

**FACTORS ASSOCIATED WITH NUTRITIONAL STATUS OF CHILDREN AGED 6-59 MONTHS IN
MAIKONA WARD OF MARSABIT COUNTY, KENYA**

BY

SABDIO O. GALGALLO

**A Dissertation Submitted in Partial Fulfillment of the requirements for the award of the
Degree of Master of Science in Applied Human Nutrition of the University of Nairobi,
Department of Food Science, Nutrition and Technology**

2017

DECLARATION

I hereby declare that this dissertation is my original work and has not been presented for a degree in any other University or institution of higher learning.

Signed..... Date

Sabdio O. Galgallo

This dissertation is submitted with our approval as University Supervisors

Signed Date

Dr. Alice Mboganie Mwangi
Department of Food Science, Nutrition and Technology
University of Nairobi

Signed Date

Dr. George Ooko Abong'
Department of Food Science, Nutrition and Technology
University of Nairobi

DEDICATION

This dissertation is dedicated to my lovely daughter Asili Alinoor, my loving husband Alinoor Hussein, for his support, continuous love and encouragement, to my parents Mr. Jillo Huka and Mrs. Fullam Bonaya for their support throughout the study process.

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful, Alhamdulillah, all praises to Allah for the wisdom and His blessing in completing this dissertation.

I am extremely grateful to my supervisors who were more than generous with their skills and precious time. A special thanks to Dr. Mwangi Alice Mboganie and Dr. George Ooko Abong' both from the University of Nairobi for their professional guidance, with full compassion, interest, encouragement and constructive criticism.

My sincere thanks are due to my husband, Alinoor Hussein and my parents; Mr. Jillo Huka and Mrs. Fullam Bonaya and also to my sisters and brothers for their constant love, support and continued belief in me.

I would like to acknowledge and thank the Director medical services Marsabit County, Dr. Kochi Adano Diba of Marsabit County, for granting me permission to carry out this research in Maikona ward. I am also grateful to the County Nutrition Officer Marsabit, Mr Kamotho Maingi for assisting me with the vital research tools. I also acknowledge the field assistants who participated in data collection: Barako, Abdub, Somo and the nutritional officer Kalacha location, Mr. Abdub Hache for their support in the data collection process. I would also like to thank the caregivers/mothers who willingly participated in the study together with their children.

Finally I would like to thank all my classmates in Msc Applied Human Nutrition Class of 2014 for their co-operation and encouragement to furnish my work.

PLAGIARISM DECLARATION FORM



UNIVERSITY OF NAIROBI

Plagiarism Declaration Form for Students

Name of Student: Sabdio Galgallo

Registration Number: A56/70522/2013

College: College of Agriculture and Veterinary Sciences

Faculty/School/Institute: Agriculture

Department: Food Sciences, Nutrition and Technology

Course Name: MSc. Applied Human Nutrition

Title of the Work: Factors Associated with Nutritional Status of Children Aged 6-59 Months in Maikona Ward of Marsabit County, Kenya.

DECLARATION

1. I understand what Plagiarism is and I am aware of the University's policy in this regard
2. I declare that this dissertation is my original work and has not been submitted elsewhere for examination, award of a degree or publication. Where other people's work or my own work has been used, this has properly been acknowledged and referenced in accordance with the University of Nairobi's requirements.
3. I have not sought or used the services of any professional agencies to produce this work
4. I have not allowed, and shall not allow anyone to copy my work with the intention of passing it off as his/her own work
5. I understand that any false claim in respect of this work shall result in disciplinary action, in accordance with University Plagiarism Policy.

