MATERNAL COMPLIANCE WITH RECOMMENDED DIETARY DIVERSITY IN PREVENTION OF MALNUTRITION AMONG CHILDREN AGED 6-23 MONTHS IN KWALE COUNTY, KENYA

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DECLARATION

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

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DEDICATION

I dedicate this study to Curtis, Chloe & Claire, my beautiful children. I hope that this research motivates you to pursue higher educational goals.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

SID	Society for International Development
IDDS	Individual Dietary Diversity Score
DDS	Dietary Diversity Scores
FANTA	Food and Nutrition Technical Assistance
FGD	Focus Group Discussion
DD	Dietary Diversity
GoK	Government of Kenya
HDSS	Health and Demographic Surveillance System
IYCF	Infant and Young Child Feeding
IYCN	Infant and Young Child Nutrition
KEMRI	Kenya Medical Research Institute
KDHS	Kenya Demographic Health Survey
KNBS	Kenya National Bureau of Statistics
MDD	Minimum Dietary Diversity
MoH	Ministry of Health
NACOSTI	National Commission for Science, Technology and Innovation
NUITM	Nagasaki University Institute of Tropical Medicine
UNICEF	United Nations Children Fund
SDGs	Sustainable Development Goals
SUN	Scaling Up Nutrition
WHO	World Health Organization

DEFINATION OF OPERATIONAL TERMS

Dietary Diversity: This is the diversity of foods both within and without food groups. The research examines a range of foods in eight categories: Breast milk; grains, roots, and tubers; legumes and nuts; dairy products (milk, yogurt, and cheese); flesh foods (meat, fish, poultry, and organ meat); eggs; vitamin A–rich fruits and vegetables; and other fruits and vegetables.

Malnutrition: According to the WHO, this is when a person's energy and/or nutrient consumption exhibits deficits, excesses, or imbalances. Undernutrition and overnutrition are two major categories covered. This research concentrates on undernutrition, which encompasses nutrient deficiencies or insufficiencies as well as retardation (low height for age), wasting (low weight for height), and underweight (low weight for age).

Nutrient adequacy: The accomplishment of specified energy and other key nutrient intakes. In this study it refers to Recommended Daily Intakes.

Minimum Dietary Diversity: This is the bare minimum number of food groups that must be ingested each day. WHO recommends that children between 6-23 months consume foods from at least five of the eight different dietary categories.

Minimum meal Frequency: It alludes to the bare minimum number of meals that must be consumed each day. WHO recommends giving children 6 to 23 months of age solid, semi-solid, or soft foods (containing milk feeds for non-breastfed infants) at least four times a day. The minimal number of times varies according to age, two times for

infants aged 6 to 8 months, three times for those aged 9 to 23 months, and a minimum four times for non-breastfed infants aged 6 to 23 months).

Minimum Acceptable Diet: It refers meeting the requirements of both minimum dietary diversity and the minimum meal frequency in a day.

Dietary Diversity Scores: This is the total number of different food categories ingested during a specific time frame. The food that was taken the day before and the night before will be used to calculate the dietary diversity scores in this research.

Complementary feeding: This refers to feeding of children on other foods or fluids in addition to breast milk, the recommended period begins when a child reaches the age of six months.

Complementary Feeding Period: This refers to period recommended for complementary feeding. In this study, this period begins when a child is six months old till the child reaches the age of two years.

Compliance: Extent to which mothers adopt the recommended dietary diversity practices in feeding their children aged 6-23 months.

Recommended: Used in the research to refer to guidelines or practices that are advised for adoption based on evidence and expert consensus to promote consumption of diverse diets.

ABSTRACT

Dietary Diversity (DD) is a crucial element of Infant and Young Child Nutrition (IYCN). WHO and UNICEF recommends feeding of diverse diets to children aged 6-23 months as a public health measure in curbing malnutrition. In feeding of young children, caregivers (mostly mothers) play a central role. Mothers make vital decision pertaining breastfeeding and complementary feeding. Kenyan government has input lots of resources in fighting malnutrition however, children aged 6 to 23 months still have below-average levels of mother adherence with recommended dietary diversity with only 37% countrywide meeting the minimum dietary diversity. This study was conducted in Kwale County, where persistent chronic malnutrition has been noted. The main aim was to assess level of maternal compliance with recommended DD among children aged 6-23 months. Study's objectives included: determining mothers' socio-demographic and economic characteristics, mother's nutritional knowledge and other factors associated with compliance or non-compliance with recommended DD. The study utilized a mixed methods study approach, randomly selecting 244 mother-child pairings with children between the ages of 6 and 23 months. In order to gather information on the socio-demographics, financial status, and nutrition education of mothers, a pre-tested, moderately structured questionnaires were employed. A qualitative 24-Hour recall and DD questionnaires were also administered. Complementary information was collected through five subsequent Focus Group Discussions (FGDs). All respondents (244) were females aged 17- 68 years with a mean of 29.3 ±9.6 years. By educational levels, 29.5% of the respondents did not have any formal education, 10.2% had lower primary education (class 1 – 4), 53.3% had upper primary education (class 5- 8), and 5.3% had secondary education while only 1.2% had post-secondary education. Most (54.1%) of the respondents were housewives. A computed wealth index classified 20.5% in the first quintile (poorest) and 21.3% in the wealthiest quintile (5^{th} quintile). Nutritional knowledge levels of the caregivers were generally very low with more than half (57.4%) of the mothers scoring zero (0) and only 3.3% having a high score of more than 9 out of 12 of the questions asked. Children's DD scores ranged from 1 to 6 with a mean of 2.63 ± 0.9. Only 5.5 % of the children met the minimum dietary diversity (MDD) of 5 food groups or more in a day. A bivariate regression analysis to determine factors associated with children's dietary diversity scores showed significant positive with caregiver's educational level ($r=0.186$, $P<.000$, $\alpha=.01$), household wealth index ($r=0.163$, $P<.011$, $\alpha=.05$) but not with the caregiver's nutritional knowledge ($r=0.024$, $P>.05$) and attitude score ($r=0.098$, $P>.05$). In conclusion, diets fed to children in the study area was poor in diversity. The socioeconomic situation of the household and low maternal education level was statistically significantly associated with this. Low maternal nutrition awareness and discrepancies in attitudes about providing children with a variety of foods exist. Other factors contributing to low DD were: poverty, environmental conditions, low educational levels and unfavorable cultural practices. The study therefore recommends a multisectoral approach in identification of interventions to address the identified issues.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Globally, an issue with population health is malnutrition. According to the World Health Organization (WHO), malnutrition is associated with nearly half of all child deaths worldwide. Specifically, it contributes to 45% of deaths among children under five (WHO, 2020). Global malnutrition rates indicate 21.3% stunting and 6.9% wasting with Sub-Saharan rates at 33.1% stunting and 7.1% wasting (UNICEF *et al.,* 2020). Many factors have been attributed to cause malnutrition; one amongst the major factors is lack of adequate nutrition (FAO *et al.,* 2021). To solve the problem of inadequate nutrition, WHO and UNICEF established a program for Infant and Young Child Feeding (IYCF). The strategy made several recommendations and one amongst the recommendation was provision of dietary diversity to children aged 6-23 months (WHO, 2017).

Consuming a range of foods from both within and outside of one food group is referred to as dietary diversity (DD). Consuming a broad range of foods has indeed been linked to a higher likelihood of getting enough of the macro- and micronutrients needed for basic biological processes (He *et al*., 2021). Dietary diversity is extremely important for children between the ages of 6 and 23 months because this time frame is frequently seen as a crucial window in the mitigation of poor nutrition and growth failure (Yang *et al.,* 2020).

Kenya faces the challenge of ending all forms of malnutrition. One the strategies the government of Kenya has adopted in effort to end this problem is the IYCF strategy developed by UNICEF and WHO (MoH, 2017). One indicator under this strategy is DD. About 37% of children between the ages of 6-23 months fulfill the Minimum Dietary Diversity (MDD), indicating that adherence with the advised dietary diversity

is still not ideal (KDHS, 2022). This rate is a decline from the previous 41% (KDHS, 2014) which indicates an urgent need and attention towards enhancing adherence.

For significant improvements in compliance, in-depth understanding of the drivers of lack of adherence to the recommendation needs to be understood (Lutter *et al.*, 2011; Issaka *et al*., 2015).

Kwale County presented an ideal study site to uncover and understand these drivers that contributed to persistent high levels of malnutrition among young children. According to data collected in Kenya Demographic and Health Surveys (KDHS) conducted in 2008-09, 2014, and 2022, Kwale County has consistently reported alarming rates of chronic malnutrition in this demographic. These surveys indicated a significant proportion of children in Kwale County suffer from stunting, an indication of long-term nutritional deficiencies and poor growth outcomes. (KDHS, 2022)

1.2 Problem statement

Kwale County has been experiencing a problem with chronic malnutrition in children less than the age of five. The recent KDHS indicated a total of 29.7% stunting, 11.8% underweight and 4.4% wasting in children under five years (KDHS, 2022). A comparison of these malnutrition rates with the national's average of 18% stunting, 10% underweight and 5% wasting (KDHS, 2022) is a clear indication of higher rate of stunting and underweight rates in the county.

Chronic malnutrition pin points lack of dietary diversity as an immediate cause (Temesgen *et al*, 2018; WHO, 2017). However, the extent of maternal compliance with feeding practices that ensure dietary diversity for children aged 6-23 months remains under-researched in Kwale County. Many nutritional surveys focus on minimum dietary diversity with a dearth of detailed information on factors affecting maternal

compliance with dietary guidelines for children aged 6-23 months. (KDHS, 2022; Mbogoh, 2017 & Ochola, 2017).

1.3 Justification

Kenya is evidently committed towards ending malnutrition. Kenya adopted the IYCF strategy that was developed by WHO and UNICEF and has since been revised (WHO, 2017) and is committed in actualizing the stated recommendations. By joining the Scaling Up Nutrition (SUN) movement in 2012, Kenya reiterated its commitment to achieving the second Sustainable Development Goal (SDG), which calls for achieving zero hunger and the total eradication of malnutrition by 2030. Additionally, Kenya has implemented Food Nutrition and Food Security Policy which provided a framework that sought to address issues of nutrition (FNSP) (MoA, 2011)

In Kenya, both the county and national levels of government have used multi-stakeholder platforms to carry out all of these policies. However, the revamped efforts and resource allocation has yielded very little improvements. To achieve more significant results, there is need to implement community-sensitive interventions (Lutter *et al.*, 2011). This study focused on inhabitants of Kwale County, areas that have continuously reported high malnutrition rates to better understand the factors that underlie this situation. This study is centered on minimum dietary diversity as a key indicator because in Kwale County, stunting is high and several studies have linked stunting to inadequate nutrient intake which is in turn as a result of poor dietary diversity to this. (Fekadu *et al.*, 2015; Frempong and Annim, 2017).

1.4 Research Questions

1. What is mothers' level of knowledge on dietary diversity?
2. What are maternal perceptions on feeding of diverse diets among children aged 6-23 months?

3. What is mothers' level of compliance with recommended dietary diversity among children aged 6-23 months of age?
4. What are the other factors that influence maternal compliance with recommended dietary diversity among children aged 6-23 months?

1.5 Objectives

1.5.1 Main Objective

To assess maternal compliance with recommended dietary diversity among children aged 6-23 months in Kwale County, Kenya.

1.5.2 Specific Objectives

1. To establish mothers' level of knowledge on dietary diversity in Kwale County.
2. To determine maternal perceptions on feeding of diverse diets among children aged 6-23 months in Kwale County.
3. To determine mothers' level of compliance with recommended dietary diversity among children aged 6-23 months in Kwale County.
4. To determine other factors affecting maternal compliance with recommended dietary diversity among children aged 6-23 months in Kwale County.

1.6 Significance of the Study

The findings of this research provided an insight on mother's understanding on the concept of dietary diversity, current level of compliance with dietary diversity recommendation and factors affecting compliance. Kwale County Health Department and other pertinent authorities will be informed of the proposals, which have been established in light of the findings. Reports will also be made available to policy makers to be incorporated in policies to better IYCF practices through evidence-based intervention implementation in the County.

1.7 Limitation and Delimitation

1.7.1 Limitation

The reliance on a previous 24-Hour recall food record posed a potential limitation to the study as it would not be able to capture habitual diet of children due to daily food consumption variability. Efforts to minimize this was done through thorough probing. Future similar studies might benefit from using multiple recall days to provide a more comprehensive picture of dietary patterns.

1.7.2 Delimitation

The study was limited to areas within an established HDSS program. These areas were purposively selected due to reported high rates of malnutrition. HDSS database possesses up to date, well documented records of periodic surveys conducted at household level thus making it easy to conduct accurate sampling.

1.8 Conceptual Framework

Feeding of diverse diets to young children is influenced by decisions their mothers make. Mothers' food choices are dependent on various factors. In this study, the researcher conceptualized those maternal characteristics such as socio-demographics, household economics, prior knowledge on dietary diversity and maternal perceptions as well as other factors such as cultural practices affect the ability to comply with the recommendation of providing and feeding of diverse diets to children. This concept is based on a theory first developed by Lutter (Lutter, 2000).

