The degree of significance was established at a p-value of less than 0.05. The results of the research show that mothers made up 95.8% of the caregivers. According to study results, 49.1% of caregivers, or 58.5% of them, were farmers making a maximum of one dollar per day. The most frequent birth interval was between 18 and 23 weeks, with roughly equal numbers occurring between 24 and 35 months (34.9% and 33.5%, correspondingly). On the other hand, 81.5% of the family members preferred a 24- to 60-month birth interval. The hospital provided details about child spacing to 78.7% of the caregivers, and this appears in the methods that were chosen. According to the discussion in the focus group, formula feeding was not acknowledged by those in charge as a useful strategy for extending the time between childbirths. The percentage of children who were stunted was 28.3%, with boys accounting for 60% of those cases. Child placing and food intake were significantly correlated (p=0.001). There is a need for more research on child spacing, with a focus on reproductive health concerns that impact along with contributing to child spacing.

The association between periods of birth and undernourished Indian children five years old was investigated by Holendro et al. in 2020. Children in India who are under the age of five are in the analysis unit. The information is from the 2015–2016 Indian National Family Medical Survey, fourth wave. The association between children's low food intake and birth intervals was investigated using bivariate as well as multivariate logistic regression models. According to the logistic regression, children born to mothers with a birth period of fewer than twenty-four months had a 28% higher risk of stunting. Additionally, children with a birth period shorter than 24 months have a 26% higher risk

of being underweight. It is clear that low birth weights and inadequate prenatal care are mathematically linked to children's poor dietary habits.

In 2014, Shahjada, Sharma, Mahashabde, and Bachhotiya set out to investigate any potential correlation between the nutritional state of a child and the interval between births. Materials and Procedures: In the operational area of the Urban Gesundheit Training Center, Index Health College Hospital & Research Centre, Indore (MP), India, a cross-sectional, observational, centered around communities investigation was carried out. Physical measurements, clinical examinations, home-to-home visits, and interviews with adults who care for childrens using a pre-tested, pre-designed proforma were conducted for children under five. The investigation's participant population exhibited a prevalence of underweight, wastefulness, and stunting of 46.8%, 38.6%, and 40.6%, respectively. A large percentage of children who were malnourished had birth intervals shorter than 24 months. The childrens with a birth period of less than 24 months had the highest incidences of underweight, malnutrition, and stunting (57.21%, 42.78%, and 51.03%, respectively), while children with a birth period of more than 48 months had the smallest prevalence (29.62%, 22.22%, and 25.92, respectively). In summary, the research demonstrated a perpetually favorable correlation, meaning that children with improved nutrition had longer intervals. A situation like this would be in keeping with the hypothesis that a child's nutritional deficiency and a short afterward birth interval are related.

A 24-35 one-month inter-pregnancy gap was found to be correlated fewer times with higher relative risks for stunted development than shorter intervals between births (less than 12 months) and thinner birth intervals (between 12 and 23 months) by Fink et al. (2014), who examined information from 153 longitudinal DHS surveys conducted in 61

different countries between 1990 and 2011. These polls were conducted between 1990 and 2011.

2.2.2.2 Birth Order and Malnutrition among Under-Five Children

Any evaluation of that state must take into account the negative effects of birth order on the nutritional well-being of childrens. Jayachandran and Pande (2013) contrasted the height gradient in India and Africa to ascertain the relative significance of both environmental and genetic factors in clarifying birth order effects. They think that rather than genetic predisposition, personal preference is the main factor influencing birth order impacts. Several studies carried out in India attest to the fact that first-born Indian childrens tend to be taller than other childrens according to tests of the implications of birth order.

Children with lower birth orders had a greater chance of surviving, indicating that the hypothesis put forth by Jayachandran and Pande (2013) that the findings were a result of death choosing was not supported. It is also conceivable that the birth request effect is caused primarily by the inherent health of women. If this is indeed the case, then women in worse health would see a decline in health more quickly as their order of birth increases. Nevertheless, the birth order coefficients did not significantly change once the mother's height was factored in when calculating the child's height.

This implies that there is no connection between the effects of birth order and maternal height, which is typically thought of as a summary indicator of the condition of the mother's inputs throughout her lifetime. This is so because a parent's height is an indicator of her general well-being over her lifetime. This observation leads them to the conclusion that the choices made by grandparents simultaneously may have some bearing on the outcomes of birth order. Birth order does not appear to affect the phenomenon within a family, suggesting that it is more closely related to use compared with access to

neighborhood assets. African children of second and greater birth classes have an average of greater height compared to Indian children, as reported by Jayachandran and Pande (2013). This is a result of the influences from households and culture that were more pronounced in India. The circumstances are compared to those of infant African babies born in the initial birth order.

How birth order influences child nutrition may be understood by looking at the allocation decisions and preferences of households, which in turn affect birth order and child health patterns. The take-up of services is a major factor in birth order effects. When a family has more children, they can only afford to devote so much money to their health and education. Children born later in the family's birth order benefit less from this resource dilution than those born earlier (Jayachandran & Pande, 2013). Furthermore, there may be a societal bias in favour of males over girls. This bias might amplify the negative impact of birth order on children's diet and health. Birth order has a stronger and more statistically significant influence on children's long-term nutritional condition (as measured by stunting) than on their short-term nutritional status (as measured by wasting) (Leticia et al., 2013).

As an additional incentive for parents to prioritize children born lower in the family tree, particularly the firstborn is the expectation that they would one day take care of their aging parents (Agola, 2012). Another factor is that in many countries, including Pakistan, a woman's parents provide the best care and, most likely, the healthiest nutrition, throughout her pregnancy and the birth of her first child. This may be one of the reasons why first-born children tend to be taller and healthier overall (Agola, 2012). There is evidence on biological, cultural, and environmental variables that benefit children of lower birth order, but there is also research that suggests the contrary.

Mmopelwa (2019) looked into alternative family structures, such as the impact of family size on wellness, as well as the order in which children are born. To investigate the within- and between-household operation, we calculate the random effects framework using data from the 2009–10 Botswana Core Welfare indication Survey (BCWIS). It is probable that children with higher birth orders will not have as good of nutrition as the childrens with lower birth orders. There are also greater differences between families than within, while there is a negative correlation between household numbers and the well-being of children. The characteristics that have been observed cannot account for higher variances. To evaluate the program under the country's national population planning objective to promote a good life, the paper advocates for additional research on the topic of intra-household allocation of resources.

Even though the percentage of births where the mom was an adolescent has significantly decreased since 1990, over sixteen million adolescents between the ages of 15 and 19 still make up over 11% of all births. In countries that are developing, teen pregnancy and child marriage have become common issues (Gibbs et al., 2012). Nearly 90% of pregnancies among teenagers in developing nations take place outside of marriage (Finlay, 2011). Many of the distinctions found among older teenagers may be related to behavioral or economic status distinctions, even though the causes of the differences in young adult and newborn outcomes are multifaceted and may differ by country (Gibbs et al., 2012). Lower birth weights, previous conceptions, and a greater incidence of mommy anemia are linked to conceptions to younger mothers.

Studies carried out in Asia, Africa, and Sierra Leone have shown that youngsters born to teenage mothers are more inclined to be underweight, have fewer possibilities for the DPT vaccination, and spend a longer stay in the hospital. Additionally, there was a higher chance that teenage mothers would know the alphabet. Investigation in Sierra Leone, for

example, has demonstrated that teenage pregnancy possesses broad monetary and social ramifications and adversely affects the health of both the expecting mother and the child. Adolescent pregnancy accounts for 40% of deaths among mothers, in accordance with UNICEF (2010) estimates.

In Tamale Metropolis, Ghana, Wemakor, Garti, and Azongo (2018) examined the dietary habits of childrens under five who had teenage and adult moms. A case-control investigation was conducted on three hundred mother-child pairs (one hundred fifty cases and 150 in number controls). Mothers' and children's demographic data was gathered via a questionnaire, and the dietary habits of the children were evaluated using anthropometry, which The WHO Child Development Standards utilized to generate anthropometric measurements z-scores that were used to assess young people's stunting, wasting, and underweight conditions(Ahmed et al., 2023). The nutritional requirements of children born to mothers who were adolescents and those born to adult mothers were compared using logistic regression analysis. Adolescent mothers' offspring had eight times higher odds of stunting [Modified Odds Ratio (AOR) = 7.56; 95% certainty interval (CI) 4.20–13.63], three times higher odds of being wasted (AOR = 2.90; 95% CI 1.04–8.04), and thirteen times higher odds of being underweight (AOR = 12.78; 95% CI 4.69–34.81) when any possible uncertainties were taken into account. Younger mothers are more likely to suffer from nutritional deficiencies in their childrens, so actions aimed at lowering that risk ought to concentrate on adolescent moms and their offspring.

Čvorović (2022) sought to determine if the age of the mother at her first marriage had any bearing on the dietary needs and growth trajectory of her Roma offspring. A population-based research investigation focusing on Roma people nationwide was the main objective. The personal level height-for-age Z (HAZ) and weight-for-age Z (WAZ) scores of children, as well as HAZ and WAZ scores less than two standard errors from the

median value of the WHO regard the population (children aged 0–59 months) and Early Pediatric Development (ECD) (children aged 36–59 months), were used as proxies for child nutritional success. The correlation between the results and the mother's age at marriage was estimated using multiple and logistic regressions, with additional socioeconomic factors considered as potential confounders. For Serbian Roma settlements, combined information from UNICEF's fifth and sixth The act of Indicator Cluster Surveys were utilized. births (n = 2652) from ever-married women aged 15–48 years, ranging in age from 0 to 59 months. Overall, 64% of women who married before turning 18 had low ECD scores, 19% of their children were stunted, and 9% wasted. The dietary needs or developmental stage of Roma children was not correlated with the mother's age at the time of her initial marriage. Children's weight at birth (ages 0 to 24) has been shown to be the most reliable indicator of their dietary requirements. Compared to girls, boys had a higher probability to be shorter in length more malnourished, and wastage. The mother's literacy protected against poor dietary and developmental results, but the age of the child, mother parity, and inadequate restroom facilities adversely affected the child's diet.

Mother's risk variables for underweight between children under five were identified by Sigdel, Sapkota, Thapa, Bista, and Rana (2020). A community-based case-control investigation was carried out in a small village in the Chitwan District of Nepal. Children with low weight for their age were classified as instances, while childrens who had normal weight for their age were classified as substitutes. In order to gather the data, mothers of 186 controls and 93 cases were asked to participate in interviews. Almost a third (31.2%) of underweight children were between the ages of 13 and 24 months, and over one fifth (51.6%) consisted female. Individuals in the bottom quintile of wealth accounted for nearly 30% of the cases, and 82% of the cases involved families that experienced food

insecurity. According to a logistical regression analysis, children of mothers with no formal education had a 1.48-fold increased risk of underweightness (95% likelihood interval [CI]: 1.53–3.07)) compared with children whose mothers were literate. In comparison with mothers who finished their postnatal therapy (95% CI: 1.24–8.03), children with mothers who had not finished their PNC were 3.16 periods more likely to be underweight. Children with mothers who made no money at all had 5.13 periods the odds that they would be underweight (95% CI: 1.27–20.71); childrens who experienced a bout of diarrhea within a month had 2.09 times the likelihood of becoming underweight (95% CI:1.02–4.31) contrasted to those who did not. Children who received good care from relatives outside their mothers were 6.05 times more probable to be underweight (95% CI: 1.44–25.42). It is important to motivate women to care for their children on their own, to use PNC services, and to take preventative measures against diarrhea in their children. Additionally, supportive elements like education and bigger paychecks for women can aid in the decrease of childhood nutritional deficiency.

Tchuente et al., (2024).investigated, in a sample of economically disadvantaged nations in the African continent, Asia, and Latin America, the impact of an early mother birthing age on the height-for-age of the first-born children. Utilizing longitudinal information from 18 countries' Demographic Health Surveys, the firstborn child of mothers between the ages of 15 and 24 as well as several possible distracting factors, such as mother's height, were chosen. The child's length/height-for-age z-scores (HAZs) were calculated in age ranges of 0–11, 12 to 23, 24 to 35, 36 to 47, and 48 to 59 months. The HAZ was initially contrasted between the 15–17, 18 to 19, and 20 to 24-year-old mother age groups. Low child HAZ and young mother age were found to have significant bivariate correlations (71 for 180 feasible cases; at $p<0.10$), however, most of both of these did not hold true when confounding factors were taken into account (41 cases, or 23% of the

180). After adjusting for confounders, a significant relationship was observed among lower infant HAZ and lower mother's age among childrens under twelve months of age across three out of seven Asian countries as well as six out of eight African countries (15–17 or 15–19 years vs. the older age the group). After a full year, the association (modified) persisted in 12 of the 18 nations in the continents of Africa, Asia, and Latin America. Around nine percentage points (ppts) of stunted development differed for children among maternal age groups in Asia, 14 ppts in the African continent, and 10 ppts in Latin America. These data don't indicate if this is caused by, say, non-included socioeconomic variables, the growing impact of limitations on intrauterine growth, or the child-rearing or caring practices among young mothers as well. It is thought that the latter is very likely.

2.4 Cultural Factors and Malnutrition among Under-Five Children

The term culture is used to describe the shared worldview, norms, and practices of a group of people. Cultural customs are outward representations of internal values and norms. Internal beliefs, family roles, social status, and choices and behaviors in nonverbal communication are all impacted by cultural norms and expectations. Ethnicity is a broad cultural category that includes but is not limited to shared ancestry and language. Traditional diets have evolved as a result of changes made by successive generations. Food availability and shifts in work and school schedules frequently contribute to this "acculturation" in a new nation with different cultural norms. Because of this, people of all sorts embrace the cuisines that are typical of their new location. When immigrants or their descendants accept the values and norms of the dominant culture, this process is known as assimilation. The production and distribution networks of food and the availability of food assistance programs are also important determinants of eating patterns (Kittler et al., 2012).