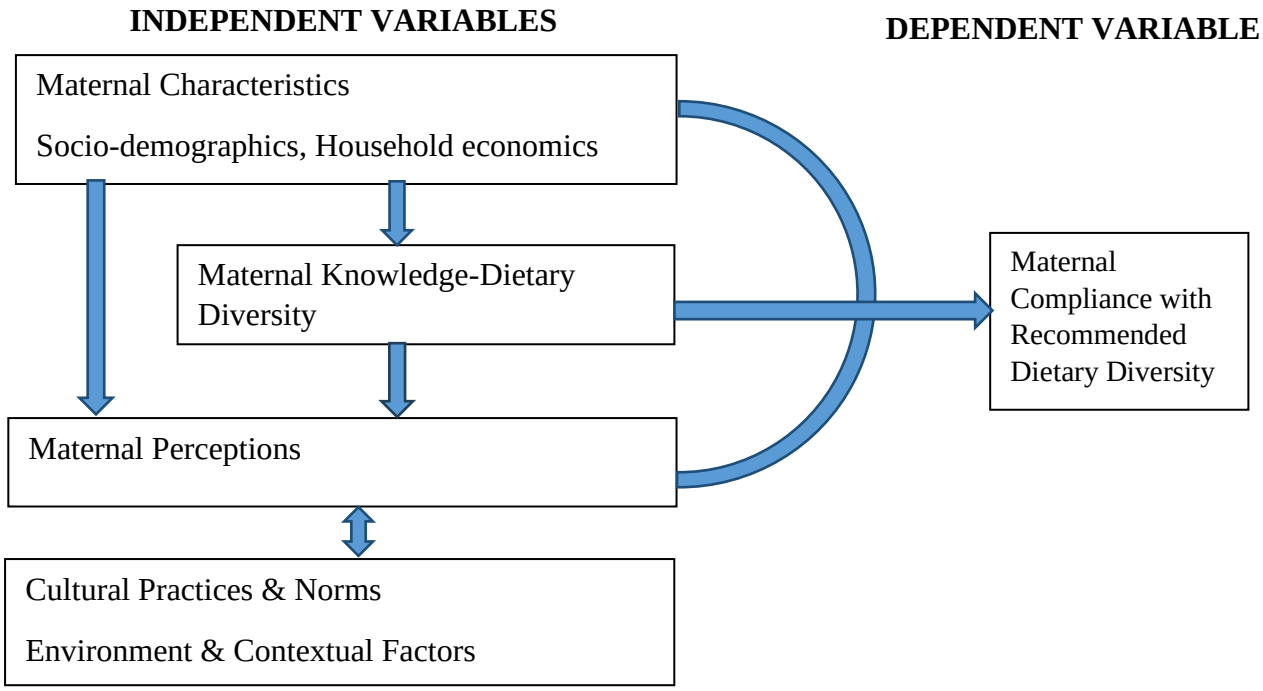

Figure 1.1: Conceptual Framework (Lutter, 2000)

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of Dietary Diversification

Dietary diversification is crucial for ensuring adequate nutrition during the complementary feeding period in young children. In Kenya, several studies have highlighted the challenges and gaps in dietary diversity among children. For instance, Thuita found that children's diets in the Eastern and Western regions of Kenya rarely included fruits and vegetables (Thuita, 2011). Similarly, Ochola reported sub-optimal complementary feeding practices, characterized by low dietary diversity and low-quality foods, in Kwale County, a coastal region of Kenya (Ochola, 2017).

Recent literature continues to underscore the importance of dietary diversity and the role of mothers or caregivers in improving child nutrition. For example, a study by Kamau *et al*. identified that mothers in Nairobi slums faced significant barriers to providing diverse diets due to economic constraints and limited nutritional knowledge (Kamau *et al*., 2020). Additionally, another research by Mbogori *et al.* found that household food security and maternal education were critical determinants of dietary diversity among children in rural Kenya (Mbogori *et al.*, 2021).

To address the persistent problem of low dietary diversity in various regions of Kenya, it is essential to engage key decision-makers, particularly mothers, who play a central role in food choices for their children. Studies have consistently identified mothers as the primary decision-makers regarding child feeding practices (Ochola, 2017; Powell *et al.*, 2017; Chege *et al.*, 2015). This study, therefore, focuses on mothers with children aged 6-23 months to uncover the factors that hinder them from complying with recommended dietary diversity guidelines.

2.2 Dietary Diversity Consideration for Young Children

Young children between the ages of six and twenty-three months are at a point of rapid growth. Their daily nutritional needs can no longer be met by mother's milk alone. WHO/UNICEF advise starting complemental feeding at 6 months. Breast milk continues to be crucial especially in the delivery of proteins and vitamins (WHO/UNICEF, 2021). However, many nutrients, like iron and zinc, are scarce in breast milk (Dewey and Mayers, 2011). Complementary foods therefore, ought to be rich in nutrients that are found in limited supply in breast milk.

It is impossible to develop a universal dietary recommendation due to the significant variation in complementary foods across different regions and cultures. Diet diversity is advised and it simply refers to the practice of consuming a range of foods during the course of the day to ensure that growing children receive all the nutrients they need (Martin *et al*., 2018)

Recent research continues to emphasize the importance of dietary diversity for young children. Studies have shown that higher dietary diversity is associated with better nutritional status and developmental outcomes (Kothari *et al.,* 2020). Furthermore, understanding the local context and food availability is crucial for developing effective complementary feeding strategies (Moursi *et al.,* 2020).

2.3 Compliance with Recommended Dietary Diversity

The study focus is on Individual Dietary Diversity Scores (IDDS), that of children aged 6 to 23 months, in line with recommendations by UNICEF and WHO (WHO, 2017). Research has shown that an increase in IDDS is associated with higher micronutrient adequacy, ultimately improving overall nutritional health. For instance, Mitchodigni *et al.* demonstrated that higher IDDS are linked to better micronutrient density in diets,

which is crucial for the growth and development of young children (Mitchodigni I.M. *et al.*, 2017).

Food and Nutrition Technical Assistance Project (FANTA) established that DDS can predict acceptable macronutrient and micronutrient densities in complementary foods for infants and toddlers (FANTA, 2006). Based on these evidences and many more, WHO and UNICEF developed set of recommendation among which is feeding of children aged 6-23 months with food from at least five food groups out of eight in a day. The eight food groups included: breast milk; grains, roots, and tubers; legumes and nuts; dairy products (milk, yogurt, cheese); flesh foods (meat, fish, poultry, liver, or other organs); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables (WHO, 2017).

Regardless of the quantity consumed, any food eaten counts. A food group earns a score of one (1) when a food in the group is consumed and it earns a score of zero(0) when no food from the group is consumed(WHO, 2010).It is presumed that when a child consumes at least 5of the above 8 food groups in a day, he/she consumes a minimum of one food derived from animal sources and that at least one fruit or vegetable in supplement to a basic diet with a high probability (grain, root or tuber) making the diet diverse an ensuring diversity in nutrients consumed (WHO, 2017).

In calculation of DDS, reference period is also put into consideration, there are several acceptable time periods, including the most recent 24 hours. (1 day), the previous 3 days, 7days or even a month. This study bases on the previous 24-Hours, this being similar to other studies done by (Steyn *et al.*, 2006; Savy *et al*., 2005; Arimond *et al*., 2010) which have noted that this reference period reduces recall errors, yielding more accurate data without overburdening the respondent.

To assess compliance with dietary diversity recommendations, the Minimum Dietary Diversity (MDD) indicator is employed. According to WHO and UNICEF guidelines, a child is considered compliant if they consume foods from at least five out of the recommended eight food groups daily. In this study, children who achieve a score of five or more are deemed to meet the dietary diversity recommendation, reflecting an adequate intake of a variety of essential nutrients necessary for their growth and development (WHO, 2017; WHO & UNICEF, 2008).

2.4 Factors Associated with Feeding Diverse Diets

2.4.1 Maternal Nutrition Knowledge

Nutrition knowledge and practices vary from one mother to another. Basic elementary education amongst mothers is a factor that cannot be overlooked, those who have gone to school often seem to be aware of basic nutrition facts. Studies that have been done in Ethiopia, Pakistan, Nepal and Kenya have associated education level of caregivers (mostly mothers) with the health of their children's diets (Demilew *et al.,* 2017; Hasnaim *et al.,* 2013; Chapagain, 2013; Masibo, 2013) These studies have concluded that educated mothers have better nourished children. Additionally, a study in Kenya further observed that an impediment to healthy eating was mothers' insufficient education (Chege *et al.,* 2015).

Nutrition knowledge and practices vary significantly among mothers and basic education plays a crucial role in shaping these practices. Mothers with elementary education often have a better understanding of basic nutrition facts. Recent studies in various countries, including Ethiopia, Pakistan, Nepal, and Kenya, have highlighted the positive correlation between the education level of caregivers (primarily mothers) and the nutritional health of their children (Demilew *et al.,* 2017; Hasnain *et al.,* 2013;

Chapagain, 2013; Masibo, 2013). These studies consistently conclude that children of educated mothers are better nourished.

Furthermore, a recent study in Kenya observed that a significant barrier to healthy eating was the lack of sufficient education among mothers (Chege et al., 2015). This accentuates the importance of improving maternal education to enhance child nutrition outcomes. More recent studies continue to support this association, emphasizing the need for educational interventions to improve dietary practices and child health (Mekonnen *et al.*, 2021; Ullah *et al*., 2020; Paudel *et al.*, 2020).

In a typical rural set up, many mothers may have gone to school but hardly completed their primary education. Lack of completion of the primary level of education is a factor that may justify why mothers have an inadequate understanding of nutritional facts and information. For illustration, respondents in a FGD in Garissa, Kenya, were prompted to list the foods they gave their kids to grow their bodies, give them energy, and defend them. The foods that individuals most regularly named were "ugali, chapati, rice, and potatoes" as the meals for building muscle, "bananas, water melon, mangoes, and paw paw" as the foods for supplying energy, and "beef and attenuated milk of camel/cow/goat" as the meals for providing protection (Abdulrahim *et al*., 2015). This indicated the existence of knowledge of food groups but inadequate information as to which food belongs to a specific food group.

It is believed that improving caregivers' comprehension of nutrition, sanitary conditions, and methods for preventing common diseases should intuitively minimize malnourishment, which would in turn reduces the rates of infant morbidity and death (Luchuo *et al*., 2013).

This study compared the level of maternal compliance with dietary diversity with their knowledge on nutrition. These comparisons yielded gaps that could be field through nutrition education interventions.

2.4.2 Household Socio-Economic Status

In recent studies by Kamau et al. (2019) and Torell & Anderson (2020), the family's socioeconomic situation has been identified as a significant contributing factor to dietary diversity in a household. These studies underscore that higher socioeconomic status is associated with better dietary diversity, as it influences access to a variety of foods, the ability to purchase nutrient-rich foods, and overall food security.

Agrobiodiversity has been was found to rise as a result of wealthier people's ability to acquire more land and buy additional varieties of seeds as well as other farm products, according to an ethnographic study conducted in Tanzania (Powell *et al*., 2017). This study, like that of Powell *et al*., (2017) explores factors that contributed to mothers feeding diverse diets to their children through FGDs. The information is useful in explaining the association between maternal compliance to the recommendation with their household socio economic and socio-demographics.

2.4.3 Influence of Culture

The influence of culture in many communities has been globally acknowledged since time immemorial (Barer-Stein, 1999; Cohen AB, 2009; Sucher and Kittler, 2007). Every community possesses distinct cultural practices that differ from one another. Studies by Morrel, (1999) and Johnson *et al.,* (2011) established an association between culture and people’s dietary habits (Morrel, 1999 and Johnson *et al*., 2011). It is the existence food taboos and different values placed on foods that are a limiting factor to dietary diversity. Among the Maasai community in Kenya, there is existence of food taboos that prohibits consumption of wild animal, chicken and fish. The Maasais value

their livestock so much that they believed land was to only be used for grazing, this cultural practice limits crop cultivation and consequently limiting household dietary diversity readily available in their lands (Chege *et al.,* 2015).

In Western Kenya, caregivers cited the foods that were culturally unacceptable for their young children. Eggs were not to be fed to young children because they were believed cause delay in speech while fermented porridge was thought to cause diarrhea and stomach ache (Thuita, 2011). Adherence to these food restrictions implies that children are deprived of certain macro and micro nutrients would have otherwise been readily accessible and affordable. This study explores the existence of food beliefs to deduce the implication on dietary diversity for children. It is crucial to comprehend the various cultural customs. in regards to foods especially in designing culturally-sound nutrition interventions (WHO and UNICEF, 2003)

2.4.4 Maternal perceptions on Dietary Diversity

Mothers' perceptions are a critical factor in the provision of diverse diets to children aged 6-23 months. The level of education, socio-economic status, and cultural practices greatly influence mothers' attitudes and perceptions. By enhancing maternal knowledge and addressing practical challenges, mothers can improve dietary diversity which eventually leads to improved nutritional status of their children.

Mothers with higher nutritional knowledge are more likely to provide a balanced diet to their children as evidenced in a study by Birch & Ventura (Birch & Ventura, 2009). On the contrary, fallacies about nutrition can lead to poor dietary choices, an example is a study in Ethiopia that found mothers had limited understanding of the importance of dietary diversity, and their children experiencing poor nutritional status (Aemro *et al.,* 2013).

In addressing issues of negative perceptions, comprehensive studies have often been suggested to better understand the diverse contexts that the study target is exposed to. Gupta *et al*., in their study tries to expound on the influence of culture on perceptions and how they can be integrated in developing nutrition interventions that can yield positive perceptions and encourage good practices (Gupta *et al.,* 2020).

2.5 Summary of Literature

The interaction of dietary diversity, maternal knowledge, perceptions, and cultural practices significantly impacts child nutrition. In Kwale county, where the current study targets, Kimani-Murage *et al.,* recognized that many households lacked financial resources to purchase a variety of foods (Kimani-Murage *et al.,* 2015) this lingers back to the existing socio-economic status. On the other hand, Savy *et al.,* pin points the existing emphasis on traditional diets and the neglect of other foods that could provide essential nutrients (Savy *et al.,* 2006).

In addition to the identified gaps, M'Kaibi *et al.,* concludes that many parents in Kwale County lack adequate information on the nutritional needs of their children and the benefits of providing a diverse diet. This knowledge gap was aggravated by inadequate access to education and health services (M'Kaibi et al., 2015)

Examination of the existing research such as in those alluded to earlier, provides valuable insights, and perpetuates a need to address the identified gaps by developing targeted and effective nutrition interventions. This study yields an understanding and integrating cultural and contextual factors, and the recommendations it makes contributes to reducing malnutrition and improving the health and development of children globally.

CHAPTER THREE: MATERIALS AND METHODS

3.1 Research Design

This research used a mixed-methods approach comprising of individual interviews with caregivers as well as conversations in focus groups (FGDs). It adopted the convergent parallel design where results from both quantitative and qualitative data were merged during analysis. Data on maternal socio-demographics, household socio-economics, maternal knowledge on dietary diversity, children's diets, maternal perceptions on dietary diversity and information on food taboos and other factors affecting compliance were collected in a cross-sectional design. Mothers who lived in specific areas and had children aged 6 to 23 months within a HDSS program formed the sampling frame. The individual interviews were structured to capture both qualitative and quantitative data while the FGDs captured qualitative data. This research study design was utilized as it suited this kind of study where large amount of data was to be gathered in a little period of time and it allowed for robust and valid interpretation of the data.

3.2 Variables

Mothers' compliance with advised dietary diversity was regarded as a dependent variable in this study. Dietary Diversity Scores (DDS) were used to assess the compliance levels of target children. Independent variables comprised of maternal socio-demographics, Household socio-economics, mothers' knowledge on dietary diversity and mothers' perceptions on feeding of diverse diets.

3.3 Location of the Study

In Kwale County, Kenya, the study was carried out. Matuga, Msambweni, Kinango, and Lungalunga sub-counties make up Kwale County. This research was conducted in purposively selected locations within an acknowledged Health and Demographic System Surveillance (HDSS) program. HDSS covers areas within three sub-counties

which include Matuga, Kinango and LungaLunga. HDSS spans 384.9 km^2 in size with 9000 households and about 50, 000 inhabitants as at October, 2013. Between latitudes 4°17′S and 4°5′S, and longitudes 39°15′E and 39°29′E, is the region (Kaneko *et al*., 2012). Matuga and Kinango sub-counties were purposively selected due to reported high rate of stunting in periodic HDSS surveys. An area within LungaLunga sub-county was used to conduct pre-test. Although the HDSS program did not cover all four sub-counties in Kwale County, the up-to-date data platform provided a credible database for sampling of study participants. It also served as a foundation for useful community assistance initiatives aimed at enhancing the health of the local populace.

3.4 Study Population

Mothers with children between the ages of 6 and 23 months made up the study's target demographic. They were residents of Kwale County living within selected locations in a HDSS program. Mothers who gave written and signed participation consent took part in the study. Mothers were targeted due to their direct involvement in infant's nutrition both in provision and feeding.

3.4.1 Inclusion Criteria

Mothers either biological or otherwise of children aged 6-23 months who had lived in areas within established HDSS program for more than six months. A written consent of participation indicating free will was also considered as part of inclusion in the study.

3.4.2 Exclusion Criteria

Mothers either biological or otherwise of children aged 6-23 months who had not lived in the areas within established HDSS program for more than six months or declined to give a written consent of free will participation in the study.

3.5 Sampling Technique

3.5.1 Sampling of Study Location

This research study was conducted in Kwale County. The study locations were purposively selected from an established Health and Demographic System Surveillance (HDSS) program. HDSS covered areas within three sub-counties which included Matuga, Kinango and LungaLunga. The high rates of stunting recorded in the HDSS database placed Matuga and Kinango sub-counties as ideal sites to uncover factors associated with adherence by mothers to the advised dietary diversification of their children. LungaLunga sub-county was selected as a pretest site as it was comparable to the selected study site in selected variables.

3.5.2 Sampling of participants for individual interviews

A simple random sample of participants was computer generated from the list of households within the selected locations. Random sampling ensured that the study participants represented the entire target participants and that inference could be made.

3.5.3 Sampling of participants for FGDs

One FGD was held in each of the five villages that were randomly picked from the earlier purposefully chosen places. FGD members were purposively sampled. In each village, FGDs involved 8–10 persons altogether. The ideal number of participants in FGDs is 6-12; therefore, a total of 8-10 participants was well within the recommended size and was a manageable number which aided successful discussions.

To ensure homogeneity within the FGD groups, participants within the same age group were recruited. FGD tool was used in this study purposely to provide complementary information to that which was collected using individual interviews questionnaire. A total of five FGDs were therefore considered sufficient to attain a level of information saturation as the discussion was well conducted.

3.6 Sample Size Determination

The sampling size was obtained following the formula provided by Fischer et al. (1998).

The states as follows:

$n = z^2pq/d^2$

In this formula

n= the target population's preferred size >10,000

z= 95% confidence interval for the usual standard deviation is 1.96.

p= In this scenario, the percentage of the population thought to possess the positive traits, the proportion of mothers in Kenya who comply to feeding recommended diverse diet. (p=0.41) according to KDHS 2014.

q= probability of not having the desired characteristic (1-0.41)

d= the established level of statistical validity. It is 0.05 in this instance.

$$n = \frac{1.96^2 * 0.41 *(1-0.41)}{0.05^2}$$

=372 mother-child pairs

However, because the study population was less than 10,000, the intended proportion was calculated using the known population adjustment factor as follows:

$$n = \frac{n_o N}{n_o + (N-1)}$$

Where: n = the population's ideal sample size< 10,000

n_o = determined the population's representative sample.>10,000

N = the study's whole population of interest

$$n = \frac{372 * 669}{372 + (669-1)}$$

= 240 mother-child pairs

264 mother-child pairings in a randomly selected sample was computer-generated from list of participants meeting selection criteria from HDSS database. This sample size added 10 % to cater for non-response. The Study presents results of 244 participants.

3.7 Construction of Research Instruments

Individual interviews were carried out with the aid of a semi-structured questionnaire, a qualitative 24-Hour recall questionnaire and a dietary diversity questionnaire. There were both closed-ended and open-ended items in the semi-structured questionnaire on socio-demographics, socio-economics, maternal nutrition knowledge and maternal perceptions on feeding young children and infants. Additional 24-Hour recall questionnaire was structured with open-ended questions to capture foods consumed by children within the last 24 hours. Data from the 24-hour recall survey were utilized to complete the dietary variety survey. FGDs were conducted with the aid of a FGD guide, which was a semi-structure questionnaire. The questions contained pre-determined open-ended questions to capture information on socio-demographics of participants, maternal perceptions on feeding of diverse diets, food taboos and other factors that influence maternal compliance to feeding of diverse diets to their children.

3.8 Pre-test of Data Collection Tools

A pre-test of the study questionnaires as well as the FGD protocol was completed in a location in Lunga Lunga sub-County, Kwale County. The location was within the HDSS program. Lunga Lunga sub-County was selected for this purpose has it had not been purposively selected for the study. This ensured that the actual study ran smoothly as the pretest location was comparable with the study population. Pre-test served as a simulation of the real situation on study area.

3.9 Validity

Data collecting technologies were used to confirm validity (questionnaires and FGD protocol) were reviewed by supervisors and subjected to a pre-test. The tools were also translated to Kiswahili for ease of interpretation during interviews. Additionally, prior to conducting interviews an informed consent was sought and a copy of signed consent documented.

3.10 Reliability

By cross-checking, inspecting, and closely examining the pre-tested surveys to assess precision, appropriateness, thoroughness, integrity, and homogeneity of the queries, the data collection tools' dependability was guaranteed. Before the commencement of the research, the questionnaires and FGD methodology were modified as needed in response to the pre-test comments. In addition, the lead investigator gave study assistants full training and oversight, conducting daily debriefings.

3.11 Data Collection Procedure

Individual interviews were carried out with the aid of a semi-structured questionnaire. Randomly sampled Mothers with children between the ages of 6 and 23 months. One on one interviews were carried out on consenting mothers by trained data enumerators at household level.

FGDs were conducted with the aid of a developed and pre-tested FGD guide. A trained facilitator moderated the discussion. Note taking was done during discussion and a smart recorder was used to record the discussion. The recorded data acted as back-up to the notes taken and this ensured that all data was captured during the transcription process. FGDs were conducted in a centralized place that was convenient to participants.

3.12 Data Analysis

Analytical program IBM SPSS version 21.0 was used to analyze the data from each survey. At the beginning of the report, inferential statistical approaches were used to reveal the data's structure and spot anomalies or unusually inputted numbers. Central tendency indicators like average, standard deviations, midpoint, and range were used to describe statistical parameters, whereas descriptive statistics like proportions were used to characterize explanatory data. Bivariate regression analysis and spearman's parametric bivariate correlation analysis was conducted to ascertain the relationships between and among variables. This analysis was essential in understanding underlying patterns and making predictions.

Data analysis of FGD data was done once transcripts had been satisfactorily completed and compiled. Transcripts were worked on directly due to the relatively small number (n=5). Themes were identified and coded. Each coded theme was then analyzed based on the content of transcripts. Analysis result from the scripts was correlated with the quantitative findings from the individual interviews and this enabled the capture of complexities of participants' experiences and perspectives.

Correlating qualitative and quantitative findings ensured that the results were robust and well-rounded, addressing both the numerical trends and the contextual nuances of the data.

3.13 Ethics-Related Matters

Prior to their involvement in the trial, all mothers who were randomly chosen were asked for their explicit consent. Each prospective participant was provided enough information on the study's objectives, procedures, predicted advantages, potential hazards, and also any inconvenience it might cause. This was explained in extremely clear, basic, and straightforward phrases using a language which the respondent

understood quite well. Additionally, the participants were reminded of their ability to refuse to engage in the research at any moment or to revoke their agreement to do so. The informed consent ensured respondents' rights as a study participant were maintained. Voluntariness of participation was confirmed to participants prior to their decision to join the study. A written waiver of expressed permission was obtained from the respondent after they had read and understood all of the details. In front of an unbiased witness, those who were unable to write attached their finger stamps. A study authorization was secured from NACOSTI, and ethical approval was obtained was requested from the Kenyatta University Ethical Review Committee. Approval was also pursued at the County level from the Ministry of Health, Kwale County office through KEMRI-NUITM Kwale office in-charge of programs within the HDSS.

CHAPTER FOUR: RESULTS

4.1 Socio-demographic and economic characteristics of the sample

4.1.1 Index Child Characteristics

Index child's characteristics were: 125(51.2%) girls and 119 (48.8%) boys with an average age of 15 months. Table 4.1 shows frequencies of age of index children by age clusters of 6-11months, 12 to 17 months, and 18 to 23 months.

Table 4.1: Index childs' Age distribution

Characteristics	Frequency(n)	Percent
Age in months(n=244)		
6-11	76	31.1
12-17	68	27.9
18-23	100	41.0

4.1.2 The socio-demographic characteristics of study respondents

The demographical details of the participants in the sample population are shown in Table 4.2. All respondents (100%) were females as per the study target population. Their average age was 29.24 ±9.6 years, having ages ranging from 17 through 68. By educational levels, 29.5% of the participants, or nearly one in three, lacked any kind of formal schooling, 10.2% had fewer primary school years (class 1 – 4), 53.3% had upper primary education (class 5-8), 5.3% had secondary education while only 1.2% had post-secondary education. Most (54.1%) of the respondents were housewives. Households had 5 – 10 members, almost one – third (29.2%) had less than 5 members and only a small percentage (7.4%) had more than 10 members in the household.

Table 4.2: Socio-demographic characteristics of the respondents

Characteristics	Frequency	Percent (%)
Age in years of respondents (n=242)		
<= 24	84	34.7
25 – 34	108	44.6
35 – 44	31	12.8
45 – 54	10	4.1
55 – 64	7	2.9
65+	2	0.8
Educational level of respondent (n=244)		
No formal education	72	29.5
Primary 1-4	25	10.2
Primary 5-8	130	53.3
Secondary 1-4	13	5.3
Tertiary - college/university	3	1.2
Madrassa	1	0.4
Occupation of the respondent (n=244)		
Employed	3	1.2
Casual worker	9	3.7
Housewife	132	54.1
Business	32	13.1
Farmer	54	22.1
Unemployed	13	5.3
Retiree	1	0.4
Household size (n=243)		
Less 5	71	29.2
5 – 10	154	63.4
More than 10	18	7.4

4.2.3 Economic characteristics of the study respondents

An assessment of the respondents' financial features is presented in Table 4.3. Economic variables were operationalized as household income sources, income expenditure, and Income quintiles. The principal component approach was used to calculate the income quintiles using the home water and sanitation practices, ownership of assets and housing characteristics.

Most (63.4%) of the household depended on Casual labor (40.6%) and small-scale farming (33.6%) as the main source of income with 8.6% getting their income from formal employment. Farming accounted for more than 70% of food sources for the

households. Majority of the households spent less than Ksh. 10,000 in the one month preceding the survey.

The computed wealth index classified 20.5% in the first quintile (poorest) and 21.3% in the wealthiest quintile (5^{th} quintile). The majority (94.7%) of the households owned the houses they lived in, 3.7% lived in the houses without having to pay rent possibly because they were owned by their relatives and a lesser proportion, 1.6%, rented the houses they lived in. Most (90.6%) of the houses had their floors made of earth or dung, 9% were made of cement and only one (1) was finished floor. The number of sleeping rooms was two (2) in 45.1% of the households, three or more in 28.7% and only one (1) in 26.2% of households. Almost all (97.5%) of the houses cook primarily with fuelwood, with both the remainder using charcoal.