It is commonly known that eating habits are influenced by cultural norms within neighborhoods. Hunger disproportionately affects children under under the age of five. Insufficient food supply exacerbates the challenges that ASAL already faces. Pastoral villages and ASAL counties in Kenya are examples of areas with food insecurity. The Maasai have traditionally eaten a healthy diet, with the exception of their fondness for raw food and their tradition of exclusively nursing. It's possible that your body would get all it needs from a diet that only included these foods. However, Karienye (2017) notes that pastoralists' dietary modifications have persisted as a result of western cultural influences and the drop in animal output brought on by climate change.

According to Peter et al. (2015), globalization leads some traditional cultures to evolve in order for them to be compatible with the changes that are taking place in emerging nations. A person's cultural views provide insight into the kind of diets they consider to be necessary, diets they consider to be less essential, and diets that should not be eaten. Ethnicity is regarded a major explanatory variable in the examination of variance in child malnutrition since cultural norms and expectations vary by social grouping. This is mostly due to the fact that women have little means of support and that males are trusted with making important family decisions in patriarchal societies. Child health and, by extension, malnutrition, vary considerably with ethnicity in nations with substantial ethnic variety, particularly in rural regions. The most significant barrier to a successful nutritional development program is people's ingrained cultural or traditional attitudes on eating. Rice is a sign of life and a need for newborns since it has been shown to be a great meal in South and Southeast Asia. Protective foods like eggs are not offered to children due to the cultural notion that they are too hot for them, while other meals are avoided or provided in limited amounts.

Due to the prevalent aspects that eating fish might lead to the development of worms, it is forbidden in Malayan households in which small children are prevented to consume fish, despite the fact that it is an excellent source of both protein and vitamins. Instead, according to IFRI (2015), cereals should be the main food type that is provided to a child who is being weaned from breast milk or formula. Children younger than five are particularly impacted by malnutrition, according to Yangchen, Tobgay, and Melgaard (2017). This is because different ethnic groups and tribes have different eating habits, especially when it comes to how they use the environment and sanitation. This is particularly valid for childrens who reside in places with inadequate access to clean water and sanitary facilities. This is especially true for childrens who reside in areas with limited availability of toilets and clean drinking water. Patton, Sawyer, Santelli, Ross, Afifi, Allen, and Kakuma (2016) found that a Muslim child has a far greater likelihood of surviving to see their first birthday than a Hindu child. The study they conducted was done in India. This is true even though Muslims are more unlikely to enjoy access to public services like water pipes as well as medical facilities, and they also have fewer advantages in terms of disposable income, consumption, and degree of education.

Babies who are raised in communities where there is a sizable Muslim population have a higher chance of staying alive the initial year of life than those who are raised in Hindu neighborhoods. Since those around them are more inclined to share their cultural and religious beliefs, children of Hindu and Muslim faiths typically perform better academically in areas with a significant Muslim population. A number of child health indicators have a negative relationship with the number of Muslim families in an area, with the exception of sanitation, which has a beneficial relationship with the existence of Muslim households as well. The vast majority of Hindus in India urinate outdoors more frequently than the the nation's minority Muslim society as a whole per investigation by

Geruso and Spears (2018). This is true even though the Hindu community enjoys economic advantages. This includes the spaces behind bushes, beside roads, and in open fields.

Chege, Kimiywe, and Ndungu (2015) looked into how these childrens' eating habits might be influenced by their culture. Six focus conversations in groups with ten moms each were held in two randomly chosen villages in the Sajiloni location of Kajiado County. The results of the investigation indicated that childrens mostly eat cereals and legumes. Most children are unable to purchase animal products due to nomadism. Cattle are usually killed on special occasions because they are thought to be a symbol of money. Furthermore, it is discouraged to sell creatures or animal-derived goods, which would reduce revenue and enhance the grocery basket. Food taboos restrict the variety of foods available in the home by forbidding the ingesting of wild animals, poultry, and fish. The intake of vegetables is restricted because they are thought of as animal feed. The idea that land should only be used for feeding leads to low crop yields and use, which implies that diets aren't very diverse. Blood, animal milk, and bitter plants are introduced to infants who are less than six months old in Maasai culture, which has an impact on sole breastfeeding.

In the Devbhumi Dwarka district of Gujarat State, India, Umallawala et al. (2022) investigated the community-level factors contributing to hunger among children who were undernourished and those who were well-nourished. A qualitative study with targeted ethnographic approaches was conducted. We conducted extensive interviews of sixty families in a home cooking setting. Each children was watched for a total of three days in a row at their homes. A variety of thematic strategies were employed to analyze the data. According to the study, the main community-based factors that contribute to inadequate nourishment were unsuitable feeding practices, poor economic status,

sufficient hygiene and sanitation procedures, a lack of variation in food, use of wellness facilities, and difficulties related to childbirth.

2.5 Theoretical Framework

The following theories served as the basis for this investigation: Theories of community structure, classical theory, dysadaptation, and free radicals postulated by Golden. However, this study was guided by the community organization theory.

2.5.1 Community Organization Theory

According to Bracht (1999), community organization theory is defined as a planned process that activates a community to utilize its own social structures and any resources that are available to fulfill community objectives that are set largely by community representatives and are typically compatible with local values. Community goals are generally consistent with local values. This term was taken from Bracht's book "Community Organization Theory," which you may get by clicking here. Participants in the program are encouraged to work together toward the achievement of the program's aims, which include carrying out a variety of projects meant to improve the community's health as a whole. Within the framework of community organization theory, "primary prevention" places the major emphasis on the community's individual members. The results of a team of researchers (Glanz et al., 2008) suggest that the techniques outlined in community organizing theory may have been used in the past in an effort to bring about social change.

According to Glanz et al. (2008), the WHO expressed interest in the use of such ideas during the 1980s as a means of encouraging individuals to exercise agency over the factors that affect their health. It was suggested that this interest was a manner of using such ideas as a means of motivating folks to exercise agency over the things that impact their health. It is considered that when people have an active part in the factors that impact

their health, this will result in more consistent conditions and habits for those persons. People need to feel empowered to take action in order for them to be able to recognize problems, find solutions to those problems, and achieve justice for themselves in relation to the issues that affect their life. (Glanz et al., 2008) points out that this is one of the primary reasons why community organization theory is so essential. As health education should, according to Glanz and colleagues, begin with the people, community organizing is the most crucial theory to adopt when putting health education into practice. If health education is suited to the needs of the community and starts with an analysis of those requirements, there is a greater likelihood that it was effective.

2.5.2 The Dysadaptation Theory

This suggestion came from Gopalan. According to this theory, children who suffer from marasmus may have developed compensatory mechanisms to make up for the low protein content of their diet. Because their parents adhere to the adaptation paradigm, these children are not at risk for developing edematous malnutrition. The figure that follows demonstrates adaptation in its most fundamental form. The instances of kwashiorkor did not support the success of this concept of adaptation. These children's bodies were able to turn the protein in the food they ate into useful types of energy. As a defense mechanism against persistent infection, the body will produce acute phase reactants from the protein in the food. Because of this, the newborn with kwashiorkor develops hypoalbuminemia, which eventually results in malnutrition and edema.

2.6 Conceptual Framework

The concept put forth by Mosley and Chen, which suggests that the impact of five immediate factors on the health of the population can be classified into five groups, served as the inspiration for this investigation. This structure categorizes and identifies several temporary variables or factors that have a significant impact on the likelihood of

experiencing morbidity or death. Social and economic factors influence those variables, which in turn impact children's safety. Each of the four groups of variables are primarily concerned with a population's social assistance patterns. Conditions like infections and inadequate nutrition are typically transient, with possible outcomes including complete recovery, a degree of persistent growth (or other survival handicap), and/or death. The conceptual structure provided in Figure 2.1 below was used in the present investigation.

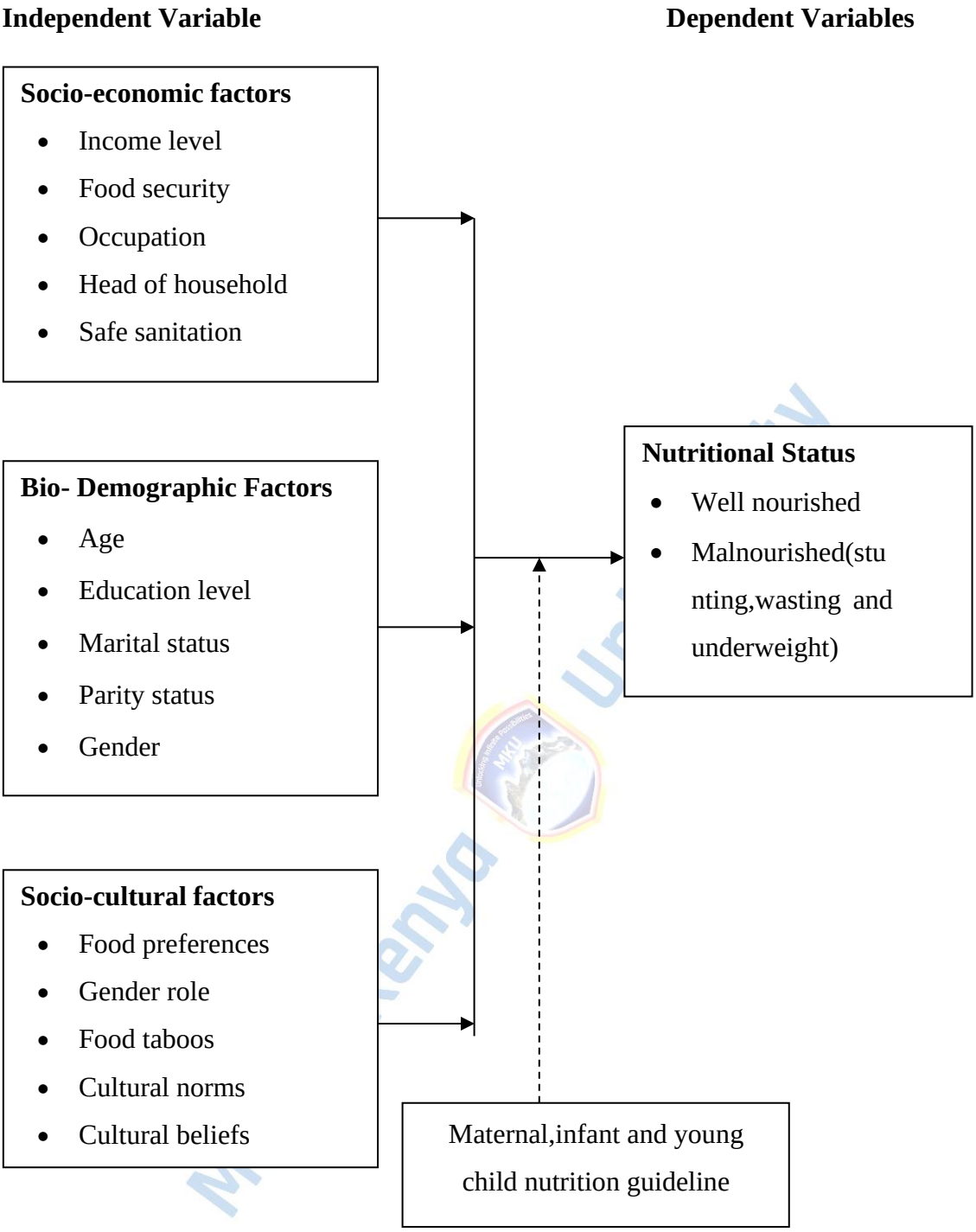

Figure 1: Conceptual Framework

Source: Researcher (2023)

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter covers data collection methods, the design of the research, the study setting, the investigation population size, the analytical unit, the sampling plan, the statistical analysis methodology, and ethical considerations. Tools for administration and data collection are also thoroughly discussed here. Furthermore, a detailed plan for reporting the results and the statistical methodologies to be employed are provided.

3.1 Study Design

For this investigation, a descriptive cross-sectional study design was employed. The research was planned with limited time and the requirement for quick data collection in mind.

A descriptive cross-sectional study design was chosen for this investigation due to time constraints and the need for rapid data collection. This design allows for the assessment of the prevalence and determinants of under-five nutritional deficiencies at a specific point in time. It is cost-effective, efficient, and suitable for identifying associations between nutritional status and various bio-demographic, economic, and cultural factors.

3.2 Study Area

The county of Tana River, which is part of Kenya's Coastal region and has around 38,437 km2, served as the research site. There are an estimated 315, 943 people living there as per the KNBS 2019. Counties to the west, north, east, and south of Tana River County include Kitui County, Garissa County, Isiolo County, Lamu County, and Kilifi County. Bura, Galole, and Garsen are the three sub-counties that make up the County as a whole. Pastoral, Marginal Mixed Farming, Mixed Farming, and National Park are the four primary economic zones of Tana River County. A 2024 SMART survey conducted by

the County Department of Health, with support from UNICEF and other partners, assessed the nutritional status of children aged 6 to 59 months. The survey found a global acute malnutrition (GAM) rate of 13.1%, indicating a serious nutrition situation according to World Health Organization (WHO) classifications

This bimodal rainfall pattern, which is frequently unexpected, occurs when the rains are long between April and June, and they are short between October and December. Rainfall that is less than an inch an hour is adequate for the mixed farming and pastoral lifestyle zones, even if longer rains are required for the mixed farming and pastoral lifestyle zones. In comparison, the remainder of the nation receives between 220 and 500 millimeters of precipitation on an annual basis, while the mixed agricultural zone receives between 750 and 1250 millimeters. July is the month with the lowest average high temperature, while September and January are the months with the highest average high temperature, reaching 38 degrees Celsius on average.

The months of December and October are the driest in this county. The highest peaks in the County are Minjila and Bilbil, however, most of the area is flat. From its source in neighboring Tharaka Nithi County in the north to its mouth in the Indian Ocean in the south, the River Tana flows through the county's eastern Tana Delta, covering a distance of about 500 kilometers and providing residents with a means of subsistence in the form of flood-reduced crop farming.

3.3 Variables of the Study

3.3.1 Dependent Variable

The variable that was dependent in this study was nutrition status(normal nutrition status and malnutrition) in children between the ages of 0 and 59 months.