The vast majority of homes (60.2%) relied mostly on water gathered from water pans as their primary source of drinking water (*mtsara*) with households with tap water outside their compound accounting for 31.6% and tap water within the compound at 5.3%.

Over 50 percent of the families (54.5%) lacked availability to bathroom facilities whether shared or owned by the household. The traditional pit latrine was the most prevalent kind of sewage treatment facility available to the households accounting for 35.7%, More than three-quarters of respondents used pit latrine in some form. The households with the improved pit-latrine accounted for 8.2% of the households and flush toilets only 1.2%. 51.4% of the homes, or a little over half, with access to toilet facility share the same with other households in the community.

Table 4.3: Characteristics of Respondent's Economics

Characteristic	Frequency	Percent (%)
Household size (n=243)		
Less 5	71	29.2
5 – 10	154	63.4
More than 10	18	7.4
Main source of income for the household		
Formal employment	21	8.6
Small scale farming	82	33.6
Farming & selling produce	6	2.5
Small business	28	11.5
Petty trade	6	2.5
Casual labor	99	40.6
Relatives/remittances	1	0.4
Others	1	0.4
Approximate monthly expenditure		
Less 1,000	1	0.4
1,000-2,999	14	5.7
3,000-4,999	56	23
5,000-9,999	111	45.5
10,000-19,999	39	16
20,000-49,999	3	1.2
Not sure	20	8.2
Main food sources		
Purchase	71	29.1
Household farm/ garden	173	70.9
Wealth index		
1st quintile (Poorest)	50	20.5
2nd quintile	23	9.4
3rd quintile	73	29.9
4th quintile	46	18.9
5th quintile (wealthiest)	52	21.3
Main source of water for domestic use		
Tap water within compound	13	5.3
Tap water outside compound	77	31.6
Tap water purchased	3	1.2
Well/ borehole	1	.4
Pond water	1	.4
Spring/ chemi chemi	2	.8
Pan/ mtsara	147	60.2

Characteristic	Frequency	Percent (%)
Type of restroom facilities		
Flush toilet	3	1.2
Pit latrine (traditional)	87	35.7
Pit latrine (VIP)	20	8.2
Hanging toilet	1	.4
Bush/field	106	43.4
No facility	27	11.1
Share the toilet (n=111)		
Yes	57	51.4
No	54	48.6
Main cooking fuel		
Firewood	237	97.5
Charcoal	5	2.1
Ownership of the house		
Rented	4	1.6
Live without pay/live with relative	9	3.7
Own home	231	94.7
Number of sleeping rooms		
Zero/one sleeping room	64	26.2
the two bedrooms	110	45.1
at least three bedrooms	70	28.7
Materials for the floor		
Finished floor	1	.4
Cement, raw wood	21	9.0
None, earth, dung	212	90.6

4.2 Maternal Nutritional knowledge on Dietary Diversity

The study assessed the maternal comprehension of kinds of foods and further assessed the knowledge of the food rich in energy, body building foods and protective foods. From the study, 79.1% of the respondents reported having heard of the term diverse diet while only 27% of the respondent's indicated knowledge of the food groups. Figure 4.1 describes the sources of information about diverse diet as reported by the mothers. About 75% of them reported hearing the information from health institution (Health center, hospital, dispensary, clinic) 11% from friends, neighbors and family members, 7% from extension workers and seminars, 5% through radio and 2% from school.

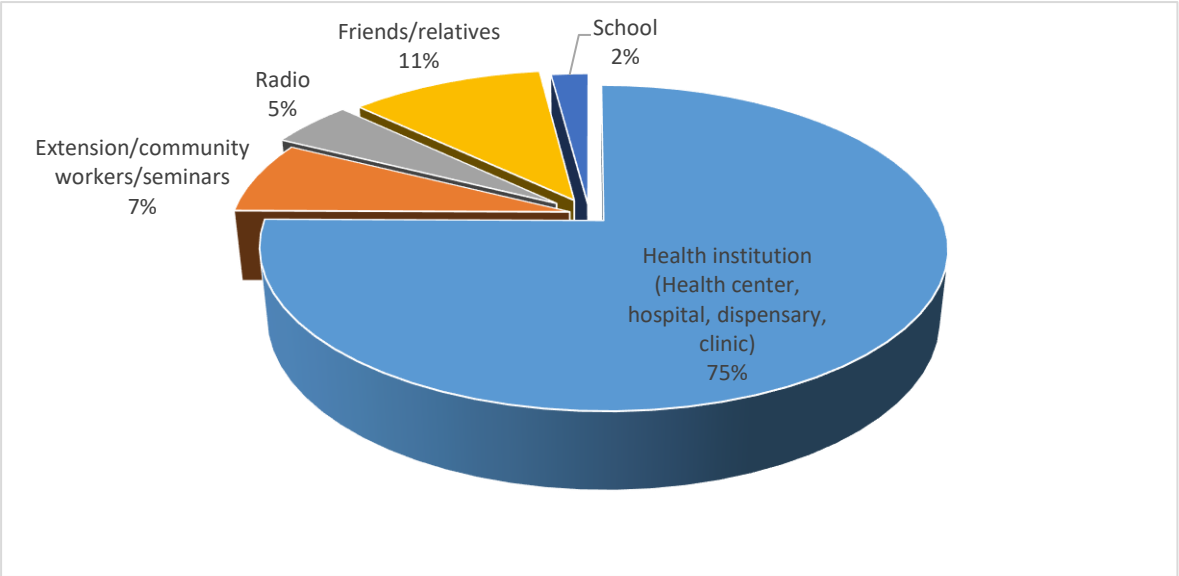

Figure 4.1: Cited sources of information on dietary diversity

On assessment of knowledge of food groups however, about 11.5% of the participants in the survey properly recognized at least a single type of food, according to the results. Fruits and veggies with a high vitamin and mineral content are part of the preventive food category were the most popular, mentioned by 10.7% followed by energy giving foods (7.4%) and body building foods at 7%.

The proportion of responders by the precise number of dietary categories indicated is shown in Table 4.4. Fifteen respondents (6.1%) were able to correctly cite 3 food groups, seven (2.9%) correctly mentioned 2 groups and six (2.9%) mentioned only 1 group. The rest (88.5%) did not know any of the food groups.

Table 4.4: Distribution of Scores of Knowledge of food groups

Correct number of groups	**Frequency(n)**	**Percent (%)**
0	216	88.5
1	6	2.5
2	7	2.9
3	15	6.1

The respondents were further asked to name three kinds of meals that promote energy, bodybuilding, and protection. 36.5% of the respondents correctly mentioned at least one example of food rich in energy with 13.9% listing one correct food, 9.8% listing two foods and 12.7% listing three foods correctly. 16.4% of the respondents correctly identified at least one example of body building foods. 6.6% of these identified correctly one example, 7% two examples and 2.9% three examples. On the other hand, 11.5% of the respondents gave correct examples of protective foods. Of these, 1.2% mentioned one correct example, 4.9% mentioned two correct examples and 5.3% mentioned three correct examples.

Table 4.5: Distribution of Scores of Knowledge on food sources per food groups

Category	Correct Responses (%)				
	N	0	1	2	3
Sources of Energy giving foods	244	63.6	13.9	9.8	12.7
Sources of Body-building foods	244	83.5	6.6	7.0	2.9
Sources of protective foods	244	88.6	1.2	4.9	5.3

In the next step of the analysis, each one of the four questions was worth a total of three points, and the results as from the four questions were added together to determine the final score. The scores ranged from 0 to 12. The nutritional knowledge levels on dietary diversity of the mothers were generally very low. More than half (57.4%) of the

caregivers scored zero (0). Only 3.3% of the mothers had higher score of more than 9 out of 12. Applying the cut offs 0 – 5, 6 – 9 and 10 -12 to group the participants as low score, medium score and high score respectively placed majority (91%) in the low score, 7% in the medium and only 2% in the high score group.

Table 4.6: Mothers' Overall Score of Knowledge on Dietary Diversity

Cut-offs	Score Category	Frequency(n)	Percentage (%)
0-5	Low	222	91
6-9	Medium	17	7
10-12	High	5	2

A spearman's non-parametric correlation matrix between the mother's knowledge score and other sociodemographic information and family economics of the participants is shown in the table 4.7. Mothers' educational level showed a modest positive significant relationship with nutritional knowledge scores (ρ=0.22, P <0.001, α=0.01). This implied that mothers who have completed more schooling seem to be more informed about dietary diversity as compared with those with lower educational levels.

Table 4.7: Spearman's non-parametric bivariate correlation between scores of mothers' knowledge on dietary diversity and other variables

	educational level	**age**	**Wealth rank**
P	.220**	0.024	-0.015
P	0.001	0.707	0.822
N	244	242	244

** At the threshold of 0.01, correlation is significant (2-tailed).

4.3 Mothers' perceptions on infant and young child feeding.

When it comes to starting breastfeeding, having enough breast milk for the first six months, and different nursing and supplementary feeding techniques, the maternal impressions of newborn and early child nutrition were evaluated. A three – point Likert-like scale was used to assess whether they agreed, disagreed or were neutral about the

assessment statements. Table 4.8 shows the responses of the mothers under the three categories. In most cases except one, most participants believe the remarks, showing a generally upbeat mindset. However, only 21% of mothers agreed with expressing breast milk in the community. One – in – three (75%) respondents did not agree with the statement on express breastfeeding. Similarly, more than 22% of the respondents did not believe that mothers working away from home should breastfeed their children. At the same time, almost 25% of the respondents did not believe that Children between the ages of 6 and 23 months must be fed upwards of four times daily.

Table 4.8: Mother's perceptions on infant and young child feeding

Statements	Agree (%)	Disagree (%)	Not sure (%)
An infant has to receive colostrum.	93.0	5.7	1.3
An infant benefit from starting exclusive lactation at a young age.	94.9	4.6	.4
Breast milk contains sufficient water	91.7	6.1	2.2
Within the first six months, infants ought to only be nursed without receiving any other food or drink.	93.8	5.3	.8
Infants should always be nursed on need, even at night.	99.6	.0	.4
At six months, complementary foods should then be offered.	95.0	4.5	.4
Sustained lactation is advised following the addition of complementary feeding.	98.8	.8	.4
Mothers working away from home should breastfeed	75.4	22.8	1.7
A mother working away from home can express breast milk for the baby to use while she is away	21.8	75.2	2.9
Children who are aged 6-23 months who are nursed need to eat well over four to five times each day.	73.8	24.4	1.8
Upwards of 4 different food categories should be served to children above the age of six each day.	87.4	9.5	3.2
Throughout pregnancy and nursing, women need to consume additional food.	94.2	5.0	.8

In the next analysis step of the mothers' attitudes based on their perception responses were scored such that those who gave a positive response to the statement was awarded

a score of one, those who disagreed with the statement was awarded a negative score as those who had neural score were awarded zero. The attitude score had an average of 8.3±2.6 and a variation of -4 to 12, and a median of 8. Figure 4.3 describes the attitude scores by mothers. Majority (90.6%) had a score of 6 or more with most (27.9%) recording a score of 10.

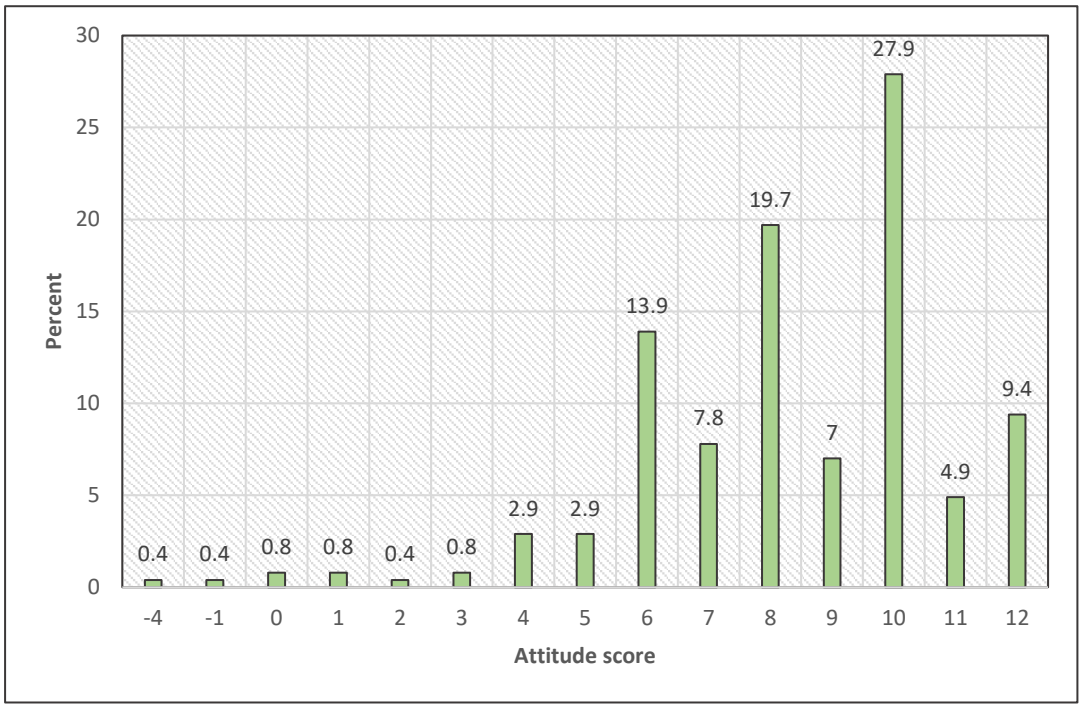

Figure 4.2: Distribution of Scores on Maternal Attitude towards dietary diversity

Mothers' wrong perception of what constitutes a diverse diet was also noted in conversations held in focus groups. Most of the participants' perception of diverse diet did not include a mention of foods of animal origin. A mother in FGD Dumbule said: *"In the morning I will give uji, at 10 o'clock I give tea and before lunch I give an orange. At lunch time I give sima and beans, at 4 o'clock I give an orange/banana and in the evening before bed I give sima and mchicha."*

Table 4.9 describes the spearman's correlation between the mothers' attitude scores and the socio-economic and demographic details on the mothers. The participants'

disposition score showed a strong positive link with their academic background (ρ=0.192, *P*<0.003, α=0.01) and maternal nutritional knowledge score (ρ=0.154, P=<0.016, α = 0.05). This demonstrates how better attitudes and greater nutritional knowledge are related to respondents' higher educational levels.