3.3.2 Independent Variables

The investigation's independent variable comprised the subsequent parameters;

1. In social economic factors, the following variables were examined; employment status, household income, occupation type, and mother's workload.
2. The following parameters pertaining to bio-demographic variables were scrutinized: age, education level, marital status , parity status, and gender.
3. Concerning social-cultural factors, the following parameters were examined, food preferences,gender role,food taboos, cultural norms, and beliefs.

3.4 Study Population

A population, as defined by Mugenda & Mugenda (2013), is any group of individuals, occasions, or objects that satisfy specific requirements and have a common set of characteristics. Participants of the families staying in Tana River, Tana North, was included in the research population in this investigation. Tana River County is made up of three districts: Tana North, Tana River, and Tana Delta. Together, these districts occupy an area of 38,782 km², and their predicted population is 245,204.

3.5 Target Population

The target population was mothers and other caregivers for young children below 5 years of age. The three-month study period runs from January to April of 2024. The investigation focused on participants who were going to Child Welfare Clinics in particular government-run medical centers in Tana River County (Bura sub-county hospital and Hola County Referral Hospital).

3.6 Criteria for Inclusion and Exclusion

3.6.1 Criteria for Inclusion

Mothers and other caregivers of children under five who have resided in the region for over a year before the investigation began were enlisted.

3.6.2 Criteria for Exclusion

Mothers and other caregivers who had childrens who have illnesses or conditions that could influence the research's findings were excluded. Similarly, any potential participant with a parent who suffers from schizophrenia were also excluded.

3.7 Sample Size and Sample Determination

385 people were needed as the sample size for the research. By utilizing proportion as an estimate and the Standard Error (S.E.) below, the population size was determined.

$$n = \frac{P(100\% - P)}{(S.E)^2}$$

Where;

n – Desired sample size of the sample for the investigation.

P – Proportion of children under five assumed to be malnourished during the investigation period. $S.E = \frac{5}{1.96} = 2.55$

$$n = \frac{50\%(100\% - 50\%)}{(2.55\%)^2} = \frac{2500}{6.50} = 384.61 \cong 385$$

3.8 Sampling Criteria

The Tana North Sub-County was selected for this study using a systematic random sampling technique, in which the investigator chose samples at regular intervals from a numbered population. A proportional-to-size sampling method was employed to ensure an even distribution of randomly selected participants from accessible villages. The sampling process involved listing all households within a village or cluster and then randomly selecting homes for in-person interviews. Every child aged 0 to 59 months in the selected households was assessed.

For this study, a household was defined as a group of individuals who share a kitchen and prepare meals together. In cases where a polygamous family lived in a compound with multiple buildings but each wife maintained a separate kitchen, each unit was treated as a distinct household. If a respondent or child was unavailable during the scheduled

household visit, the researcher left a note and returned at a later time to collect the missing data. However, the substitution of households was not permitted.

3.9 Data Collection Tools

A structured questionnaire was used to obtain quantitative data. A structured questionnaire was used to collect quantitative data which had four sections; The tool's Section A collected information on the nutrition status of children under five years, in this section anthropometric measurements such as weight, and height were captured.. Section B collected information on the bio-demographic data of the study respondents, Section C on social-economic factors, and Section D on social-cultural factors associated with the nutrition status of children under the age of five years.

3.10 Pretesting of the Tool

Each survey item, the full questionnaire, and/or the answer scales was put through a pilot test to ensure their validity and reliability before the main research began (Bailley, 2011). Tana River is where it took place. The researcher evaluated many aspects of the questionnaire in the pilot study, including its readability, length, number of questions, repetition, and potential for offending respondents. This was useful in determining the survey's reliability. A checklist and a survey were provided to gather information on cultural, biodemographic, and socioeconomic aspects of society. Further data collection on children's height while standing, lying down the length and weight was aided by a healthcare professional with an education as the highest degree of schooling, using an anthropometric tool.

3.11 Data Collection Procedure

Before starting data collection, approval for ethics was obtained from the National Commission for Science, Technology, and Innovation and the Research and Ethics Committee (MKUREC) of Mount Kenya University. Two weeks before the start of data

collection, the investigator put together a team of four investigator assistants. The study's four research assistants were briefed on the project's goals, how to get informed permission, and data collection/extraction/summarization procedures before the researcher set out into the field. Preliminary research was conducted by the team a week before the major fieldwork began. The team coordinated with the County administration to get permission to visit the selected communities before making any trips there. Every day, they submitted a standardized summary of the day's cases to the study's lead investigator. The data was summarized by the main investigator and then prepared for coding and analysis in an Excel spreadsheet.

3.12 Methods of Data Analysis

The summary of the investigation was quantitatively analyzed using descriptive statistics, and the bivariate analysis of variance employed cross-tabulations to determine the relationship between specific socioeconomic, bio-demographic, and cultural variables and the nutrition status of children under the age of five years.

3.13 Validity and Reliability

3.13.1 Validity

A doctor with expertise in the health of women and children examined the data collection tools in the current investigation to guarantee their accuracy. Administrators examined the data-gathering instruments to ensure that all the required data was being collected accordingly.

3.13.2 Reliability

Reliability was assessed using SPSS version 26, and internal uniformity was measured using the Cronbach alpha coefficient. These metrics assess how well the information collection instruments function over time when employed with the same those who participate in studies. In the present investigation's evaluation, a kappa value of 0.7 was

deemed satisfactory. In this study, the Cronbach alpha coefficient was 0.88 meaning the data collection tools were reliable for data collection.

3.14 Data Management and Analysis

Before being entered into the Statistical Package for Social Sciences (SPSS) version 26 for analysis, the collected data was cross-checked and verified for accuracy and completeness using Microsoft Excel to avoid double entry. Descriptive statistics were used to analyze the data, which were then displayed as tables and percentages. The bivariate analysis used was a chi-square test for independence. For significant variables, a p-value of less than 0.05 served as the cutoff point. Significant variables were imported into the binary logistic regression from the bivariate analysis. Binary logistic regression was utilized to identify the variables that exhibited a significant association with nutrition status.

3.15 Ethical Consideration

The Research and Ethics Committee (MKU-IREC) of Mount Kenya University provided both the ethics approval certificate and an introductory letter. Following this, the researcher applied for a research license from the National Commission for Science, Technology, and Innovation (NACOSTI). The research team sought official consent from clinic administrators before commencing data collection. Ethical guidelines were strictly adhered to, ensuring the confidentiality and anonymity of participants. The collected data was used exclusively for the study. Participants were informed about the study's purpose, assured that their privacy would be protected, and given the freedom to withdraw from the research at any time. Additionally, they were only required to respond to the study questionnaire, and their names would not appear in any reports. All participants provided informed consent, and relevant authorities were duly notified.

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CHAPTER FOUR

RESEARCH FINDINGS/RESULTS AND DISCUSSIONS

4.1 Introduction

This section provides the research response rate, the prevalence of nutrition status, the bio-demographic data, and social economic, and cultural factors associated with the nutrition status of the under five.

4.2 Questionnaire response rate

This research administered 385 questionnaires to eligible study participants. The response rate of this study was (91%) indicating that 350 of the study questionnaires were considered fit for the analysis of data.

4.3 Prevalence of nutrition status

Table 1 below provides descriptive statistics of the study participants' nutrition status. More than half (64.9%) of the study participants had normal nutritional status while more than a quarter(35.1%) of the study participants had malnutrition. However, another investigation carried out in India recorded a higher prevalence rate of (46%) of malnutrition (Anand & Sharma, 2023), while another research conducted in Ethiopia recorded a lower prevalence rate of 26.4% of malnutrition (Yimer & Wolde, 2022). The difference between recorded prevalence could be attributed to differences in sampling procedures and the locality of the studies where they were conducted. Among the study participants who had malnutrition, 41.4% of the study respondents had wasting, while more than a quarter (36.6%) were underweight. The findings also indicate that only (22%) of the study participants had stunting.

Table 1: Study Respondent's Nutritional Status

Independent variables	Categories	Frequencies	Valid percentage
Nutrition status	Normal nutrition status	227	64.90%
	Malnutrition	123	35.10%
Type of malnutrition	Wasting(weight for height)	51	41.40%
	Stunting(height for age)	27	22%
	Underweight (Weight for age)	45	36.60%

Source: Field Data

4.4 Bio-Demographic Characteristics Associated with Nutritional Status

4.4.1 Bio-Demographic Characteristics of the Study Respondents

Table 2 below provides descriptive statistics on the bio-demographic characteristics of the study respondents. Concerning the age of the study respondents, 135(38.6%) of the study participants were infants aged 12-23 months, while, 105(30%) of the study respondents were aged between 0-11 months, 20(5.7%) of the study participants were aged 36-47 months. Findings on the education status of the guardians, 109(31.1%) of the study respondents had no formal education which could be linked to the poor devolvement of the education system in this region coupled with poor infrastructure to support the education system. 37(10.6%) of the study respondents had a tertiary level of education. Concerning the marital status of the guardians, 231(66%) of the study respondents were married while 56(16%) of the study respondents were separated. Concerning the provision of health education on under-five health and well-being, 191(54.6%)of the study respondents reported to have never been provided with health education which could be linked to a lack of health education and promotion programs on the under-five health and well-being. Among those who reported having been provided with health education, 86(54.1%) of the study respondents reported this information being

provided by community health workers while 11 (6.9%) reported this information being provided by the media. Concerning the parity status of the guardians, 168(48%) of the study participants were multiparous while 182(52%) of the study respondents were primiparous. Concerning the gender of the study respondents, 166(47.4%) were males while 184 (52.6%)of the study respondents were females. Lastly concerning the presence of multiple births among guardians, 338(96.6%) of the study participants had no multiple births while only a few(3.4%) of the study participants had multiple births. Of those who had multiple births, 10(83.3%) were twins while 2(16.7%) were triplets.

Table 2:Bio-Demographic Characteristics of the Study Respondents

Independent variables	Categories	Frequencies	Valid percentage
Age	0-11	105	30%
	Dec-23	135	38.60%
	24-35	28	8%
	36-47	20	5.70%
	48-59	62	17.70%
Education level	No formal education	109	31.10%
	Primary	73	20.90%
	Secondary	131	37.40%
	Tertiary	37	10.60%
Marital status	Married	231	66%
	Single	63	18%
	Separated	56	16%
Health education	Yes	159	45.40%
	No	191	54.60%
Source of health education	Health facility	17	10.70%
	CHV	45	28.30%
	Media	11	6.90%
	CHW	86	54.10%
Parity status	Primi	182	52%
	Multi	168	48%
gender	Male	166	47.40%
	Female	184	52.60%
Multiple births	Yes	12	3.40%
	No	338	96.60%
Type of multiple birth	Twins	10	83.30%
	Triplets	2	16.70%

Source: Field Data

4.4.2 Bio-Demographic Characteristics Associated with Nutritional Status

As indicated in Table 3 below, Concerning the age of the study respondents, 53(50.5%) of the study participants who had mal-nutrition were aged between 0-11 months. While exclusive breastfeeding for the first six months of life is recommended by organizations like the World Health Organization (WHO), not all mothers are able to breastfeed exclusively due to various reasons such as insufficient milk production, maternal illness, or lack of knowledge about the importance of exclusive breastfeeding which increases the risk of malnutrition in this age group. There was a statistical association between age and nutrition status when the chi-square test for independence was conducted($\chi^2=16.986, df=4, p=0.002$).

As indicated in Tables 3, Concerning the guardian's education level, 41(64.9%) of the study respondents who had a normal nutrition status had their guardians attained a tertiary level of education. Caregivers with higher levels of education tend to have better knowledge and awareness of proper infant feeding practices, including the importance of breastfeeding, timely introduction of complementary foods, and nutrition requirements during infancy. They are more likely to receive and understand information provided by healthcare professionals or through educational materials. There was a statistical association between education level and nutrition status when the chi-square test for independence was conducted ($\chi^2=13.516$, df=3,p=0.004).

As indicated in Table 3 below, concerning the marital status of the guardian, 25(39.7%) of the study respondents were malnourished, their guardians reported being single, while 150(64.9%) of the study respondents who had a normal nutrition status, their guardians reported being married. Marriage may provide access to shared economic resources, such as dual incomes or financial support from a spouse, which can improve the household's

ability to afford nutritious foods and healthcare services for infants. Financial stability can reduce the risk of food insecurity and ensure that infants have access to a diverse and balanced diet necessary for optimal nutrition. There was no statistical association between marital status and nutrition status when the chi-square test for independence was conducted($\chi^2=1.133, df=2, p=0.57$).

The results from this study were consistent with those of a study carried out in Burkina Faso where marital status was not associated with the nutrition of children aged 6-59 months (Picbougoum et al., 2023). This was contrary to an investigation conducted in sub-Saharan Africa where being married increased the odds of having a normal nutrition status among under-five infants(Amadu et al., 2021).

As indicated in Table 3, concerning the gender of the study participants, 130(70.7%) of the study respondents who had normal nutrition status were females while 69(41.6%) of the study participants who had malnutrition were males. Gender dynamics within households can influence how food and resources are allocated among family members, including infants. In some households, male infants may receive larger portions of food or higher-quality foods compared to female infants. This can contribute to disparities in nutrition status between male and female infants. There was a significant statistical association between the gender of the study respondents and nutrition status when the chi-square test for independence was conducted($\chi^2=5.716, df=1 p=0.02$). However, this didn't replicate in the Binary Logistic Regression Analysis (p=0.26).

The study findings were in agreement with those of a study done in Ethiopia gender of the child was not statistically associated with the nutrition status of the child (Amare et al., 2019). However, another study conducted in Malawi was contrary to these outcomes as being a female infant reduced the odds of malnutrition(Tione et al., 2022).

As indicated in Table 3, concerning the parity status of the study participants' guardians, 71(42.3%) of the study respondents who had mal-nutrition had their guardians being multiparous while 130(71.4%) of the study respondents who had a normal nutrition status had their guardians being primiparous. The health and nutritional status of the mother can impact the nutrition status of the infant. Multiparous women may have experienced the physiological stress of previous pregnancies and childbirth, which could affect their overall health and nutritional status during subsequent pregnancies. This can indirectly influence the health and nutrition status of their infants. There was a significant statistical association between the parity status of the study respondents' guardians and nutrition status when the chi-square test for independence was conducted($\chi^2=7.184, df=1, p=0.007$).

The findings in this study as tabulated indicated in Tables 3 and 4 below, concerning the provision of health education on infant feeding practices, 82(42.9%) of the study respondents who reported never receiving health education on infant feeding practices had infants who were malnourished while 118(74.2%) of the study respondents who had a normal nutrition status, their guardians reported to have received health education on infant feeding practices. Hence health education programs emphasize the benefits of exclusive breastfeeding for the first six months of life and continued breastfeeding with appropriate complementary foods up to two years of age or beyond. Breastfeeding provides infants with essential nutrients, antibodies, and other bioactive components that support optimal growth and development. There was a significant statistical association between the provision of health education among guardians of the study respondents and the nutrition status of the infants when the chi-square test for independence was conducted($\chi^2=11.191, df=1, p=0.001$).

Lastly, As indicated in Table 3, concerning the guardians of the study respondents having multiple births, 71(42.3%) of the study respondents who had malnutrition had their guardians having multiple births. Multiple births often result in smaller birth weights for each infant compared to singletons. As a result, multiple-birth infants may have increased nutritional needs to support their growth and development, including higher calorie and nutrient requirements. There was no significant statistical association between having multiple births and the nutrition status of the infants when the chi-square test for independence was conducted($\chi^2=1.861, df=1, p=0.17$).

These findings were in agreement with another study carried out in Somalia where having multiple births was not associated with the nutrition status of children below the age of five years (Kebede & Aynalem, 2021). However, another study conducted in Ethiopia found an association between having multiple births and nutrition status(Kassie & Workie, 2020).

Table 3:Bio-Demographic Factors Associated with Nutrition Status

Independent variables	Categories	Dependent variable (Nutrition status)		Statistical Significance (Chi-square test)
		Well-nourished (N=227)	Mal-nourished (N=123)	
Age	0-11	52(49.5%)	53(50.5%)	χ^2=16.986 df=4 p=0.002
	Dec-23	97(71.9%)	38(28.1%)	
	24-35	22(78.6%)	6(21.4%)	
	36-47	15(75%)	5(25%)	
	48-59	41(64.9%)	21(35.1%)	
Education level	No formal education	56(51.4%)	53(48.6%)	χ^2=13.516 df=3 p=0.004
	primary	54(74%)	19(26%)	
	secondary	93(71%)	38(29%)	
	tertiary	24(64.9%)	13(35.1%)	
Marital status	married	150(64.9%)	81(35.1%)	χ^2=1.133 df=2 p=0.57
	single	38(60.3%)	25(39.7%)	
	separated	39(69.6%)	17(30.4%)	
Health education	yes	118(74.2%)	41(25.8%)	χ^2=11.191 df=1 p=0.001
	no	109(57.1%)	82(42.9%)	
Parity status	Primi	130(71.4%)	52(28.6%)	χ^2=7.184 df=1 p=0.007
	multi	97(57.7%)	71(42.3%)	
gender	male	97(58.4%)	69(41.6%)	χ^2=5.716 df=1 p=0.02
	female	130(70.7%)	54(29.3%)	
Multiple births	yes	10(83.3%)	2(16.7%)	χ^2=1.861 df=1 p=0.17
	no	217(64.2%)	121(35.8%)	

4.4.3 Binary Logistic Regression on Bio-Demographic Factors

As provided in Table 4, In the Binary Logistic Regression Analysis age of the study respondent was an independent factor for nutrition status(p=.001). In addition, study respondents aged 0-11 months were 2.2 times more likely to have malnutrition as compared to study participants aged 48-59 months. After six months of age, infants need complementary foods alongside breastfeeding to meet their increasing nutritional needs. However, the introduction of complementary foods is often delayed or inadequate, leading to deficiencies in essential nutrients. Furthermore, inadequate sanitation and hygiene practices during this period can increase the risk of infections and illnesses among infants, which can further exacerbate malnutrition by affecting their appetite, nutrient absorption, and overall health.

The findings from this research were consistent with those of a study done in Tanzania where children aged below the age of one year were at higher odds of getting malnutrition as compared to those children aged 24 months and above (Mmbando et al., 2022). However, another study conducted in Kenya was not in agreement, as age was not found to be associated with nutritional status among infants under the age of five(Olack et al., 2011).

In the Binary Logistic Regression Analysis, the level of education of the study respondent was an independent factor for nutrition status(p=.03). In addition, having a guardian who had no formal education reduced the odds of having a normal nutrition status by 1.9. Mothers with lower education levels are less likely to initiate breastfeeding and more likely to discontinue breastfeeding prematurely. This can deprive infants of the optimal nutrition and protective factors found in breast milk, increasing their risk of malnutrition and infections. In addition, caregivers with lower education levels may lack knowledge about appropriate complementary feeding practices, such as introducing nutrient-rich

foods at the right time and in the right consistency. They may rely on inexpensive but nutritionally inadequate foods or resort to early introduction of solid foods, which can compromise infant nutrition.

The findings from this study were in agreement with those of a study done in Zambia where lack of formal education among caregivers increased the odds of having a malnourished child by 4.5(Mitsunaga & Yamauchi, 2020). However, another research conducted in Ethiopia was not in agreement, as education level was not associated with the nutrition status of the under-five(Abdulahi et al., 2017).

Parity status was not an independent factor for nutrition status in the Binary Logistic Regression Analysis (p=0.07). The study findings were concurrent with those of a study done in Ethiopia and Ghana where the parity status of the guardians did not influence the nutritional status of their children (Boah et al., 2019; Gebreegziabher & Regassa, 2019). However, another study conducted in Rwanda was contrary to these outcomes as having a primiparous mother increased the odds of having a normal nutrition status among infants (Nshimyiryo et al., 2019).

In the Binary Logistic Regression Analysis, health education on infant feeding practices was an independent factor for nutrition status(p=.04). In addition, having a guardian who had been provided with health education on infant feeding practices increased the odds of having normal nutrition status by 2.3. Health education programs address barriers that caregivers may face in providing optimal nutrition for their infants, such as cultural beliefs, economic constraints, and lack of access to resources. By raising awareness and providing practical solutions, these programs empower caregivers to overcome obstacles and make informed decisions about infant feeding. In addition, Health education emphasizes the importance of hygiene and food safety practices to prevent contamination and foodborne illnesses in infants. Caregivers learn proper techniques for preparing,

storing, and handling infant foods to minimize the risk of infections and ensure the safety of the infant's diet.

Study findings were in harmony with those of a study carried out in Ghana where the provision of health education on infant feeding increased the odds of having a normal nutrition status among those under-five(Aboagye et al., 2022). This was contrary to another study carried out in Ethiopia where the provision of health education on matters related to child nutrition was not associated with the nutrition status of children below the age of five years(Ahmed et al., 2023).

Table 4:Binary Logistic Regression Analysis on Bio-Demographic Factors

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.	
								Lower	Upper
Step 1a	Age of the infant			19.964	4	0.001			
	0-11	-0.803	0.357	5.056	1	0.025	2.232	1.109	4.495
	12-23	-0.409	0.352	1.351	1	0.245	0.664	0.333	1.324
	24-35	-0.616	0.566	1.185	1	0.276	0.54	0.178	1.637
	36-47	-0.562	0.633	0.787	1	0.375	0.57	0.165	1.972
							ref		
	education level of the caregiver			14.153	3	0.03			
	No formal education	0.692	0.428	2.613	1	0.006	1.997	1.863	4.622
	primary	-0.497	0.469	1.119	1	0.29	0.609	0.243	1.527
	Secondary	-0.186	0.428	0.188	1	0.664	0.831	0.359	1.92
							ref		
	provided with health education(1)	-0.853	0.252	11.437	1	0.04	2.3	0.26	0.699
							ref		
	Primi	-0.675	0.249	7.358	1	0.07	0.509	0.313	0.829
							ref		
	Male	0.552	0.247	4.98	1	0.26	1.736	1.069	2.818
							ref		
	Constant	**-0.288**	**0.489**	**0.348**	**1**	**0.555**	**0.75**		

4.5 Social Economic Factors Associated with Nutrition Status

4.5.1 Social-Economic Factors of the Study Respondents

Table 5 below provides descriptive statistics on the socioeconomic characteristics of the study respondents. Concerning access to safe sanitation, 191(54.6%) of the study respondents' guardians reported having access to safe sanitation which could be linked to a lack of water and other basic amenities. Regarding, the size of the household, 146(41.7%) of the study respondents had a family size of 1-3 members while 128(36.6%) of the study participant had a family size of 4-6 members. Concerning the food security status of the household, 211(60.3%)of the respondent's households were food secure while 139(39.7%) of the respondent's households were food insecure. Concerning the income level of the study respondent guardians, 220f(62.9%) of the study respondent guardians were earning between 1-10000 Kenyan shilling(Ksh) while 33(9.4%) were earning between 20001-30000 Ksh. This could be linked to poor social economic activities coupled with a high inflation rate. Concerning the occupation status of the study respondents' guardians, 142(40.6%) were unemployed while 105(30%) reported being self-employed. Lastly, concerning the head of the household of the study respondents, 278(79.4%) of the households were father-headed while 30(8.6%) of the households were relative-headed.

Table 5:Social economic factors of the Study Respondents

Independent variables	Categories	Frequencies	Valid percentage
Access to safe sanitation	Yes	191	54.60%
	No	159	45.40%
Size of the household	01-Mar	146	41.70%
	04-Jun	128	36.60%
	>7	76	21.70%
Food security status	Food secure	211	60.30%
	Food insecure	139	39.70%
Income level	0-10000	220	62.90%
	10001-20000	97	27.70%
	20001-30000	33	9.40%
occupation	Unemployed	142	40.60%
	Self_employed	105	30%
	Employed	47	13.40%
	Casual labor	56	16%
Head of the household	Father	278	79.40%
	Mother	42	12%
	Relatives	30	8.60%

Source: Field Data

4.5.2 Social Economic Factors Associated with Nutrition Status

As indicated in Table 6 below, Concerning access to safe sanitation, 139(72.8%) of the study respondents who were well nourished had their guardians reporting access to safe sanitation. Mothers are more likely to breastfeed their infants in hygienic environments. Safe sanitation facilities provide mothers with privacy and cleanliness, encouraging them to breastfeed comfortably. Breastfeeding is crucial for infant nutrition as it provides essential nutrients and boosts the baby's immune system, protecting them from infections and diseases. There was a significant statistical association between access to safe sanitation and the nutrition status of the infants when the chi-square test for independence was conducted($\chi^2=11.564$,$df=1$, $P=0.001$).

As indicated in Table 6 below, Concerning the size of the household, 105(71.9%) of the study respondents who were well-nourished had a family size of 1-3 members. Household size is often correlated with socioeconomic status. Larger households may be more likely to experience poverty or food insecurity, which can negatively affect infant nutrition status. Economic constraints may limit the household's ability to afford nutritious foods, access healthcare services, and provide a stimulating environment conducive to infant development. There was a significant statistical association between the size of the household and the nutrition status of the infants when the chi-square test for independence was conducted ($\chi^2=12.05$,$df=2$, $P=0.002$).

As indicated in Table 6 below, Concerning the income level of the study respondents' guardians, 74 (33.6%)study respondents who were malnourished had their guardians earning between 1-10000 Ksh. Higher income levels generally afford families greater purchasing power, allowing them to buy a diverse range of nutrient-rich foods, including fresh fruits, vegetables, lean proteins, and dairy products. Infants in higher-income households are more likely to have access to breast milk or formula, as well as a variety

of complementary foods that support their nutritional needs during early infancy and beyond. Conversely, lower-income households may struggle to afford nutritious foods, relying more on cheaper, calorie-dense but nutrient-poor options, which can compromise infant nutrition status. There was no significant statistical association between income level and the nutrition status of the infants when the chi-square test for independence was conducted ($\chi^2=2.85$,$df=2$, $P=0.24$).

These results were steady with another research in Burkina Faso where poverty index level was not statistically associated with the nutrition status of children aged 6-59 months (Picbougoum et al., 2023). However, another study in Pakistan was contrary to these findings income was found to influence the nutrition status of the study respondents(Ahmad et al., 2020).

As indicated in Table 6 below, Concerning the food security status of the study respondents, 154(73%) of the study respondents who were well nourished were food secure. Food security ensures that infants have access to a diverse range of nutrient-rich foods necessary for optimal growth and development. Adequate intake of essential nutrients, such as protein, vitamins, and minerals, during infancy is critical for building a strong foundation for lifelong health. Insecure access to nutritious foods can lead to deficiencies in key nutrients, increasing the risk of undernutrition, stunting, and impaired cognitive development in infants. There was a significant statistical association between food security status and the nutrition status of the infants when the chi-square test for independence was conducted ($\chi^2=15.402$,$df=1$, $P=<.001$).

As indicated in Table 6 below, Concerning the head of the household of the study respondents, 20 (47.6%) of the study respondents who were mal-nourished had mothers as head of the household. The socioeconomic status of the head of the household can impact the nutrition status of infants. Higher socioeconomic status may be associated with

greater access to nutritious foods, healthcare services, and opportunities for education and awareness about infant nutrition. Conversely, lower socioeconomic status may limit access to these resources, increasing the risk of malnutrition among infants. There was no statistical association between the head of the household and the nutrition status of the infants when the chi-square test for independence was conducted ($\chi^2=4.686, df=2, P=0.09$).

These findings were consistent with two other studies done in South Africa, the head of the household didn't influence the nutritional status of the under-five(Govender et al., 2021). Nevertheless, another study conducted in Nigeria revealed that father-headed households were less likely to have a malnourished infant(Cook et al., 2008).

As indicated in Table 6 below, concerning the occupation of the study respondent guardian, 66 (46.5%) of the study respondents who were mal-nourished had guardians who were unemployed. Caregivers who are unemployed or underemployed may face financial constraints that limit their ability to afford nutritious foods, leading to suboptimal infant nutrition and an increased risk of malnutrition. There was a statistical association between occupation and the nutrition status of the children under five when the chi-square test for independence was conducted ($\chi^2=17.37, df=3, P=0.001$).