Table 4.9: Spearman correlation between attitude score and other variables

	Age	Education	Main occupation	Nutritional knowledge
P	0.021	0.192**	-0.083	0.154*
P	0.749	0.003	0.197	0.016
N	242	244	244	244

* The 0.05 level of significance for correlation (2-tailed).
** The 0.01 level of significance for correlation (2-tailed).

4.4 Compliance with recommended Dietary Practices

The degree to which the advised feeding practices were followed, such as only nursing for six months, continuing nursing for two years and beyond, and food diversity for the children during supplementary feeding time, was evaluated.

4.4.1 Compliance with breastfeeding practices

According to the survey, 62% of the children were exclusively breast fed. When the survey was conducted, as shown on Table 4.10 below, 64.8% of the children were still breastfeeding. Of these, 25% were those from 6 to 11 months, with 19.7% between 12 and 17 months. and 20.1% in the age group 18 – 23months. A much higher percentage of kids between the ages of 18 and 23 months (59.3%) had stopped breastfeeding compared with 12- to 17-month-olds (23.3%) and age group 6 -11 months at 17.4 percentage points (χ= 19.898, df=2, p<.000).

Table 4:10: Maternal Compliance with recommended breastfeeding practice

Age group (months)	Frequency (n)	Compliance Level	
		Still Breastfeeding (%)	Stopped Breast feeding (%)
6-11	76	25 (n=61)	6.1 (n=15)
12-17	68	19.7 (n=48)	8.2 (n=20)
18-23	100	20.1 (n=49)	20.9 (n=51)
Total	244	64.8	35.2

4.4.2 Compliance with minimum dietary diversity

Eight food groups were considered in the evaluation of children's dietary diversity: breastmilk, grains, roots and tubers, legumes and nuts, dairy products, meat and poultry, vitamin A-rich fruits and vegetables, and other fruits and vegetables. The dietary diversity scores for children ranged from 1 to 6, with an average of 2.63 ± 0.9. Nine children (3.7%) had a score of 1, having only breastfed. Additionally, 20.5% of the children recorded a score of 2, having consumed foods from two food groups. A substantial portion, 49.6%, consumed foods from three food groups, while 20.8% ate foods from four different groups. Only 5.24% and 0.26% of children consumed foods from five and six food groups, respectively.

Table 4.11 details the food group consumption by the children. An overwhelming majority, 95.9%, consumed items from the category of cereals, roots, and tubers. Additionally, 34.4% consumed vitamin A-rich vegetables and fruits. Less than a third of the children ate foods from other groups. Notably, none of the children in the sample consumed eggs. The distribution of food group consumption by age is also described in Table 4.11. Children aged 6 to 11 months consumed significantly fewer meals from flesh foods and vitamin A-rich vegetables and fruits compared to other age groups. Conversely, a higher percentage of children in this age group consumed items from the dietary groups of cereals, roots and tubers, and legumes or nuts.

This analysis highlights the dietary patterns of children across different age groups, emphasizing the prevalence of specific food group consumption and the overall dietary diversity among the children studied.

Table 4.11: Maternal Compliance with minimum dietary diversity recommendation

Food group	6 – 11 months %	12 - 17 months %	18 – 23 months %	Overall %	X	Significance
Grains, roots and tubers,	90.8	95.6	100	95.9	10.597	.009
Legumes and nuts,	10.5	20.6	46.0	27.9	13.816	.000
Dairy products	25.0	17.6	22.0	21.7	2.773	.563
Flesh foods	6.6	17.6	25.0	17.2	9.210	.006
Eggs	0	0	0	0	-	-
Veggies and fruits high in vitamin A	14.5	41.2	45.0	34.4	13.816	.000
Other fruits and vegetables	21.1	17.6	21.0	21.1	0.103	.840
Breast Milk	25.0	19.7	20.1	21.6	0.806	.900

Overall, only 5.5% of the children achieved the required nutrient intake score of five or much more types of food. Significantly bigger proportion (14%) of the kids between the ages of 18 and 23 months compared with age groups 6 -11 months at 5.7% and 12 -17 months at 4.4% (χ= 7.594, df=2, p=.022).

4.4.3 Compliance with minimum meal frequency

A measure of a child's energy needs, minimal meal regularity looks at how frequently kids consume meals besides their mother's milk. The absolute minimum depends on the age of onset and whether she is breastfed. If breastfed children get rigid, semi-liquid, or soft foods at least once or twice daily for infants aged 6 to 8 months or at three times a day daily for kids aged 9 to 23 months, they are regarded to be receiving the recommended minimum meal pattern. A minimum of four meals per day are advised

for non-breastfed children between the ages of 6 and 23 months. In this study, as shown on Table 4.12 below, 23.2% of the Children did not consume meals as frequently as was advised. for the respective age. Of these 12.5% are Kids aged 6 to 11 months, 7.7% between 12 and 17, and 3% between 18 and 23 months. The proportions of children was substantially higher in the 18 to 23 month age group. different from the other group (χ=6.175, df=2, P= 0.046).

Table 4.12: Maternal Compliance with recommended minimum meal frequency

Compliance level	**Frequency (%) per Age group (months)**			**Frequency (%)**
	6-11 (n=76)	**12-17 (n=68)**	**18-23 (n=100)**	**(N=244)**
Compliant	87.5	92.3	97	76.8
Non-compliant	12.5	7.7	3	23.2

4.4.4 Compliance with minimum acceptable diet

For evaluating newborn and little child dietary habits, a composite indicator called the standard minimum dietary is utilized. It integrates the basic measures of dietary patterns and feeding practices to assess both the quality and quantity of components. In this study, only 5.4% of the kids consumed the recommended minimum amount of food. The low numbers were as a result of the poor dietary diversity scores by the children. Despite the fact that most kids were able to eat at least once a day, experts advocate, the meals were very low in diversity as they mostly consumed the starchy food groups and sometimes tea without milk which did not count as a food group.

4.5 Other factors influencing maternal compliance with recommended dietary diversity

A bivariate regression analysis to determine elements that affect children's appropriate dietary diversity scores showed significant positive with maternal educational level (r=0.186, P<.000, α=.01), household wealth index (r=0.163, P<.011, α=.05) with the

age of the infant (r=0.396, P<.004, α=.01) but not with the maternal nutritional knowledge (r=0.024, P>.05) and attitude score (r=0.098, P>.05). The analysis of the qualitative data from the focus group discussions covered six thematic factors that promote or discourage dietary diversity in the community. First, the discussions revealed high levels of poverty in the community that makes diverse diets out of reach of many households. Due to high poverty levels, the community which depends on small scale farming and with no other sources of income cannot afford other foods not produced.

> One mother in FGD Dumbule noted that: "*I like to feed my child with sima and vegetables because these are the foods I get easily. I grow my own maize and vegetables."*
>
> One other mother in FGD Chifusini said, *"I feed my child sima and mchicha because that is the food I can afford, I do not have the money to buy other foods."* Yet another mother in FGD Yapha said, *"I cannot confidently say that I diversify food for either my child or members of my household because when I talk of my child drinking milk, a year can go by and I do not get the milk. I have only stated what I normally do, I lack the resources beyond that, so I am contented with what I provide, and I believe it is adequately diverse."*

The second factor relates to environmental conditions. With small-holder farming dependent on rainfall being the main economic activity in the area, the participants noted unfavorable weather conditions as one of those factors that contributed poor dietary diversity in the community.

> A mother in FGD Mwachinga said *"We cannot feed our children when there is no rainfall. During dry seasons we cannot harvest. There is no surplus harvest to sell during the dry seasons therefore you cannot get money."*

Having farming as the principal business occupation in a rural setting, diversity of the farms is a key determinant of the dietary diversity and overall diet quality and food security. This was clearly demonstrated by the focus group discussions as described by one of the respondents when asked about factors that promote diverse diets.

> A mother in Chifusini FGD noted that: *"Farming and running businesses promote dietary diversity. On farming, we grow vegetables on our farms for example mchicha, bananas and even fruits example mangoes, oranges and other kinds of vegetables. Having these foods grown on our farms enhances accessibility. We get them easily and prepare for our families. We also have domestic animals. From these animals we get milk. We keep cattle and goats. We get milk from both cows and goats. We also have chicken; we can get eggs. Still to add on livestock, when we get surplus milk we sell, the money we get we use to purchase beans."*

The third factor reported by the participants related to inadequate nutritional knowledge. For instance, one participant stated when asked about the factors that hinder feeding children in diverse diet.

> A mother in FGD Dumbule stated that: *"Lack of education. We may have the foods but do not understand their functionality in the body. You could have mangoes in plenty for example, and that is the time you will eat them"*

Forth, unfavorable cultural practices and beliefs were also mentioned brought out during the discussions. It was established for example that children are not fed to

children reason being that their weight would deteriorate. Similarly, according to the discussions male children above three years are not allowed to eat sweet potatoes as this would interfere with their veins. A follow up question as to whether the taboos are followed to date received negative a low tone response from a few of the participants. In FGD in Dumbule for instance a mother said “If children eat eggs, their weight will deteriorate” on asking the other FGD participants whether it was still a belief, a few responded “No” and a low tone was noted implying a high chance that they are still practiced. Eggs are among the cheap sources of animal proteins while sweet potatoes especially the orange fleshed variety is a beneficial source of vitamin A. The taboo about egg justifies the result from the child dietary diversity score where no child reported consuming eggs in the recall period.

Presence and participation in social insurance through women groups was considered as one of the factors that promoted good nutrition practices and diverse diets of children. Through such avenues, members assist one another in times of need enabling them to cushion each other during difficult times.

> A mother in FGD Moyeni noted: “*You can take loans by joining chamaas. You can borrow up to Kshs 20,000 and from the money you can purchase a bag of rice and another bag of beans.* Another one claimed: “*There are groups that deal with foods. We can form such group and a set day for example Saturday; all group members bring different types of foods. The foods may include maize, beans, wheat flour and salad oil.”* Another mother in FGD Moyeni again noted: “*Having good rapport or relationship with your neighbors, that way you can borrow from them and if their children work in Mombasa, when they come home, they will bring you good foods.”*

Poor health of the caregivers and children also featured in the discussions as a cause of poor dietary diversity. The participants noted that when the caregivers are in unhealthy state, they will be unable to earn income or work in their farms in order to provide for their families.

> A mother in FGD Mwachinga said: "*When you are suffering from TB you cannot do hard work, so you wait upon your husband if you get you are lucky if not, there is nothing to do."*

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Socio-Demographics and Economic Characteristics

The research population's age distribution, current family status, mothers' educational backgrounds, religious affiliation, characteristics of household dwelling, sanitation, and occupations were among the noted socioeconomic and demographic features All respondents were females, majority were biological mothers to the index child of focus in this study. This was expected as most of the caregivers are often women, usually mothers or some other women in the household. Sometimes men can also look after the kids while the women go out to take care of other home duties.

This study was limited to interviewing mothers so as to understand factors associated with compliance or non-compliance with feeding of diverse diets to their children. The survey found that there were significantly more married women than unmarried, separated, or widowed women, demonstrating that the social norms of the family continue to be respected whilst still creating a setting that is favorable for raising children. The presence of both parents presents a better economic potential for improved diets and nutrition (Black *et al.*, 2017; Doyle *et al.*, 2023). It found that children in stable, two-parent households tend to have better access to resources, including nutritious food, which positively impacts their growth and health. Conversely, children in single-parent households often face economic challenges that can lead to poorer dietary diversity and nutritional status (De, 2024)

With respect to the age of the mothers, the study found that majority were young mothers aged 35 years or less. Other studies have reported high proportions of even

younger mothers in the study area. Wekesa *et al.* reported for example that more than 20% of the mothers in Kwale were teenagers (Wekesa *et al.,* 2017).

The study established that close to 30% the mothers lacked a formal schooling while more than two – thirds had dropped out of school after class eight or did not get to finish the primary level of education. Very few mothers, 6.5%, had attained secondary school education or beyond. Low educational levels of women in Kinago have been documented in several investigations. (Chimerah *et al.,* 2018). Undoubtedly one of the most crucial tools for women to be capable of providing their children with the proper care, which is a key factor in determining the child's growth and development, is education (Prickett and Augustine, 2016). There is widespread agreement that the education system is connected to higher earnings and work status, which are both connected to babies' meals and nourishment. Superior nutritional consequences in infants have been closely correlated with higher academic achievement among women (Frongillo *et al*., 1997; Smith and Haddad, 2000).

Among the possible contributors to the low educational levels in the study area include early pregnancies and early marriages which force girls to drop out of schools (Wodon *et al., 2017).* This implies lost economic potential of the mothers and increased risk of poor dietary practices. In this study, only 1.2% of the population was in formal employment while more than half reported being housewives. As identified above, this high unemployment is highly likely a result of low educational attainment by the mothers.