Table 6:Social Economic Factors Associated with Nutrition Status

Independent variables	Categories	Dependent variable (Nutrition status)		Dependent variable (Nutrition status)
		Well-nourished (N=227)	Mal-nourished (N=123)	
Access to safe sanitation	yes	139(72.8%)	52(27.2%)	χ^2=11.564 df=1 P=0.001
	no	88(55.3%)	71(44.7%)	
Size of the household	01-Mar	105(71.9%)	41(28.1%)	χ^2=12.05
	04-Jun	85(66.4%)	43(33.6%)	df=2
	>7	37(48.7%)	39(51.3%)	P=0.002
Food security status	Food secure	154(73%)	57(27%)	χ^2=15.402 df=1 P=<.001
	Food insecure	73(52.5%)	66(47.5%)	
Income level	0-10000	146(66.4%)	74(33.6%)	χ^2=2.85
	10001-20000	64(66%)	33(34%)	df=2
	20001-30000	17(51.5%)	16(48.5%)	P=0.24
Occupation	Unemployed	76(53.5%)	66(46.5%)	χ^2=17.37 df=3 P=0.001
	Self-employed	82(78.1%)	23(21.9%)	
	employed	34(72.3%)	13(27.7%)	
	Casual labor	35(62.5%)	21(37.5%)	
Head of the household	father	188(67.6%)	90(32.4%)	χ^2=4.686 df=2 P=0.09
	Mother	22(52.4%)	20(47.6%)	
	relatives	17(56.7%)	13(43.3%)	

Source: Filed data

4.5.3 Binary logistic regression on socio-economic factors

As provided in Table 7, access to safe sanitation was an independent factor for nutrition status(p=.04) when Binary Logistic Regression Analysis analysis was done. In addition, lack of access to safe sanitation reduced the odds of having a normal nutrition status by 1.6. Proper sanitation practices extend beyond water and hygiene facilities to food handling and preparation. In households with inadequate sanitation, there's a higher risk of food contamination, which can lead to illnesses in both children and adults. Ensuring access to safe sanitation helps maintain food safety standards, reducing the likelihood of foodborne illnesses that could impact infant nutrition.

These verdicts were in collaboration with an investigation done in Benin where access to safe sanitation increased the odds of having a child with a normal nutrition status by 2.3 (Gaffan et al., 2023). However, another study carried out in Tanzania was contrary to these findings as they found no association between access to safe sanitation and nutrition status(Mshida et al., 2020).

As provided in Table 7, the size of the household was an independent factor for nutrition status(p=.005)when Binary Logistic Regression Analysis analysis was done. In addition, having a small household size of 1-3 members increased the odds of having a normal nutrition status by 2.7. In larger households, resources such as food and healthcare may need to be distributed among more family members, potentially leading to competition for these resources. This competition could result in inadequate access to nutritious foods for infants if resources are limited or unevenly distributed within the household.

These results were steady with another investigation done in South Africa where a large household size reduced the odds of having a well-nourished child by 5.7 (Govender et al., 2021). However, another study done in Nigeria was not in harmony with these findings

as they found no association between the size of the household and nutrition status(Otekunrin & Otekunrin, 2022).

As provided in Table 7 food security status was an independent factor for nutrition status(p=.01) when the Binary Logistic Regression Analysis analysis was done. In addition, being food insecure reduced the odds of having a normal nutrition status by 2.3. Food security enables households to provide infants with a diverse and balanced diet, incorporating a variety of foods from different food groups. Introducing complementary foods that are rich in nutrients and textures supports the transition to family foods and helps meet the evolving nutritional needs of infants. In contrast, food-insecure households may rely on a limited range of inexpensive, calorie-dense but nutrient-poor foods, which can compromise infant nutrition status and increase the risk of micronutrient deficiencies. These verdicts were in harmony with another investigation carried out in Kenya where households that were food secure increased the odds of being well-nourished by 7(Chege et al., 2016). However, another study done in Ethiopia found no relationship between food security status and nutrition status(Mulu & Mengistie, 2017).

As provided in Table 7, occupation was not an independent factor for nutrition status(p=.08) when the Binary Logistic Regression Analysis analysis was done. These verdicts were in agreement with another study in Pakistan where the occupation status of the study respondent was not associated with the nutrition of children below the age of five years(Ahmad et al., 2020). However, another study conducted in South Africa revealed that unemployment increased the odds of malnutrition by 2 among children under five(Thabathi et al., 2022).

Table 7: Binary Logistic Regression Analysis of Social Economic Factors Associated with Nutrition Status

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Occupation			11.428	3	0.08			
	Unemployed	-0.323	0.337	0.915	1	0.239	1.381	0.713	2.675
	Self-employed	0.681	0.381	3.196	1	0.074	0.506	0.24	1.068
	Employed	-0.297	0.447	0.442	1	0.506	0.743	0.309	1.784
							ref		
	food security status	0.844	0.245	11.854	1	0.01	2.325	1.438	3.759
							ref		
	size of the family			10.64	2	0.005			
	01-Mar	-1.007	0.314	10.292	1	0.001	0.365	0.198	0.676
	04-Jun	-0.767	0.315	5.923	1	0.015	0.465	0.251	0.861
							ref		
	safe sanitation	0.502	0.244	4.23	1	0.04	1.652	1.024	2.665
							ref		
	Constant	**-1.797**	**0.611**	**8.656**	**1**	**0.003**	**0.166**		

Source: Field Data

4.6 Social Cultural Factors Associated with Nutrition Status

4.6.1 Descriptive Statistics on Social-Cultural Factors

Table 8 below provides descriptive statistics on social-cultural factors. 227(64.9%) of the study respondents' guardians reported food preferences were not a factor dictating the nutrition status of children under five years. Concerning cultural beliefs and practices, 105(41.5%) of the study respondents' guardians reported the presence of cultural beliefs and practices while 205(58.6%)of the study respondents these beliefs and practices were absent. Concerning gender roles,139(39.7%) of the study respondents" guardians reported gender roles being present while 211(60.3%) reported the absence of gender roles. Concerning, food taboos, 203(58%) of the study respondents' guardians reported the absence of food taboos while 147(42%) of the study respondents' guardians reported the presence of food taboos. Regarding cultural norms and stigma, 203(58%) of the study respondents' guardians reported the absence of cultural norms and stigma while 154(44%) of the study respondents' guardians reported the presence of cultural norms and stigma.

Table 8:Descriptive Statistics on Social-Cultural Factors

Independent variables	Categories	Frequencies	Valid percentage
Food preferences	present	123	35.10%
	absent	227	64.90%
Cultural beliefs and practices	present	105	41.50%
	absent	205	58.60%
Gender role	present	139	39.70%
	absent	211	60.30%
Food taboos	present	147	42%
	absent	203	58%
Cultural norms and stigma	present	154	44%
	absent	196	56%

Source: Field data

4.6.2 Social Cultural Factors Associated with Nutrition Status

As indicated in Table 9 below, Concerning food preference, 147(64.8%) of the study respondents who were well-nourished reported an absence of food preferences. Food preferences influence the variety of foods consumed by children. Children who have diverse food preferences and are exposed to a wide range of nutritious foods are more likely to have a balanced diet that meets their nutritional needs. Conversely, limited food preferences may lead to a monotonous diet lacking in essential nutrients, increasing the risk of malnutrition. There was no statistical association between food preferences and the nutrition status of the children under five when the chi-square test for independence was conducted ($\chi^2=0.003, df=1, P=0.96$).

These results were steady with another investigation conducted in Tanzania which reported similar findings where food preference of the household was not associated with the nutrition status of children aged 6-59 months(Frumence et al., 2023). However, another study carried out in Uganda was contrary to these findings as food preferences were found to have an association with the nutritional status of children under five years(Maniragaba et al., 2023).

As indicated in Table 9 below, Concerning gender role influence on nutrition status, 68(48.9%) of the study respondents who were malnourished, their guardians reported the presence of gender roles. Gender roles may dictate differential feeding practices within households. There was a statistical association between gender roles and the nutrition status of the children under five when the chi-square test for independence was conducted ($\chi^2=19.203, df=1, P=<.001$).

As indicated in Table 9 below, regarding cultural norms and stigma, 70(45.5%) of the study respondents who were malnourished, and their guardians reported the presence of cultural norms and stigma. There was a statistical association between cultural norms and

stigma and the nutrition status of children under five when the chi-square test for independence was conducted**(**χ^2*=12.829,df=1,* ***P=<.001*****).**

As indicated in Table 9 below, regarding food taboos, 146 (71.9%) of the study participants who had a normal nutrition status, their guardians reported the absence of food taboos. Food taboos may restrict the consumption of certain foods that are rich in essential nutrients necessary for children's growth and development. For example, taboos against the consumption of animal-source foods, such as meat, eggs, or dairy, can lead to inadequate intake of protein, iron, vitamin B12, and other micronutrients critical for optimal growth, cognitive development, and immune function in young children. There was a statistical association between food taboos and the nutrition status of children under five when the chi-square test for independence was conducted(*χ^2=10.582,df=1, P=0.001*).

As indicated in Table 9 below, Regarding cultural beliefs and practices, 55 (37.9%) of the study respondents who had malnutrition, or their guardians reported the presence of Cultural beliefs and practices. Cultural beliefs and practices also influence how and when complementary foods are introduced to infants. Traditional beliefs about suitable foods for infants and young children may vary widely across cultures, affecting dietary diversity and nutrient intake. Introducing complementary foods too early or too late, or offering inappropriate foods based on cultural customs, can impact children's nutrition status and growth. There was no statistical association between cultural beliefs and practices and the nutrition status of children under five when the chi-square test for independence was conducted (*χ^2=0.844,df=1, P=0.36*).

These research results were in harmony with another investigation in Nepal which found no association between cultural beliefs and practices and the nutrition status of children under five(Bhandari, 2013). However, another study done in Burkina Faso revealed that

the presence of cultural beliefs and practices increased the odds of malnutrition(Bougma et al., 2023).

Table 9:Social Cultural Factors Associated with Nutrition Status

Independent variables	Categories	Dependent variable (Nutrition status)		Dependent variable (Nutrition status)
		Well-nourished (N=227)	Mal-nourished (N=123)	
Food preferences	present	80(65%)	43(35%)	χ^2=0.003 df=1 P=0.96
	absent	147(64.8%)	80(35.2%)	
Cultural beliefs and practices	present	90(62.1%)	55(37.9%)	χ^2=0.844 df=1 P=0.36
	absent	137(66.8%)	68(33.2%)	
Gender Role	present	71(51.1%)	68(48.9%)	χ^2=19.203 df=1 P=<.001
	absent	156(73.9%)	55(26.1%)	
Food Taboos	present	81(55.1%)	66(44.9%)	χ^2=10.582 df=1 P=0.001
	absent	146(71.9%)	57(28.1%)	
Cultural norms and stigma	present	84(54.5%)	70(45.5%)	χ^2=12.829 df=1 P=<.001
	absent	143(73%)	53(27%)	

Source: Field Data

4.6.3 Binary Logistic Regression social-cultural factors

As provided in Table 10, gender role was an independent factor for nutrition status when the Binary Logistic Regression Analysis analysis was done. Furthermore, the absence of gender roles increased the odds of having a normal nutrition status by 2.6. In some cultures, boys may be prioritized over girls when it comes to food allocation, leading to disparities in nutritional intake and status. This bias can result in girls receiving fewer resources and nutrients, increasing their risk of malnutrition and stunting compared to boys. These findings were in Harmony with another study done in Tanzania which found an association between gender roles and the nutrition status of children under five(Mwaseba et al., 2016). However, another study conducted in South Africa was contrary to these findings as gender role was not statistically associated with the nutrition status of children below the age of five years (Chakona & Shackleton, 2019).

As provided in Table 10, cultural norms and stigma were independent factors for nutrition status($p=0.005$) when the Binary Logistic Regression Analysis analysis was done. Furthermore, the presence of cultural norms and stigma reduced the odds of having a normal nutrition status by 2.3. Cultural norms and dietary restrictions may limit children's access to certain foods or nutrients essential for optimal growth and development. For example, religious or cultural practices may prohibit the consumption of specific foods, restrict dietary diversity, or impose fasting periods that can affect children's nutritional intake and status. Failure to meet children's nutritional needs due to cultural dietary restrictions can contribute to malnutrition and related health issues.

These findings were in harmony with another study done in Benin which reported similar findings as the presence of cultural norms and stigma was found to increase the odds of malnutrition by 2.3 (Miassi et al., 2022). However, another scooping review done in

Africa was contrary to these findings as cultural norms and stigma were not associated with the nutrition status of children under five years (Sawadogo et al., 2022).

As provided in Table 10, food taboos were not independent factors for nutrition status($p=0.15$) when Binary Logistic Regression Analysis analysis was done. These research findings were consistent with another study done in India where food taboos were not statistically associated with the nutrition status of children aged 6-59 months (Umallawala et al., 2022). However, another investigation done in South Africa presence of food taboos reduced the odds of having a normal nutrition status by 4(Chakona & Shackleton, 2019).

Table 10: Binary Logistic Regression Analysis on Social Cultural Factors Associated with Nutrition Status

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I	
								Lower	Upper
Step 1[a]	food taboos	-0.699	0.239	8.53	1	0.153	0.497	0.311	0.795
	gender role	-0.954	0.239	15.923	1	0.008	2.6	0.241	0.615
	cultural norms	0.853	0.239	12.761	1	0.005	2.3	0.267	0.68
	Constant	**3.278**	**0.661**	**24.573**	**1**	**0**	**26.52**		

Source: Field data

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This section provides the study summary findings, conclusion, and recommendations of the study.

5.1 Summary

The prevalence of malnutrition in this study was 35.1% which is a public health concern. Among the study participants who had malnutrition, more than a third of the study respondents had wasting, while more than a third were underweight. Only a few of the study participants had stunting. In the second objective concerning bio-demographic factors associated with nutrition status, the following variable had a significant statistical relationship when the bivariate analysis was done; the age of the study respondent, education level, provision of nutrition health education, parity status, and gender hence they were imported for Binary Logistic Regression Analysis. Having multiple births and marital status were not statistically associated with nutrition status. In the third objective concerning social economic factors associated with nutrition status, the following variables had a significant statistical relationship when the bivariate analysis was done; access to safe sanitation, size of the household, food security status, and occupation hence they were imported for Binary Logistic Regression Analysis. Income level and head of the household were not statistically associated with nutrition status. In the fourth objective concerning social-cultural factors associated with nutrition status, the following variable had a significant statistical relationship when the bivariate analysis was done; gender roles, food taboos, and Cultural norms and stigma. Food preferences and Cultural beliefs and practices were statistically associated with nutrition status.

5.2 Conclusion

The prevalence of malnutrition in this study was 35.1% which is a public health concern. Wasting was the most common (41.1%) form of malnutrition occurring among children under the age of five years. In the second objective concerning bio-demographic factors associated with nutrition status, study respondents aged 0-11 months, guardians having no formal education reduced the odds of having a normal nutrition status while having a guardian who had been provided with health education on infant feeding practices increased the odds of having a normal nutrition status. In the third objective concerning social economic factors associated with nutrition status; being food insecure, and lack of access to safe sanitation reduced the odds of having a normal nutrition status while having a small household size of 1-3 members increased the odds of having a normal nutrition status. In the fourth objective concerning social-cultural factors associated with nutrition status while absence of gender roles increased the odds of having a normal nutrition status while the presence of cultural norms and stigma reduced the odds of having a normal nutrition status.

5.3 Recommendations

1. The county government of Tana-River, the Ministry of Health, and relevant stakeholders should introduce nutrition education programs aiming to educate caregivers about the timely introduction of appropriate complementary foods at around six months of age, while continuing to breastfeed aiming to promote diverse and nutrient-rich foods, such as fruits, vegetables, grains, legumes, and animal-source foods, to meet the nutritional needs of growing children.
2. The county government of Tana-River, the Ministry of Health, and relevant stakeholders should provide nutrition counseling programs to caregivers on the importance of balanced diets, portion sizes, and meal frequency for young children

aiming to address common nutritional deficiencies and micronutrient needs, such as iron, vitamin A, zinc, and iodine, through dietary diversification and supplementation if necessary.

3. The county government of Tana-River, the Ministry of Health, and relevant stakeholders should promote the use of improved sanitation facilities such as toilets, latrines, and handwashing stations with soap and water. They should also encourage safe disposal of child feces and provide education on proper sanitation practices to reduce the risk of fecal-oral transmission of diseases.
4. The county government of Tana-River, the Ministry of Health, and relevant stakeholders should ensure there is access to a diverse range of nutrient-rich foods, including fruits, vegetables, whole grains, legumes, dairy products, and lean protein sources to tackle the problem of food security. They should also aim at addressing barriers to food access such as poverty, food shortages, and limited availability of nutritious foods in rural or underserved areas.
5. The county government of Tana-River, the Ministry of Health, and relevant stakeholders should provide culturally sensitive nutrition education materials and workshops that address common misconceptions and promote evidence-based feeding recommendations.

References

Abdulahi, A., Shab-Bidar, S., Rezaei, S., & Djafarian, K. (2017). Nutritional Status of Under Five Children in Ethiopia: A Systematic Review and Meta-Analysis. *Ethiopian Journal of Health Sciences*, *27*(2), 175. https://doi.org/10.4314/EJHS.V27I2.10

Aboagye, R. G., Kugbey, N., Ahinkorah, B. O., Seidu, A. A., Cadri, A., Bosoka, S. A., Akonor, P. Y., & Takase, M. (2022). Nutritional status of school children in the South Tongu District, Ghana. *PLoS ONE*, *17*(8). https://doi.org/10.1371/JOURNAL.PONE.0269718

Abuya, B., Kimani,J., Moore, D., (2011). Influence of Maternal education on Child Immunization and Stunting in Kenya . *Maternal Child* Health, 1389-1399.

African Population & Health Research Centre (2012). Population and Health dynamics in Nairobi Informal Settlement . Nairobi

Agency for Healthcare Research & Quality (2017). *Breastfeeding & Maternal Infant Health Outcomes in Developed Countries*. Rockville:

Agola. (2012). *Experiences of Childbirth Experiences of Childbirthby Women and by Women and their Care Providers in their Care Providers in Narok and Isiolo Narok and Isiolo Counties, Kenya Counties, Kenya , Kenya*. https://covaw.or.ke/wp-content/uploads/2014/01/Experiences-of-Childbirth-Report.pdf

Ahmad, D., Afzal, M., & Imtiaz, A. (2020). Effect of socioeconomic factors on malnutrition among children in Pakistan. *Future Business Journal 2020 6:1*, *6*(1), 1–11. https://doi.org/10.1186/S43093-020-00032-X

Ahmed, K. Y., Ogbo, F. A., Tegegne, T. K., Dalton, H., Arora, A., & Ross, A. G. (2023). Interventions to improve the nutritional status of children under 5 years in Ethiopia: a systematic review. *Public Health Nutrition*, *26*(12), 3147. https://doi.org/10.1017/S1368980023002410

Amadu, I., Seidu, A. A., Duku, E., Okyere, J., Hagan, J. E., Hormenu, T., & Ahinkorah, B. O. (2021). The Joint Effect of Maternal Marital Status and Type of Household Cooking Fuel on Child Nutritional Status in Sub-Saharan Africa: Analysis of Cross-Sectional Surveys on Children from 31 Countries. *Nutrients*, *13*(5), 1541. https://doi.org/10.3390/NU13051541

Amare, Z. Y., Ahmed, M. E., & Mehari, A. B. (2019). Determinants of nutritional status among children under age 5 in Ethiopia: Further analysis of the 2016 Ethiopia demographic and health survey. *Globalization and Health*, *15*(1), 1–11. https://doi.org/10.1186/S12992-019-0505-7/TABLES/3

Anand, A., & Sharma, P. (2023). Prevalence and Determinants of Malnutrition Among Adolescents in Delhi: A Rural-Urban Comparison Study. *Cureus*, *15*(5). https://doi.org/10.7759/CUREUS.39135

Ballard, O., & Morrow, A. L. (2013). Human milk composition: nutrients and bioactive factors. *Pediatric Clinics of North America*, *60*(1), 49–74.

https://doi.org/10.1016/J.PCL.2012.10.002

Bhagowalia P, M. P. (2012). What Dimemsions of Women Empowerment Matter Most for Child Nutrition . *Internatioan Food Policy Research Institute*, 345-398.

Bhandari, T. R. (2013). Nutritional Status of Under Five Year Children and Factors Associated in Kapilvastu District, Nepal. *Journal of Nutritional Health & Food Science*, *1*(1). https://doi.org/10.15226/JNHFS.2013.00106

Black, R., Victora,G., Walker, S., Bhutta, Z., Christian,P., Enis,M,.Grantham,M., Katza,J., Martorell, R,. Uauay,R,. (2013). Maternal & Child Under-Nutrition & Overweight in Low- Income and Middle- *Income Countries, Lancet 3* (9890) 427-451.

Boah, M., Azupogo, F., Amporfro, D. A., & Abada, L. A. (2019). The epidemiology of undernutrition and its determinants in children under five years in Ghana. *PLoS ONE*, *14*(7). https://doi.org/10.1371/JOURNAL.PONE.0219665

Bougma, S., Tapsoba, F., Semporé, J. N., Bougma, S., Dounia, P., Songré-Ouattara, L. T., & Savadogo, A. (2023). Socio-cultural influences on children's feeding habits and feeding frequencies in Ouagadougou, Burkina Faso: a retrospective survey. *BMC Nutrition*, *9*(1), 1–10. https://doi.org/10.1186/S40795-023-00698-W/FIGURES/4

Burgert, C. R., Colston, J., Roy, T., & Zachary, B. (2013). Geographic displacement procedure and geo-referenced data release policy for the Demographic and Health Surveys. DHS Spatial Analysis. Report No. 7. Calverton, Maryland, USA: ICF International.

Chakona, G., & Shackleton, C. (2019). Food taboos and cultural beliefs influence food choice and dietary preferences among pregnant women in the eastern Cape, South Africa. *Nutrients*, *11*(11). https://doi.org/10.3390/NU11112668

Charity M, (2017). Effects of Table Bankingon Growth of Women Owned Small and Medium Enterprises in Meru County, Kenya . *Current Aspects in Finance*, 14-29

Chege, P. M., Ndungu, Z. W., & Gitonga, B. M. (2016). Food security and nutritional status of children under-five in households affected by HIV and AIDS in Kiandutu informal settlement, Kiambu County, Kenya. *Journal of Health, Population, and Nutrition*, *35*(1), 21. https://doi.org/10.1186/S41043-016-0058-9/TABLES/8

Chege, P.M., Kimiywe, J.O., & Ndungu, Z.W. (2015). Influence of culture on dietary practices of children under five years among Maasai pastoralists in Kajiado, Kenya. Int J Behav Nutr Phys Act. 12:131. doi: 10.1186/s12966-015-0284-3. PMID: 26450270; PMCID: PMC4597609.

Collins, M., (2013). *Persistence in Effects of Birth order on Child Development: Evidence from the Philipines* . London : University of Oxford, 14 -20.

Conde - Agudelo.A,. (2012). Effects of Birth Spacing on Maternal, Perinatal, Infant & Child Health. A Systematic Review of Causal Mechanisma. *Studies in Family Planning*, 93-114.

Cook, J. T., Frank, D. A., Casey, P. H., Rose-Jacobs, R., Black, M. M., Chilton, M., De

Cuba, S. E., Appugliese, D., Coleman, S., Heeren, T., Berkowitz, C., & Cutts, D. B. (2008). A brief indicator of household energy security: Associations with food security, child health, and child development in US infants and toddlers. *Pediatrics*, *122*(4). https://doi.org/10.1542/peds.2008-0286

Čvorović, J. (2022). Maternal age at marriage and child nutritional status and development: evidence from Serbian Roma communities. *Public Health Nutr. 25*(5):1-34. doi: 10.1017/S1368980022000544. Epub ahead of print. PMID: 35260202; PMCID: PMC9991790.

Das, S., & Gulshan, J. (2017). Different forms of malnutrition among under five children in Bangladesh: a cross sectional study on prevalence and determinants. *BMC Nutr* 3, 1.

Dessie, Z.B., Fentie, M., & Abebe, Z. (2019). Maternal characteristics and nutritional status among 6–59 months of children in Ethiopia: further analysis of demographic and health survey. *BMC Pediatr* 19, 83. https://doi.org/10.1186/s12887-019-1459-x

Fink G, Sudfield R, Dananei G Ezzati M. (2014). Scalling Up Access to Family Planning may Improve Linear Growth and Child Development in Low & Middle Level Income Countries, 77-115.

Finlay J., Ozaltin E. (2011). The Association of Maternal Age with Infant Mortality , Child Anthropometric Failure, Diarrhea & Anaemia for First Births: Evidence for 55 Low-& Midlle Income Countries . *BMJ Open e00226*.

Frumence, G., Jin, Y., Kasangala, A. A., Mang'enya, M. A., Bakar, S., & Ochieng, B. (2023). A Qualitative Exploration on Perceived Socio-Cultural Factors Contributing to Undernutrition Among Under-Fives in the Southern Highlands of Tanzania. *International Journal of Public Health*, *68*, 1605294. https://doi.org/10.3389/IJPH.2023.1605294/BIBTEX

Gaffan, N., Kpozehouen, A., Degbey, C., Ahanhanzo, Y. G., & Paraïso, M. N. (2023). Effects of the level of household access to water, sanitation and hygiene on the nutritional status of children under five, Benin. *BMC Nutrition*, *9*(1), 1–12. https://doi.org/10.1186/S40795-023-00751-8/FIGURES/4

Gebreegziabher, T., & Regassa, N. (2019). Ethiopia's high childhood undernutrition explained: analysis of the prevalence and key correlates based on recent nationally representative data. *Public Health Nutrition*, *22*(11), 2099. https://doi.org/10.1017/S1368980019000569

Geruso, M. Spears, D., (2018). Neighbourhood Sanitation & Mortality. *American Economic Journal Applied Economics* 10(2).

Gibbs C, Wendt A, Peter S, Hague C. (2012). The Impact of Early Age at First Child Birth on Maternal & Infant Health . Paediatric Perinat Epidemiol, 26 Suppl, 259-284.

Govender, I., Rangiah, S., Kaswa, R., & Nzaumvila, D. (2021). Malnutrition in children under the age of 5 years in a primary health care setting. *South African Family Practice*, *63*(1). https://doi.org/10.4102/SAFP.V63I1.5337

Hannan, A. (2015). *The Association Between Women Empowerment and Child Nutrition in Bangladesh* . North Carolina: University of Northern Carolina Chapel Hill.

Hatton,R.Martin.T(2008). The Effects on Stature of Poverty, Family Size & birth Order: British Children in the 1930. Bonn Germany : *Institute of Study of Labour* (IZA), 1-24.

Hung, A. (2015). Maternal Education Linkages and Child Nutrition in the Long and Short- Run: Evidence from Ethiopia DHS . *International Journal of African Development*, 123-133.

IFRI. (2015). Global Nutrition Report: Action and Accountability to Advance Nutrition & Sustainable Development. Washington D.C: *International Food Research Institute*, 44-65.

Iftikhar, A., Bari, A., Bano, I., & Masood, Q. (2017). Impact of maternal education, employment and family size on nutritional status of children. Pak J Med Sci. Nov-Dec;33(6):1401-1405. doi: 10.12669/pjms.336.13689. PMID: 29492067; PMCID: PMC5768833.

Jang B. Mukesh K, & Manish S, (2015). Status of Maternal Nutrition and Its Association with Nutritional Status of Under Three Children in EAG States and Assam , India. *Internatioanl Journal of Humanities and Social Science Intervention, 30*-38.

Jayachandran, S., & Pande, R. (2015). Why Are Indian Children So Short. *Working Paper Series*. https://ideas.repec.org/p/ecl/harjfk/rwp15-016.html

Jing, Z. Jungxen,S. & Senbei,Y. (2011). Undernutrition status of children under 5 years in Chinese Rural Areas . *Asia Pacific Journal in Clinical Nutrition*, 584-592.