One-third of the homes were classed as being in poverty based on the economical state of the family as determined by the principal component analysis (PCA) approach that uses the house ownership attributes, dwelling features, and accessibility to services like water and sanitation. A look at the household expenditure pattern found that only 25%

of the households spent more than Ksh. 10,000 in a month. This can both be linked to the community depending on farming on one side or the high unemployment level in the area linked to low educational levels, a classical risk factor for poor dietary and nutritional outcomes.

5.1.2 Mothers' nutritional knowledge and perceptions

While food choices and eating behavior is a complex phenomenon influenced by many varied factors, nutrition knowledge plays a key role. A blend of sound nutritional information and a great mindset regarding diet can effectively transfer to various dietary practices and eating habits, provided that other conditions are beneficial. The study assessed the mother's knowledge of food groups and further assessed their knowledge of the food's rich in energy, body building foods and protective foods. Although most respondents claimed to have heard about the term diverse diet, very few of them could correctly name the food groups nor the types of foods in the various food groups. Most of the participants reported gaining their knowledge from health institutions. This is expected since nutrition counseling is often offered during most if not all the prenatal and post-natal care in Kenya. The study however revealed lack of accurate nutritional knowledge among the caregivers in this community. More than half of the caregivers scored zero (0) with only very few scorings high in the assessment. Inadequate nutritional knowledge of caregivers have been documented by several studies in Kwale county (Wanjihia *et al.*, 2021). This can relate to the low educational levels of the caregivers which make it difficult to retain the knowledge. This requires constant nutrition education through many avenues including use of mass media campaigns to ensure retention of the information. Another possible cause of this inaccurate information maybe from the neighbors, family members and friends which also forms a substantial source of the information in the community as was reported by (Wanjihia

et al., 2021). The highlights important knowledge gaps in the study area and an urgent need to implement interventions that includes nutrition education to sensitize caregivers about dietary diversity.

In a bivariate regression analysis, we established a positive significant correlation between mother's educational level and nutritional knowledge indicating the higher educational level was associated with higher nutritional knowledge. This is comparable to the findings of previous investigations, which demonstrated that mothers' nutrition education rises in direct proportion to their education level (Oduor *et al.,* 2018). Often nutrition is one of the topics taught in the schools thereby exposing the caregivers to nutrition matters early in life. Moreover, higher education increases the caregivers' ability to understand and relate to the issues surrounding nutrition and feeding superior to people without education. The need for nutrition education to boost nutrition knowledge of the caregivers was expressed by the participants of the focus group discussions. The goal of nutritional knowledge is to support individuals in making healthy food decisions as well as other nutrition-related behaviours. This can include any set of teaching techniques, backed by ecological encouragement, aimed at encouraging the adoption of healthy dietary decisions or other nutrition- and food-related behaviours beneficial to overall health and well-being. Establishing health promotion programs, fostering support networks, bolstering community engagement, fostering the development of individual abilities, and reorienting health care are all advantages of nutrition education (Hasan *et al.,* 2019).

The study also assessed the caregivers' attitudes and perceptions regarding various child feeding recommendations including feeding the newborn on colostrum, initiation of breastfeeding, adequate breast milk supply for the first six months, as well as different nursing and supplemental feeding techniques. Methods that were employed

both quantitatively and qualitatively. Overall, the attitude of the caregivers was positive revealing willingness to practice the recommendations. However, more effort will have to be put in to promote acceptance of express breastfeeding in the study area. Most caregivers did not welcome the practice, perhaps because it is a new practice that others may consider not part of their culture. Other studies have also reported similar results about express breastfeeding. One such study is a study by Okonya *et al.* aimed at examining the understanding, attitudes, and methods of breast milk expressing used by working moms in Uganda (Okonya *et al.*, 2017).

The caregiver attitude scores were positively linked with the educational level and the nutritional knowledge. Numerous more research have shown findings that are comparable. For instance, in Uganda, Okonya *et al.* reported positive association between perception of expressing breast milk and educational level (Okonya *et al.*, 2017) while Oduor et al. breast-feeding knowledge and mindset score had a favorable connection in one Kenyan study (Oduor et al., 2018).

Other important perceptions that need to be addressed in the community include the feeling that feeding children in diversified is costly. Perhaps the health belief model would be an appropriate model for use in sensitizing how important diet diversity is especially including the animal source foods (UNICEF, 2023). By informing the health implications of poor diets, the women can see the financial costs of inclusion of these kind of foods against the health and social impacts of doing otherwise.

5.1.3 Maternal Compliance with recommended dietary practices

For infants to develop and grow in a healthy manner, appropriate dietary methods for infants and early kids are crucial. Studies that have been done in underdeveloped nations show that frequently, ongoing nursing promotes better linear development in children and further safeguards their health by prolonging maternal fertility after

delivery and lowering the likelihood of illness and fatalities. Continuous nursing may help those healing from illnesses and avoid dehydration (Oates *et al.,* 2017; Sankar *et al.,* 2015). Babies can obtain nutritionally suitable and secure supplemental diets whilst continuing to nurse for a minimum of two years or longer in order to address their changing nutritional requirements. The current study revealed that overall; most caregivers practiced the recommended procedures for lactation. It was noted how common exclusively nursing was at 62%. A survey in the county reported a high prevalence of exclusive breastfeeding at 73.8% in a study that showed inconsistent impression between quantitative and qualitative data with qualitative data implying rates could be lower (Ochola, 2017). Wekesa *et al.* on the other hand reported that almost 48.5% of the infants, less than six months had indeed been exposed to supplementary (Wekesa *et al.,* 2017). When supplemental nutrition is introduced to breastfeeding newborns even before age of roughly 15 weeks, it could raise their chance of developing obesity later on in life, especially if nursing is stopped at the exact same period (Przyrembel, 2012). Often, women cite lack of enough breast milk and increased nutrition needs as the main cause for early complementary feeding before six months (Wasihun *et al.,* 2024; Wang *et al.,* 2019; Dietrich *et al.,* 2019). Of concern are the current study low rates of continued breastfeeding for at least two years or more. While all caregivers reported having breastfed their children, only 64% of the children are still breastfeeding were notable variations in the percentages of big kids who were still breastfed indicating that most children did not breastfeed up to two years as recommended. This is a risk factor especially in a community where children report low dietary diversity and Since there is little intake of foods derived from animals, infants are more at danger of having inadequate diets (Kuche *et al.,* 2021; Workicho *et al.,* 2021; Mulat and Demeke, 2022). On the contrary, it is not advised to introduce

supplemental nutrition gradually. Upon turning six months old, children's nutritional demands for some key micronutrients are greater than what can be provided by breast milk alone (WHO, 2023). We noted that some children had not been introduced to complementary feeding despite being way above the recommended age. This is worrying as the children might be exposed to malnutrition and stunting at an early age. This further proves the need for extensive nutrition education in the community.

The WHO advises infants should eat meals from the following major dietary organizations: [starches, roots, and bulbs; legumes and nuts; milk products; flesh foods (cuts of meat, seafood, and poultry); eggs; veggies and fruits high in vitamins A; as well as other fruits and vegetables] (WHO, 2017). The current study reported poor dietary diversity among children. Only 5.5 % of the children met this recommendation. This is very low compared to the results reported in coastal counties for children aged 2 – 5 years possibly due to the age difference (Nginya, 2015). Studies inclusive of the current study have shown that child's dietary diversity increased with age of the child. As the child grows older, he can consume most of the foods including those consumed by other adult members of the home. Dietary diversification is increasingly recognized as a crucial component of a high-quality nutrition for people of all ages since it has been related to increased nutrient intake (Kennedy *et al.*, 2007; Arimond *et al.*, 2010; WHO, 2015).

The majority of the baby's meals consisted of cereals, potatoes, and tubers reported in 90.8% and milk in 25% of the children. This is typical in most developing countries and as well as many parts of the country and have also been documented by several studies. in Kwale (Wekesa et al., 2017) and coastal areas (Nginya, 2015). The main possible for this is because the food in this group is easily available to the community in the shops or markets and from their own production. The main economic activity of

households in this study was reported to be farming. The discussion with participants confirmed this with participants indicating that they feed the children on these foods because they can afford them, or they produce them. Similar results have been reported among other rural farming households in Kenya by (Oduor *et al.*, 2019).

Tied to dietary diversity is the mal frequency and minimum acceptable meal. The majority of the kids throughout this research complied with the guidelines for the former indicator but not the latter which is dependent on the children meeting the minimum recommended dietary diversity. Thus, the minimal meal frequencies would not be met by all children if they did not adhere to the advised dietary patterns. While most children reached the number of meals recommended, the diets were basically in starchy staples food group or were basically other foods that did not count like tea without milk. Providing families with the means to produce a wider variety of foods, especially veggies and fruits, even during the off-season, as well as nutrition knowledge about the value of these foods, may boost domestic utilization (Boedecker *et al.*, 2019).

5.1.4 Factors influencing maternal compliance with recommended strategies for dietary diversity

Throughout this research, both qualitative and quantitative approaches were used to investigate the factors that influence children's eating diversity. The quantitative methods applied was bivariate regressions analysis.

The quantitative analysis suggested that children's dietary diversity was influenced positively by caregiver's educational level ($r=0.186$, $P<.000$, $\alpha=.01$), household wealth index ($r=0.163$, $P<.011$, $\alpha=.05$) as well as the kid's age ($r=0.396$, $P<.004$, $\alpha=.01$) but not with the caregiver's nutritional knowledge ($r=0.024$, $P>.05$) and attitude score ($r=0.098$, $P>.05$). Consistent with this result, the household's income featured strongly during the focus group discussions as a key determinant of dietary diversity. Increased

household incomes are essential because they allow them to buy other meals that they are unable to grow. Tied to this, crop failure was another cause of poor dietary diversity amongst the children as suggested by the focus group discussion. This was not a surprise since the community main undertakes rain-fed agriculture which is influenced by seasons (Beurs and Brown, 2013; Waswa *et al.*, 2014; Oduor *et al.*, 2018).

The positive correlation between child's age, as well as the dietary practices of the child is expected since as children grow, they get integrated into the household diets thus increasing their diversity. The result is also consistent with other research in other Kenyan regions (Oduor *et al.*, 2018). In the same manner, as was alluded to in the former sections above, educational level was expected to positively influence dietary diversity in children. First educated caregivers have increased chances of getting employment which means higher incomes to purchase the foods that are not produced (Burchi and De Muro, 2022). Secondly, refined caregivers are probably more conscious about the health of their children in addition to having high capacity to understand the need for feeding their children in diverse diet compared to the not educated women.

Contradictory to what we had anticipated, there was no correlation between parental dietary behaviors and knowledge and kid's dietary habits. Higher nutrition knowledge of caregivers has been associated with healthy dietary habits in the children in other studies. For example, two separate studies in western Kenya showed attitude was not directly associated with improvement in child’s dietary diversity and suggested that it may however play an indirect role when there is adequate knowledge (Waswa *et al.*, 2015; Oduor *et al.*, 2018). This means than good knowledge was necessary in addition to appropriate attitudes. Oduor *et al*, using modeling suggested that improved nutrition knowledge was necessary in mediating the impact of seasonal variations in dietary

intakes occasioned by fluctuating food production among smallholder farmers (Oduor *et al.*, 2018).

Although the household data suggests that caregiver's knowledge and attitudes were not related to the child's dietary diversity, the focus group discussions suggest otherwise. According to the discussions, inadequate knowledge and improper attitudes could be one of the impediments of improved dietary outcomes anyway. In fact, some participants suggested they did not feed their children as may be expected because they lacked the right knowledge of the recommendations.

Similarly, the study found that certain cultural customs and beliefs were frequently associated with children's food intake and dietary diversification. Food taboos especially the restriction of consumption of foods were identified. Among the foods that were prohibited in this community was consumption of eggs by children. This is despite low consumption of other foods of animal origin being reported in the study. Similar practices have been reported in other communities in Kenya. For instance, Riang'a et al. claimed that the Kalenjin communities from Kenya's Uasin Gishu County were prohibited from consuming meat, eggs, or livestock parts such as the heart, male reproductive organs, tongue and udder. Fears of large pregnancies, less blood, weakness at delivery, miscarriages or perinatal mortality, maternal mortality rates, as well as colic in children and blotchy skin problems after conception, were the primary motives for adhering to these dietary measures (Riang'a *et al.*, 2017). Such kind of taboos that restrict consumption of certain foods may expose children or other people like pregnant women to dietary inadequacy especially the lack of certain essential nutrients. In the current study for example, children are restricted from eating eggs which are amongst the cheapest sources of proteins and possibly amongst the most available in the

community since studies have shown that chickens are one of the most common species amongst Kenyan households suggesting availability (Mwanja *et al.,* 2023 .

Insufficient health is another factor that was connected to the kids' poor dietary diversification. Illness prevents people from taking part in economic activities thereby exposing their families to increased risk of malnutrition. On the other hand, close social ties and membership of social groups such as women groups were identified to promote dietary diversity among children.

5.2 Conclusions

i. Mothers' nutritional knowledge on dietary diversity was generally low with 91% of mothers having a low score on knowledge assessment. Despite 79.1% of them reporting to have heard the term diverse diets, only 27% had knowledge on the different types of food groups. Consequently, a few of those who had knowledge on food groups could correctly cite examples of foods. Level of education attained by mothers was similarly low and was shown to have an association with nutritional knowledge.

ii. The study revealed that although the attitudes of the mothers was good, there were gaps in perceptions towards expressing of breast milk for mothers working away from home with 75% disagreeing with this practice. 25% of mothers did not believe that children aged 6-23 months could be fed more than four time a day.

iii. Only 8.2% of the study's children met the required dietary diversity mark of consuming four or perhaps more types of food each day, indicating that only a small percentage of children adhered to the advised dietary diversity practices. The studied area's baby's diets have been found to be lacking in variety and

diversity, with a high intake of starchy staples and an inadequate intake of nutritional types of foods like animal-based foods, fruits, and veggies.

iv. Apart from inadequate nutritional knowledge, the study identified poverty, environmental conditions, low educational levels and unfavorable cultural practices to be among the contributors of poor dietary diversity among the children in this community.