Jubayer, A., Islam, M.H., & Nayan, M.M. (2022).Malnutrition among under-five children in St. Martin's Island, Bangladesh: A cross-sectional study on prevalence and associated factors. *SAGE Open Medicine*.10.

Kapungwe, A.K. (2015). Quality of child health care and under five mortality in Zambia: A case study of two districts in Luapula Province. Max Planck Institute 12: 301-22.

Kassie, G. W., & Workie, D. L. (2020). Determinants of under-nutrition among children under five years of age in Ethiopia. *BMC Public Health*, *20*(1), 1–11. https://doi.org/10.1186/S12889-020-08539-2/TABLES/6

Kebede, D., & Aynalem, A. (2021). Prevalence of undernutrition and potential risk factors among children below five years of age in Somali region, Ethiopia: evidence from 2016 Ethiopian demographic and health survey. *BMC Nutrition*, *7*(1). https://doi.org/10.1186/S40795-021-00460-0.

Kenya National Bureau of Statistics (KNBS) and ICF Macro, (2015). Kenya Demographic and Health Survey 2008-09. Calverton, Maryland: KNBS and ICF Macro.

Kiome, M.R., Kimiywe, J., & Njogu, E.W. (2019). Does Child Spacing Influence Nutritional Status of Children 6-59 Months?. J Pediatr Womens Healthcare. 2(2): 1019.

Kitler, P. Sucher, P. & Nelms, M. (2012). *Food and Culture*. Belmont : Cengage learning.

Maniragaba, V. N., Atuhaire, L. K., & Rutayisire, P. C. (2023). Undernutrition among the children below five years of age in Uganda: a spatial analysis approach. *BMC Public Health*, *23*(1). https://doi.org/10.1186/S12889-023-15214-9

Miassi, Y. E., Dossa, F. K., Zannou, O., Akdemir, Ş., Koca, I., Galanakis, C. M., & Alamri, A. S. (2022). Socio-cultural and economic factors affecting the choice of food diet in West Africa: a two-stage Heckman approach. *Discover Food*, *2*(1), 1–10. https://doi.org/10.1007/S44187-022-00017-5/TABLES/2.

Mitsunaga, A., & Yamauchi, T. (2020). Evaluation of the nutritional status of rural children living in Zambia. *Journal of Physiological Anthropology*, *39*(1). https://doi.org/10.1186/S40101-020-00244-8.

Mmbando, B. P., Mwaiswelo, R. O., Chacky, F., Molteni, F., Mohamed, A., Lazaro, S., & Ngasala, B. (2022). Nutritional status of children under five years old involved in a seasonal malaria chemoprevention study in the Nanyumbu and Masasi districts in Tanzania. *PLoS ONE*, *17*(4). https://doi.org/10.1371/JOURNAL.PONE.0267670

Mmopelwa, D. (2019). Household size, birth order and child health in Botswana, CREDIT Research Paper, No. 19/10, The University of Nottingham, Centre for Research in Economic Development and International Trade (CREDIT), Nottingham.

Mshida, H., Malima, G., Machunda, R., Muzuka, A. N. N., Banzi, J., Gautam, O. P., Mbeguere, M., Smith, K., Cairncross, S., Shana, E. S., Herman, A., & Njau, K. N. (2020). Sanitation and Hygiene Practices in Small Towns in Tanzania: The Case of Babati District, Manyara Region. *The American Journal of Tropical Medicine and Hygiene*, *103*(4), 1726. https://doi.org/10.4269/AJTMH.19-0551

Mulu, E., & Mengistie, B. (2017). Household food insecurity and its association with nutritional status of under five children in Sekela District, Western Ethiopia: A comparative cross-sectional study. *BMC Nutrition*, *3*(1), 1–9. https://doi.org/10.1186/S40795-017-0149-Z/TABLES/4

Murarkar, S., Gothankar, J., & Doke, P. (2020). Prevalence and determinants of undernutrition among under-five children residing in urban slums and rural area, Maharashtra, India: a community-based cross-sectional study. *BMC Public Health* 20, 1559.

Mwaseba, D. J. B., Kaarhus, R., & Mvena, Z. S. K. (2016). Food culture and child-feeding practices in Njombe and Mvomero districts, Tanzania. *Journal of Eastern African Studies*, *10*(2), 325–342. https://doi.org/10.1080/17531055.2016.1184834

Nshimyiryo, A., Hedt-Gauthier, B., Mutaganzwa, C., Kirk, C. M., Beck, K., Ndayisaba, A., Mubiligi, J., Kateera, F., & El-Khatib, Z. (2019). Risk factors for stunting among children under five years: a cross-sectional population-based study in Rwanda using the 2015 Demographic and Health Survey. *BMC Public Health*, *19*(1). https://doi.org/10.1186/S12889-019-6504-Z

Nyamasege, C.K., Kimani-Murage, E.W., Wanjohi, M., Kaindi, D., & Wagatsuma, Y. (2021). Effect of maternal nutritional education and counselling on children's stunting prevalence in urban informal settlements in Nairobi, Kenya. Public Health Nutr. 24(12):3740-3752. doi: 10.1017/S1368980020001962. Epub. PMID: 32693855; PMCID: PMC7611536.

Olack, B., Burke, H., Cosmas, L., Bamrah, S., Dooling, K., Feikin, D. R., Talley, L. E., & Breiman, R. F. (2011). Nutritional Status of Under-five Children Living in an Informal Urban Settlement in Nairobi, Kenya. *Journal of Health, Population, and Nutrition*, *29*(4), 357. https://doi.org/10.3329/JHPN.V29I4.8451

Otekunrin, O. A., & Otekunrin, O. A. (2022). Nutrition Outcomes of Under-five Children of Smallholder Farm Households: Do Higher Commercialization Levels Lead to Better Nutritional Status? *Child Indicators Research*, *15*(6), 2309–2334. https://doi.org/10.1007/S12187-022-09960-2/TABLES/6

Picbougoum, T. B., Somda, M. A. S., Zango, S. H., Lohmann, J., Allegri, M. De, Saidou, H., Hien, H., Meda, N., & Robert, A. (2023). Nutritional status of children under five years and associated factors in 24 districts of Burkina Faso. *PLOS Global Public Health*, *3*(7), e0001248. https://doi.org/10.1371/JOURNAL.PGPH.0001248

Poda, G. G., Hsu, C.-Y., & Chao, J. C.-J. (2017). Factors associated with malnutrition among children <5 years old in Burkina Faso: evidence from the Demographic and Health Surveys IV 2010. *International Journal for Quality in Health Care*, *29*(7), 901–908.

Prasetyo, Y. B., Permatasari, P., & Susanti, H. D. (2023). The effect of mothers' nutritional education and knowledge on children's nutritional status: a systematic review. *International Journal of Child Care and Education Policy*, *17*(1), 1–16. https://doi.org/10.1186/S40723-023-00114-7/TABLES/3

Rahman, M. (2016). Association between order of birth and chronic malnutrition of children: a study of nationally representative Bangladeshi sample. Cad Saude Publica. 32(2):e00011215. doi: 10.1590/0102-311X00011215. Epub. PMID: 26958818.

Rugema, J., Mukantwari, J., Twagirayezu, I., Tuyisenge, M.J., Rutayisire, R., & Katende, G. (2022) Predictors and factors associated with stunting among under-five-year children: a cross-sectional population-based study in Rwanda of the 2014-2015 demographic and Health Survey. Afri Health Sci. 22(4).671-678.

Sahu, S.K, Kumar, S.G, Bhat, B.V, Premarajan, K.C., Sarkar, S., Roy, G., Joseph, N. (2015). Malnutrition among under-five children in India and strategies for control. *J Nat Sci Biol Med. 6*(1):18-23. doi: 10.4103/0976-9668.149072. PMID: 25810629; PMCID: PMC4367032.

Sawadogo, P. M., Sia, D., Nguemeleu, E. T., Kobiane, J. F., Onadja, Y., & Robins, S. (2022). Factors associated with childhood chronic malnutrition in West and Central Africa: a scoping review. *PAMJ. 2022; 43:45*, *43*(45). https://doi.org/10.11604/PAMJ.2022.43.45.32820

Shahjada, A., & Sharma, S., & Mahashabde, P., & Bachhotiya, A. (2014). Effects of birth interval on nutritional status of underfive children in periurban area of Madhya Pradesh, India. International Journal of Medical Science and Public Health. 3. 1.

Sigdel, A., Sapkota,H., Thapa,S., Bista, A., & Rana, A. (2020). Maternal risk factors for underweight among children under-five in a resource limited setting: A community based case control study. PLoS One. 15(5):e0233060. doi: 10.1371/journal.pone.0233060. PMID: 32437366; PMCID: PMC7241795.

Tariq, I., Khan, J.I. & Malik, M.A. (2023). Decomposing acute malnutrition by educational inequality of mother's among under five children in Jammu and Kashmir. *Sci Rep* 13, 10493.

Tesfaw, L.M., & Woya, A.A. (2022). Potential mediators of the link between wealth index and anthropometric indices of under-five children in Ethiopia. Front Public Health.10:981484.

Thabathi, T. E., Maluleke, M., Raliphaswa, N. S., & Masutha, T. C. (2022). Perceptions of Caregivers Regarding Malnutrition in Children under Five in Rural Areas, South Africa. *Children*, *9*(11). https://doi.org/10.3390/CHILDREN9111784

Tione, G., Gondwe, E., Maonga, B. B., Machira, K., & Katengeza, S. P. (2022). Improving wasting among children under-5 years in Malawi: The role of farm input subsidies. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/FPUBH.2022.862461

Umallawala,T., Puwar, T., Pandya, A., Bhavsar, P., Patil, M.S, Saha, S. (2022). Sociocultural Determinants of Nutritional Status Among Children Under Five Years of Age: An Ethnographic Study From Gujarat. *Cureus.14*(7):e27377. doi: 10.7759/cureus.27377. PMID: 36046281; PMCID: PMC9418619.

UNICEF. (2023). *Nutrition Preventing and treating maternal, adolescent and child malnutrition*. https://www.unicef.org/kenya/nutrition#:~:text=Nationwide%2C 26%25 of children under,doses of vitamin A supplement.

Wemakor, A., Garti, H., Azongo, T. (2018). Young maternal age is a risk factor for child undernutrition in Tamale Metropolis, Ghana. *BMC Res Notes* 11, 877.

Yimer, B., & Wolde, A. (2022). Prevalence and predictors of malnutrition during adolescent pregnancy in southern Ethiopia: a community-based study. *BMC Pregnancy and Childbirth*, *22*(1), 1–7. https://doi.org/10.1186/S12884-022-04460-1/TABLES/2

Yu, S. H., Mason, J., Crum, J., Cappa, C., & Hotchkiss, D. R. (2016). Differential effects of young maternal age on child growth. *Global Health Action*, *9*(1). https://doi.org/10.3402/GHA.V9.31171

Appendices

Appendix I: Informed Consent

Dear respondent,

I am Ali, Abdi Garad. I'm currently a Master's student at Mount Kenya University studying the field of public health. The investigation is a component of an academic study that focuses on children under five and examines the causes of childhood inadequate nutrition in Tana River County, Kenya. Would you please help us out by filling out this questionnaire? The information will only be utilized for investigative services purposes and will be handled with the utmost confidentiality.

Your responses will be kept strictly confidential, and we won't utilize any of the data you provide us for anything other than the research project's stated objective. Your anonymity will be protected further by the fact that your name will not be requested on any of the forms, nor will it be used in the publishing of the final report. The people who are participating in this research will be the only ones who have access to any of the materials that are utilized over the course of the study. These materials will all be kept secure and under lock and key.

This research will not result in any immediate benefits; nonetheless, the outcomes of the study will assist in the modification of policies and the raising of awareness about the importance of exclusive breastfeeding. There will be no risks or harm that will be anticipated by participating in this research. It is not required that participants take part in this research. There will be no consequences for those who choose not to participate. You are not obligated to continue taking part in the research and may leave at any time without incurring any penalty.

Thanks in advance for your cooperation.

Abdi Garad Ali

I acknowledge that my personal details and privacy are going to be protected, having read and comprehended the information above and realizing that taking part in the investigation is completely voluntary. By doing this, I consent to participate in the investigation.

Participants signature…… date…….

Interviewers signature……date…….

Your kind co-operation will be highly appreciated.

Appendix II: Questionnaire

Introduction

Please share your thoughts by responding to the questions provided below. Please provide genuine information by either filling in the blanks or selecting the appropriate box next to each question. The information you submit will be kept in private since this is an academic endeavor.

SECTION A: demographic characteristic of the respondents

instructions: -

Please don't write your personal information anyplace on this survey.

Answer all the questions

1. Where do you reside (tick)?

Rural ☐

Urban ☐

Peri-urban ☐

Others (specify) ☐

2. What is the greatest degree of education you have completed? (tick)

Diploma ☐

Degree ☐

Masters ☐

Others (specify) ☐

3. How old are you in years? (tick)

Below 18 years years ☐

18– 25 years ☐

26 – 33 years ☐

Above 33 years ☐

4. How are you currently married? (tick)

   a) Married ☐

   b) Single ☐

   c) Widowed ☐

   d) Divorced/separated ☐

5. What is the size of your family?

   a) Less than 3 members ☐

   b) 3 to 4 members ☐

   c) 5 to 6 members ☐

   d) 7 members and above ☐

6. What do you understand with Malnutrition?

   .....

   ……

   ……

7. What are the benefits of maternal education that you know?

   .....

   ……

   ……

SECTION B: Demography For Children 0-59 Anthropometry, Nutrition And Health Status

Every child aged 0 to 59 months is required to complete this questionnaire.

No	QUESTION	ANSWER CODES	
SECTION CHILD1: Details of the Child 0-59 months this section is to be administered to all children in the selected households between 0-59 months			
No.	**THESE QUESTIONS NEED TO BE ASKED TO THE MOTHER OR THE MAIN CAREGIVER.**		
1	ID Number		
2	Was permission obtained to perform both the measurements and the interview?	Yes .....1 No.....2	
3	Name of the child		
4	What is the sex of the child?	Male .....m Female..... f	
5	Are you in possession of the child's official age documents?	Yes .....1 No.....2	
6	What is the date of birth of the child?	Day/Month/Year…..|___|___| /|___|___| / ___|___||___|___|	
7	The child's age expressed in months Minimum period: six months (or zero		|___|___|months

	months if the IYCF module is excluded). Maximum duration: 59.99 months **MONTHS**		
SECTION CHILD2: Nutrition and Health Status of the Child 0-59 months EVERY child between the ages of 0 and 59 months is to be administered this section.			
8	Is the child living with you at the moment?	Yes ..... 1 No..... 2	|___|
9	What is the weight of the child in kilograms (±0.1kg)		|___|___|. |___| kg
10	Was the child wearing clothing when the weight was measured?	Yes ..... y No..... n	|___|
11	How tall and how long is the child in centimeters (±0.1cm)?		|___|___|___|. |___| cm
12	Was the child sitting or laying down when they were measured?	Child lying down..... l Child standing up ..... h	|___|

SECTION C: Socio Economic Factors Influencing Under-Five Malnutrition In Tana River County

8. What is the status of your work?
    a) None
    b) Formal employment
    c) Casual work
    d) Business
9. . Does employment status affect you from feeding exclusively?
10. What is your average family monthly income in ksh?
    a) 20000 and below
    b) 20001 to 30000
    c) 30001 to 40000
    d) 40001 and above
11. Does your monthly income affect you from feeding exclusively?
    a) Yes
    b) No
12. How far is your workplace from home?
    a) Far distance from home
    b) Near home area
    c) Involves night shifts
    d) Other, specify……
13. Does nature of your work affect you from feeding exclusively?
    a) Yes
    b) No
14. Do you have increased work load at your work place?

a) Yes

b) No

15. If yes, does it affect you from feeding exclusively?

a) Yes

b) No

SECTION C: Cultural Factors That Influence Under-Five Malnutrition In Tana River County

16. Do you receive support on exclusive feeding from your employer?

a) Yes

b) No

c) At times

17. If yes, what kind of support do you get?.....

……..

18. Do you receive support on exclusive feeding from spouse or relatives?

d) Yes

e) No

f) At times

19. If yes, what kind of support do you receive? Choose those that apply.

a) Provision of financial support

b) Encouragement from partner/relative on exclusive feeding

c) Other, specify…….

20. Are their cultural beliefs in your community that affect exclusive feeding?

a) Yes

b) No

21. Have you ever experienced any stigma or discrimination because of the food you eat?

a) Yes

b) No

22. . Do you use traditional foods?

a) Yes

b) No

23. If yes, in which ways?

.....

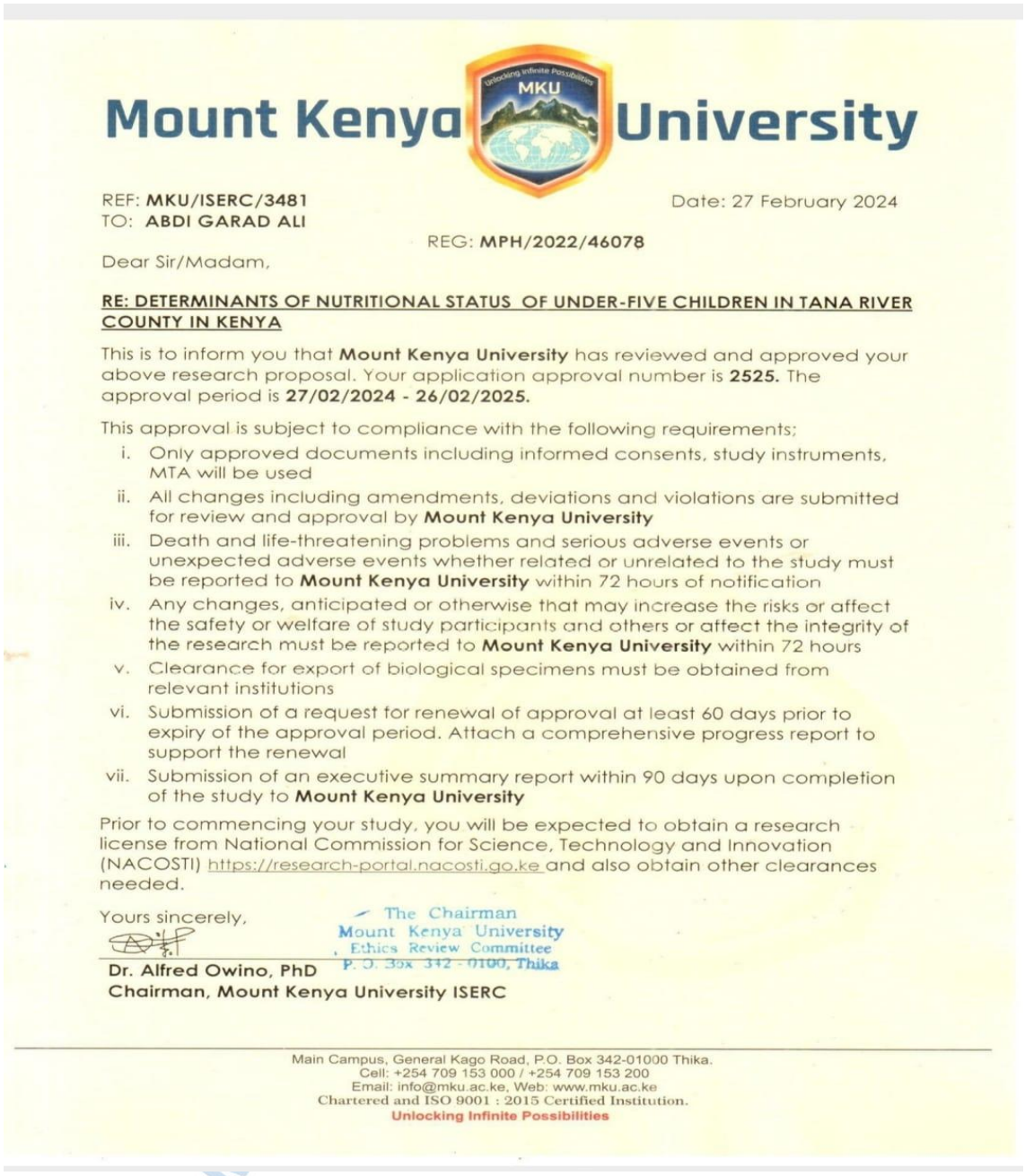
……

……

Appendix III: Anthropometric Tool

ANTHROPOMETRIC INDICATOR	**AGE (0-59 Months)**	**Z SCORE**		
		< -3 (severe)	≥ -3 to < -2 (Moderate)	≥ -2 to < -1 (Normal)
Age-for-length stunning stunting				
Height in relation to age Stunting				
Weight in relation to age Underweight				
Weight in relation to length Wasting, overweight, obesity				
Weight in relation to height Wasting, overweight, obesity				
BMI according to age Wasting, overweight, obesity				
Age-related head circumference Small/large head size				

Appendix IV: ERC Certificate



Mount Kenya University

REF: **MKU/ISERC/3481**
TO: **ABDI GARAD ALI**

Date: 27 February 2024

REG: **MPH/2022/46078**

Dear Sir/Madam,

RE: DETERMINANTS OF NUTRITIONAL STATUS OF UNDER-FIVE CHILDREN IN TANA RIVER COUNTY IN KENYA

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **2525.** The approval period is **27/02/2024 - 26/02/2025.**

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 **Mount Kenya University**
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 **Mount Kenya University** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** 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 **Mount Kenya University**

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

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

Dr. Alfred Owino, PhD
Chairman, Mount Kenya University ISERC

Main Campus, General Kago Road, P.O. Box 342-01000 Thika.
Cell: +254 709 153 000 / +254 709 153 200
Email: info@mku.ac.ke, Web: www.mku.ac.ke
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Unlocking Infinite Possibilities

Appendix V: Introductory Letter

Mount Kenya University

DIRECTORATE OF GRADUATE STUDIES

MPH/2022/46078

29th February, 2024

National Commission for Science Technology & Innovation (NACOSTI)
Off Waiyaki, Upper Kabete
P.O Box 30623- 00100
NAIROBI, KENYA

Dear Sir/Madam,

RE: ABDI GARAD ALI- REGISTRATION NO. MPH/2022/46078

The purpose of this letter is to introduce the above named student who is pursuing **Master of Public Health** in the Department of **Community Health, Epidemiology and Biostatistics** in the school of **Public Health.**

The title of the research is **"Determinants of Nutritional Status of Under –Five-Children in Tana River County in, Kenya."** It has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data between **March, 2024 and May, 2024.**

Any assistance accorded to the student will be highly appreciated.

Thank you.

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Dr. Samuel M. Karenga, Ph.D.
Director, Graduate Studies
Enc.

Appendix VI: Nacosti License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **316705**

Date of Issue: **08/March/2024**

RESEARCH LICENSE

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Appendix VII: Data Collection Approval

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ABD GARAD ALI,

STUDENT, MOUNT KENYA UNIVERSITY,

0722209495.

Dear Sir

RE: Authorization to Conduct Research

I am writing to officially permit you to conduct research within my area of jurisdiction. After carefully reviewing your research proposal and considering its potential benefits, I am pleased to provide you with the necessary authorization to proceed with your study.

I appreciate the thoroughness of your proposal and your commitment to conducting the research with professionalism and adherence to ethical standards. Your dedication to compliance with relevant policies and regulations is commendable and ensures that the research will be carried out responsibly. I trust that you will coordinate closely with my team and any relevant stakeholders to minimize disruption to our operations during your research. Should you require any assistance or have any questions or concerns, please do not hesitate to reach out to me or my office.

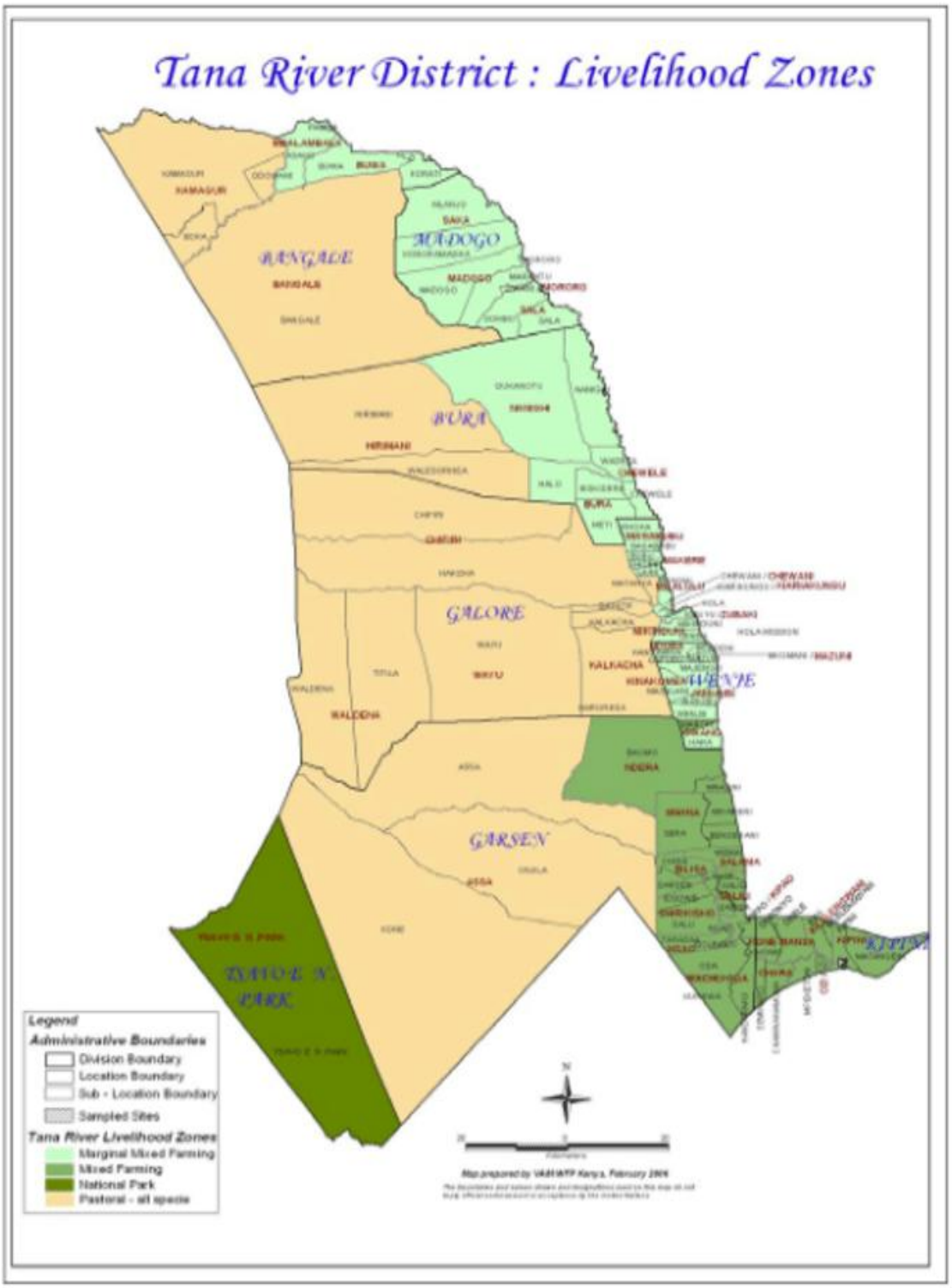
I wish you every success with your research endeavor and look forward to seeing the valuable insights that it produces.

Sincerely,

SAID KOMORA -CHIEF

ZUBAKI LOCATION.

Appendix VIII: Map of the Study Area



Appendix IX: Similarity Index

Abdi Garad Ali

DETERMINANTS OF NUTRITIONAL STATUS OF UNDER-FIVE CHILDREN IN TANA RIVER COUNTY IN KENYA

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