5.3 Recommendations

5.3.1 Recommendation from the study

According to the results of a study, the researcher suggests doing the following:

1. Ministry of Health Kwale County, Nutrition department in conjunction with KEMRI-NUITM Kwale to conduct nutrition education and promotion social behavior change amongst mothers and other household members through community outreach programmes and nutrition talks within health facilities. This intervention will help in increasing nutritional knowledge levels and fostering positive attitude amongst caregivers leading to adoption of dietary diversity.
2. Ministry of Agriculture and other Agri-Nutrition projects and programmes in Kwale to incorporate interventions to diversify agricultural production and income opportunities through for example kitchen gardening to promote year-round production of nutritious foods including fruits, vegetables, legumes and starchy staples. This will boost household income, lessen poverty and make available a variety of foods for families in Kwale. This effort will lead to an increased compliance with recommended dietary diversity.
3. Government of Kenya in conjunction with County government of Kwale to develop policies that will empower mothers in the county through education on

nutrition, community gardens and farming initiatives and economic support programs that will enable them provide diverse diets to their families.

5.3.2 Recommendations for Further Studies

i. In order to identify seasonal variations in access to food and evaluate the effects of the suggested projects, this study suggests a longitudinal study design with an intervention element. The current study, being cross-sectional may have been limited to only one season thus not depicting the actual pattern of community food diversification.

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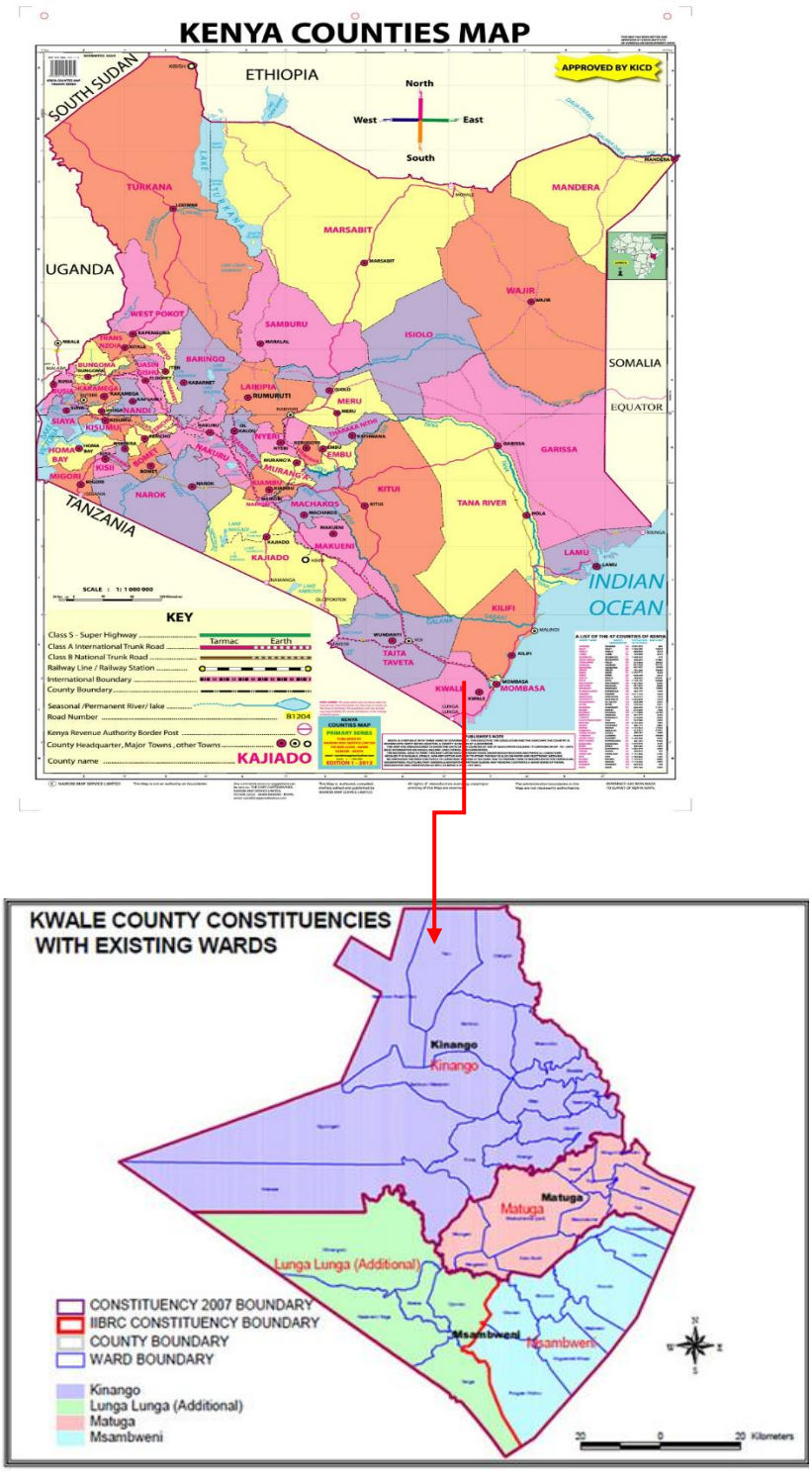
APPENDICES

Appendix I: Map of Kwale County



Source: Kaneko *et al.*, 2012

Appendix II: Consent Form for Individual Interviews

Part 1: Information Sheet

The mothers and their 6- to 23-month-old children in Kwale County are the subject of this study. The main emphasis is on children's diets and the factors that affect food selection. The purpose of this project is to gather data that will help the county government make decisions on the most efficient initiatives that will result in a broadening of young children's diets. Mothers with kids between 6 and 23 months old are welcome to take part in this study. To participate in this study, a randomized method resulted in your selection. Your involvement in this research is entirely optional. Whether you want to participate or not is entirely up to you. You will not be penalized if you decide not to participate at any point while the study is ongoing. If you engage in this research, you might receive inquiries from other members of the community. We will keep any information you choose to submit about yourself private and will not disclose it to anybody besides the study team if you want to participate. We will maintain the privacy of the data we gather for this study endeavor. Any details concerning you and your household will be marked with a number rather than your name and will only be accessible to the researchers. If you decide to take part, you will be required to give an answer to the interviewer's series of questions. Volunteering in this research carries no known risks. Your participation will probably enable us to learn more about moms and the supplementary feeding phase (6–23 months of a child's life) and as well as how mothers feed their offspring. Contact Francesca at her mobile number, which is 0725689693, if you have any other queries.

Sincerely, Francesca Chepkirui, Student Kenyatta University.

Part 2: Consent/Assent Sheet

Study title: **Maternal compliance to feeding of diverse diets among kids 6 to 23 months old, Kwale County**

I …… declare that I

1. I've read/been briefed well about the aforementioned study topic, and I've had the chance to inquire about it. Every issue I've asked has gotten a satisfactory response.
2. I consent to engage in the research and to provide data about my child and myself.
3. Recognize that there are no hazards to me, my family, or my society as a whole from this research.

4. Recognize that I am not required to engage in this research and that my involvement is purely voluntary. At any time, a participant may resign from the research.

Signature/ Thumb print…….. Date……..

Appendix III: Consent Form for Focus Group Discussion.

Part 1: Information Sheet

(Facilitator to give information to the participants)

Good day/afternoon to all. Hello, how are you? I want to embrace you in our conversation as a group. Gratitude for visiting. I'm Francesca, the conversation facilitator, and I'll guide you through today's topic. Beside me, you can see..…. he or she will assist with translating and jotting down during the talk.

I attend Kenyatta University and this discussion is part of my academic research. The main aim of this discussion is to have an insight on children's diets and factors that influence the choice of diets in your homes and community. I'd like to hear from you regarding what constitutes a healthy diet, why it's beneficial to serve kids a range of foods or not, and what aspects you consider when selecting foods for kids.

We will uphold confidentiality for anything we discuss today, while we also ask that you refrain from sharing anything private that has been stated here.

Anytime is a good moment to ask inquiries.

There are absolutely no correct or incorrect responses, so don't be scared to express yourself and feel free to voice your ideas.

Kindly let the others conclude their remark and pay attention to one another so that each individual has the chance to contribute to our discussion. This is not a question-and-answer session; it is a group conversation. I, therefore, urge you to respond to one another's comments and engage in conversation.

If it's okay with you, my partner will document this focus group using a dictaphone in addition to taking notes during it. This makes it easier to recreate what was spoken in the future. We will only use the records and notes records and notes will only be used by us; no one else will have access to them. This conversation should last one to one and a half hours.

Do you have any additional queries at this time? Do not hesitate to get in touch me if you have any more queries. Francesca may be reached at 0725689693.

Sincerely,

Francesca Chepkirui,

Student Kenyatta University.

Seek permission from the participants and guide them to sign the consent form attached.

(If someone says no, they may choose to leave the discussion)

Part 2: Consent Form for Focus Group Discussion

Participant demographic information

Name: ……. Age (in years): …….

Village: …… Primary Occupation: ……..

Education: …… Religion: …….. Marital status: …….

No. of Children…….

I…… declare that:

1. I've read/been briefed well about the aforementioned study topic, and I've had the chance to inquire about it. Every issue I've asked has gotten a satisfactory response.
2. I consent to engage in the research and to provide data about my child and myself.
3. Recognize that there are no hazards to me, my family, or my society as a whole from this research.
4. Recognize that I am not required to engage in this research and that my involvement is purely voluntary. At any time, a participant may resign from the research.

Participant signature/ Thumb print…….. Date……..

Appendix IV: Individual Questionnaire

Maternal Compliance to feeding of Diverse Diets to children (6-23 months of age)

Kwale County.

Tell the attendee: "I'm intending to ask you a few queries regarding yourself and the meals your baby, who is between the ages of 6 and 23 months, is eating. If there is anything I need to explain, just let me aware. Any queries you may also have are welcome.

1.0 Basic Information

1.1Respondent's Name……

1.2Interviewer's Name……

1.3Date of Interview……

1.4Questionnaire code……

SECTION A

2.0 SOCIO-DEMOGRAPHIC INFORMATION		
2.1	Sex of respondent ***(circle correct response)***	[1] Male [2] Female
2.2	Relationship to index child ***(circle correct response)***	[1] Mother [2] Father [3] Aunt [4] Sibling [5] Grandmother [5] Other (Specify)----------
2.3	Age of respondent (in complete years) DOB	Years ---------- dd/mm/yy
2.4	What is your current marital status? ***(circle correct response)***	[1] Single (not married and not living with a partner) [2] married (monogamous) [3] married (polygamous) [4] Separated (currently not living together but not divorced) [5] Divorced [6] Widowed/widower [7] Co-habiting (not married but living with a partner)
2.5	What education level or years of schooling did you finish? ***(circle correct response)***	[1] None [2] Primary education, 1-4 years [3] Primary education, 5-8 years [4] Secondary Education, 9-12 years [5] Secondary Education, 13-14

		[6] Tertiary Education > 14 years [7] Adult education [8] Madrassa [9] Other (Specify)----------
2.6	What is your main occupation in the last month? ***(circle one response only)***	[1] Student (Specify Level)_____ [2] Employed/Professional(Teacher, doctor, nurse, manager, accountant) [3] Casual worker (attendant in hotel, bar, shop, housemaid, gardener) [4] Housewife [5] Business (self-employed) [6] Farmer (large scale, subsistent farming, gardening) [7] Unemployed [8]Other(specify)_____
2.7	What religion do you practice? ***(circle correct response)***	[1]Islam [2] Christianity [3] Traditional [4] Other (Specify)
3.0 SOCIO-ECONOMIC INFORMATION		
3.1	Currently, who are you living with? (*Circle all that apply)*	[1] Alone [4] Children [2] Parents [5] Other relatives [3] Spouse [6] Friends
3.2	Household/family size (How many people live in the house.)	[1]Less than 5 [2] More than 5 [3] More than 10 [4] Other (Specify)
3.3	Describe the Primary revenue source for the family? (*Circle only one)*	[1] Formal employment [2] Small scale farming [3] Farming and selling of produce [4] Small business, self-employed (non-farming) [5] Petty trade [6] Casual/informal labor [7] Relatives/remittances [8] Welfare/NGO support [9] Begging [10] Other (specify) ----------
3.4	How much was your typical family's average income in the most recent month? (*circle one category*)	[1] Less than 1000 [6] 20,000-49,999 [2] 1,000-2,999 [7] 50,000- 99,999 [3] 3,000-4,999 [8] 100,000+ [4] 5,000-9,999 [5] 10,000-19,999

3.5	Which is your family's primary food supply? (*circle one response only*)	[1] Purchase (market/grocery store) [2] Household farm/garden [3] Relatives and friends [4] Welfare/NGO support [5] Other (specify) _____ [88] Don't Know
3.6	Where does the majority of your household water come from? (*circle one response*)	[1] Tap/rain water within compound (pipedto the home) [2] From outside housing complex is tap water (public tap) [3] Tap water, bought from a cart (mkokoteni) [4] Well/bore hole/kisima [5] Pond water/ziwa [6] Spring/ chemic hemi [7] Pan/ mtsara [8] Other (specify) _____ [88]Don't Know
3.7	Which type of restrooms or latrines do individuals of your family typically use? (*circle one response*)	[1] Flush or pour flush toilet/ WC [2] Pit latrine (Traditional) [3] Pit latrine (VIP) [3] Bucket toilet [4] Hanging toilet/hanging latrine [5] No facility/bush/field [6] Other *(specify)*_____ _____
3.8	Are there any other homes using this restroom?	[1]Yes [2]No
3.9	Does your household have *(circle as many)*	[1] Clock/watch [5] Mobile telephone [2] Electricity [6] Fixed telephone [3] Radio [7] Refrigerator [4] Television [8] Solar panel
3.10	Does any member of this household own: *(circle as many)*	[1] Bicycle [2] Motorcycle/scooter/bodaboda [3] Animal-drawn cart/ mkokoteni [4] Car/truck [5] Boat with motor [6] Tuktuk
3.11	What kind of fuel **DO YOU USE** most frequently in your home to cook? (Mark one answer in the circle)	[1] Firewood [2] Charcoal [3] Kerosene [4] Electricity [5] Gas [6] Other*(specify)* _____

3.12	The house you live is it, (*circle one response*)	[1] Rented [2] Live without pay? [3] Owns [4] Squatting [5] Other (Specify)
3.13	How many sleeping rooms are there in the house you live in?	[1] Zero or one sleeping rooms [2] Two sleeping rooms [3] Three or more sleeping rooms.
3.14	What quality /type of material is the floor of the house you live in?	[1] Parquet, tiles, carpets, and ceramic finish the floor. [2] Cement, concrete, raw wood, etc [3] None, earth, dung Wood [4] Other (specify) _____
4.0 KNOWLEDGE, ATTITUDES AND PRACTICES ON NUTRITION		
4.1 4.1b	Identify the following three groups of food. IF YES, Name them	[1]No [2]Yes 1. 2. 3.
4.2 4.2b	What are the sources of energy? IF YES, Name them	[1]No [2]Yes 1. 2. 3.
4.3 4.3b	Could you determine the sources of foods for growing muscle? IF YES, Name them	[1]No [2]Yes 1. 2. 3.
4.4 4.4b	What are the origins of foods that are protective? IF YES, Name them	[1]No [2]Yes 1. 2. 3.

Read each statement and then respond in one of these four (4) ways:		
If you think the assertion is true, respond		[1] **AGREE**
If you think the assertion is false, respond		[2] **DISAGREE**
If you can't definitively concur or disagree, respond		[3] **NOT SURE**
if you are unaware of the item, respond		[4] **DON'T KNOW**
4.5	An infant need to be given colostrum.	
4.6	A newborn benefit from starting exclusively breastfeeding at a young age.	
4.7	Mother's milk has enough water in it.	

4.8	Infants should only be offered breast milk during the first six months of their lives.	
4.9	Infants should always be nursed on need, even at night.	
4.10	At six months, complementary foods should then be introduced.	
4.11	After the addition of complementary feeding, lactation should proceed.	
4.12	Mothers who travel for work can breastfeed their babies.	
4.13	When a woman is working outside of the home, she might extract breast milk for the infant to utilize.	
4.14	Children who are breastfed and aged 6 to 23 months ought to be served upwards of four times each day.	
4.15	Upwards of four food categories should be served to children above the age of six each day.	
4.16	Throughout pregnancy and the postpartum period, women need eat extra food.	

SECTION B

5.0 Qualitative 24-Hour recall Questionnaire

5.1	Child's name:	
5.2	Child's Date of Birth: 5.2b Child's age …… months	
5.3	Questionnaire code	
5.4	Was yesterday a holiday or festival day when the kid had strange foods? 1=Yes 2= No	☐
5.5	Was the youngster sick yesterday? 1=Yes 2= No	☐
5.6	Does the infant breastfeed? 1=Yes 2= No	☐
5.7	Do you presently provide your baby with any vitamins or dietary supplementation (powders, liquids, sprinkles, etc.)? 1=Yes 2= No	☐
5.8	Then which, if any? (record)	

Time of Day	Food/Dish Name	Main meal/ Snack	Description of Dish

Fill this sheet based on the 24-hour recall record

Q. No	**Category of Meals**	**Illustrations**	**YES(1) /NO (0)**
5.9	CEREALS	Anything composed of millet, maize, wheat, sorghum, or rice, including bread and cookies (cite regional cuisine, such as ugali and rice porridge)	
5.10	White roots and tubers	White yams, white potatoes, cassava, or other root-based cuisines sweet potatoes tubers, zucchini, pumpkin, and carrots (orange fleshed)	
5.11	Vegetables	Leafy green vegetable foods, particularly locally - sourced wild greens like cassava leaves that are packed with vitamin A. different veggies, wild ones included	
5.12	Fruits	Delicious Mangoes, papayas, and other vitamin A-rich fruits widely accessible domestically. Various additional fruits, such as tropical fruits	
5.13	Meats	Wild species, poultry, duck, goose, lamb, goat, rabbits, beef, pork, and other meats. meat from the kidney, liver, heart, or other organs, or dishes made with blood	
5.14	Eggs		
5.15	Seafood, including fish	Fish or shellfish might be preserved or fresh. Various other fruits, such as tropical fruits	
5.16	Pulses, legumes and nuts	Beans, peas, green grams, seeds, nuts, lentils, or products manufactured with these ingredients	
5.17	Milk and milk-related items	Dairy products such as cheese, yoghurt, and milk	

5.18	Fats and oils	Butter, oil, or other fats often used to cook with or add to meals	
5.19	Candies	Honey, sugar, sweetened beverages, or meals high in sugar including candy, chocolates, or sweets	
5.20	Condiments, beverages, and seasonings	Tea (black, green herbal) or coffee, spices and condiments	

Appendix V: Focus Group Discussion Guide.

INTRODUCTION

(Activities or queries that will introduce the attendees to one another while bridging to the primary issue.)

Warm up activities

Materials required: a ball

We'd want to start by getting to know one another by getting to know one another a little further. Although you obviously know who we are, we'd still would like to get to know you. We, therefore, devised a small game in response.

Kindly allow us to stand up and form a loop.

I'm going toss the ball in my hand to have here in my hand towards one of you. The individual who collects the ball will introduce herself and the two things she enjoys feeding her 6- to 23-month-old child. After that, this individual (Person 1) tosses it to Participant 2. Paticipant 2 will likewise introduce herself and the two foods she prefers to provide for her children. Until each individual has touched the ball at first when, this will continue.

EXPLORATION

(Tasks and inquiries related to the core subject - nutrition attitudes and understanding)

Kiswahili Translation in italics

1.0 Knowledge and Maternal perceptions on Diverse Diets

(UJuzi na maoni ya mama kuhusu vyakula vya aina tofauti tofauti)

1.1 Definition of a diverse diet. ***(Maelezo kuhusu vyakula mbalimbali)***

During introduction everybody mentioned the foods they like to feed their children. We would like to know why you like to feed your children with those foods.

(Wakati wa kuamkuana, kila moja wetu alitaja vyakula anvyopenda kulisha mwanao, tungependa kujua ni kwa nini mlichagua hayo vyakula haswa?)

[One can begin to lead to the subsequent inquiry if someone says that it is indeed beneficial to eat a wide range of foods.] What do you understand by feeding of a diverse diet (variety of foods) to children? How would you describe a diverse diet for your children?

(Kwa maoni yenu, ni nini maana ya kulisha mtoto vyakula vya aina tofauti tofauti? Tafadhali nitajieni mifano ya hayo vyakula.)

2.0 Perceptions on Feeding Diverse Diet

(Maoni Kuhusu Kulisha watoto vyakula vya aina tofauti tofauti)

Do you think you or mothers in your community are feeding diverse diets to their infants, ages 6 to 23 months? (Categorize the responses: possible answers include Yes, No and Not sure) For every response probe why they think it is so.

(Je mnafikiri kina mama katika jamii jenu hulisha watoto wao kati ya umri wa miezi sita hadi ishirini na tatu vyakula vya aina tofauti tofauti?) (Majibu yanayo tarajiwa ni Ndio, La au sina Uhakika….Kwa kila jibu uliza ni kwa nini?)

Do you think there are benefits in feeding diverse diets to your children? (Probe reasons for every response.) Encourage mothers to state all the benefits they think their children will get from being fed on diverse diets.

(Je, unafikiri watoto wananufaika wanapolishwa vyakula vya aina tofauti tofauti? Ni manufaa gani hayo?)

Do you think something may happen to children if they are not fed on a diverse diet? (For every response probe why they think it is so) Encourage mothers to state all the possible outcomes from not feeding children on diverse diets.

(Je, unafikiri ni jambo gani litafanyika iwapo mtoto hatapata lishe yenye vyakula aina tofauti tofauti?)

(If during the above discussion no mother talks of malnutrition especially about growth of their children then ask this additional prompting question.)

Do you see any trends in the development of children in your neighborhood that would point to a lack of a range of foods being fed to them? What about the growth features and why?

(Je, Kuna jambo kuhusu kukua kwa watoto mnafikiri inaambatana na kutopata lishe ya vyakula aina tofauti tofauti? Ni jambo kana gani?)

3.0 Factors Influencing Maternal Compliance to feeding of diverse diets.

(Mambo yanayochangia mama kulisha/kutolisha vyakula vya aina tofauti tofauti)

We would like to discuss factors that influence feeding of diverse diets to our children. These factors can either be that enable us or those that hinder us from feeding diverse diets to our children.

(Tungependa kujadiliana kuhusu mambo yanayosaidia au kuzuhia kina mama kulisha watoto wao vyakula vya aina tofauti tofauti.)

3.1 Factors that Promote feeding of diverse diets

(Mambo yanayochangia kulisha vyakula vya aina tofauti.)

Let us begin by those factors that enable us to feed diverse diets to your children. Which factors are these and why do you think they are ‘enablers’? (Probe till these factors have been exhaustively discussed.)

(Je, ni mambo kama yapi yanayochangia kina mama kulisha watoto wao vyakula vya aina tofauti tofauti? Ni kwa nini unafikiri mambo haya yanachangia?)

3.2 Factors that Hinder feeding of diverse diets

(Mambo yanazuia kulisha vyakula vya aina tofauti tofauti.)

Let us now discuss those factors that hinder us from feed diverse diets to your children. Which factors are these and why do you think they cause hindrance? (Probe till these factors have been exhaustively discussed.)

(Je, ni mambo kama yapi yanyozuia kina mama kulisha watoto wao vyakula vya aina tofauti tofauti? Ni kwa nini unafikiri mambo haya yanazuia?)

4.0 Food Taboos

(Tamaduni na Mila Kuhusu vyakula)

(If culture and food taboos does not come up in the above discussions the follow up with this question)

Are there foods that should not be fed to 6 to 23 months old youngsters, based on your culture? If yes, what are these foods and what repercussions are associated with feeding children with the tabooed foods?

(Je, Kulingana na mila, desturi na tamaduni ya jamii hii, kuna vyakula havipaswi kulishwa watoto umri wa 6-23? Ni vyakula kama gani? I wapo utamlisha mtoto na vyakula hivyo ni jambo gani litatendeka?)

5.0 Perceived Solutions to barriers to feeding diverse diets

(Maoni ya Suluhisho kwa mambo yanayozuia kulisha watotot vyakula vya aina tofauti tofauti.)

We would like to get rid of these hindrance or barriers to diversifying our children's diets. What do you think are some of the possible solutions so that every mother in your community becomes capable of feeding diverse diets to her young children?

(Tungependa kusuluhisha mambo yanayo zuia kina mama kutolisha watoto wao vyakula vya aina tofauti tofauti.) (Taja mambo yaliyotajwa kama vizuizi alafu uulize kina mama wateje suluhisho ya vizuizi hivyo.)

(List the previously mentioned barriers then ask the participants to list possible solutions.)

CONCLUSION

(TAMATI)

We appreciate your participation in this group conversation very much. We appreciate you taking the time to speak with us. Are there any more queries or remarks? If not, we'd want to thank you once more. Enjoy your return trip home.

(Shukuru kina mama kwa utulivu wao na wakati wao uliotumika katika majadiliano.)

Appendix VI : K.U. Ethics Review Committee Approval Letter

Kenyatta University
P.O Box 43844-00100
Nairobi-Kenya

REF: KU/ERC/APPROVAL/VOL1/1 Date: 13th December, 2019

Chepkirui Francesca
P.0 Box 43844-00100

NAIROBI

Dear Ms Chepkirui,

RE: APPLICATION NUMBER: PKU/1043/I1193 MATERNAL COMPLIANCE WITH RECOMMENDED DIETARY DIVERSITY IN PREVENTION OF MALNUTRITION AMONG CHILDREN AGED 6-23 MONTHS IN KWALE COUNTY, KENYA.

This is to inform you that ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** has reviewed and approved your above research proposal. Your application approval number is **PKU/1043/I193.** The approval period is ***13th December, 2019- 13th December, 2020.***

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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE.***
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** 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 ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE.***

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

Yours sincerely

KENYATTA UNIVERSITY
18 DEC 2019
ETHICS REVIEW COMMITTEE
P.O. BOX 43844 - 00100 NAIROBI

Prof. Judith Kimiywe

CHAIRPERSON- KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE.

Appendix VII: Research Permit

REPUBLIC OF KENYA

NATIONAL SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **534789**

Date of 2/Mar20

RESEARCH

This is to Certify that Ms.. francesca - chepkirui of Kenyatta University, has been licensed to conduct research in Kwale on the topic: MATERNAL COMPLIANCE WITH RECOMMENDED DIETARY DIVERSITY IN MALNUTRITION AMONG CHILDREN AGED 6-23 MONTHS IN KWALE

License No: **NACOSTI/P/20/4001**

534789

Applicant Identification Number

Director

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR

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