Signature _____ **Date:** _____

TABLE OF CONTENTS

<i>DECLARATION</i>	<i>i</i>
<i>DEDICATION</i>	<i>i</i>
<i>ACKNOWLEDGEMENT</i>	<i>ii</i>
<i>PLAGIARISM DECLARATION FORM</i>	<i>iii</i>
<i>LIST OF ABBREVIATIONS AND ACRONYMS</i>	<i>vii</i>
<i>OPERATIONAL DEFINITION OF TERMS</i>	<i>viii</i>
<i>LIST OF TABLES</i>	<i>ix</i>
<i>LIST OF FIGURES</i>	<i>x</i>
<i>ABSTRACT</i>	<i>xi</i>
<i>CHAPTER ONE: INTRODUCTION</i>	<i>1</i>
1.1 Background Information	<i>1</i>
1.2 Statement of the Problem	<i>2</i>
1.3 Justification	<i>3</i>
1.4 Aim of the Study	<i>3</i>
1.5 Purpose of the Study.....	<i>4</i>
1.6 Overall objective of the Study.....	<i>4</i>
1.6.1 Specific objectives.....	<i>4</i>
1.7 Hypotheses	<i>5</i>
<i>CHAPTER TWO: LITREATURE REVIEW</i>	<i>6</i>
2.1 General Overview of Childcare Practices.....	<i>6</i>
2.2. Infant and Young Child Feeding Practices.....	<i>6</i>
2.2.1 Optimal breastfeeding practices and its importance	<i>6</i>
2.2.2 Complementary feeding practices and its benefits	<i>8</i>
2.3 Psychological and Emotional State of the Caregiver	<i>9</i>
2.4. Under-nutrition and Water, Sanitation and Hygiene.	<i>10</i>
2.5 Health Care Access and Seeking Behaviour	<i>11</i>
2.6 Importance of Immunization and its Coverage in Marsabit County.....	<i>12</i>
2.7 Gaps in Knowledge.....	<i>12</i>
<i>CHAPTER THREE: STUDY DESIGN AND METHODOLOGY</i>	<i>13</i>
3.1 Study Setting	<i>13</i>
3.2 Study Population.....	<i>13</i>

3.3 Study Design.....	14
3.4 Sampling.....	14
3.4.1 Sample size determination	14
3.4.2 Sampling procedure	14
3.5 Data Collection.....	17
3.5.1 Data collection tools	17
3.5.2 Selection and training of interviewers.....	17
3.5.3 Pre-testing.....	17
3.5.4 Data collection procedure.....	18
3.6 Data Quality Control	20
3.7 Data Analysis.....	20
<i>CHAPTER FOUR: RESULTS.....</i>	<i>22</i>
4.1 Households Socio-Demographic Characteristics	22
4.1.1. Water, Sanitation and Hygiene Status of the Study Households.....	26
4.2 Nutritional Status of Children 6-59 Months Old	28
4.3 Infant and Young Child Feeding Practices.....	32
4.4 Morbidity Patterns and Maternal Health Seeking Behavior among Children 6-59 Months Old.....	35
4.4.1. Immunization Coverage	37
4.5 Caregivers Knowledge and Attitude	39
4.6 Constraints to Obtaining appropriate Childcare and Feeding Practices.....	40
4.7 Factors Associated with Nutritional Status of Children	41
<i>CHAPTER FIVE: DISCUSSION.....</i>	<i>45</i>
5.1 Demographic and Socio-economic Characteristics of the Study Households	45
5.1.1. Water Availability Hygiene and Sanitation Status.	45
5.2. Nutritional Status of Children under-five Years in Marsabit County: Recent trends	46
5.2.1 Nutritional status of children (6-59 months old) in Marsabit County	47
5.3 Infant and Young Child Feeding Practices.....	49
5.3.1 Breastfeeding practices.....	49
5.3.2 Complementary feeding practices.....	50
5.4 Child Health.....	52
5.4.1 Morbidity experience for children 6-59 months old.....	52
5.4.2 Immunization coverage for children 12-24 months old	52

5.5 Caregivers Nutritional Knowledge and Attitude	53
5.6 Factors Associated with Nutritional Status	54
<i>CHAPTER SIX: CONCLUSION AND RECOMMENDATION</i>	<i>57</i>
6.1 Conclusion	57
6.2 Recommendations	58
<i>REFERENCES</i>	<i>59</i>
<i>APPENDICES</i>	<i>68</i>
<i>APPENDIX 1: Map of North/Horr Sub County showing Maikona Ward</i>	<i>68</i>
<i>APPENDIX 2: INTRODUCTORY NOTE AND INFORMED CONSENT FORM</i>	<i>69</i>
<i>APPENDIX 3: DATA COLLECTING TOOLS/INSTRUMENTS</i>	<i>70</i>
<i>INSTRUMENT1: STRUCTURED QUESTIONNAIRE</i>	<i>70</i>
<i>INSTRUMENT 2: KEY INFORMANT INTERVIEW SCHEDULE. (Strictly for health workers)</i>	<i>81</i>
<i>INSTRUMENT 3: FOCUS GROUP DISCUSSION GUIDE (Not for individuals)</i>	<i>82</i>
<i>INSTRUMENT 4: OBSERVATION CHECKLIST</i>	<i>82</i>
<i>APPENDIX 4: FIELD ASSISTANT TRAINING PROGRAM</i>	<i>83</i>

LIST OF ABBREVIATIONS AND ACRONYMS

ASAL: Arid and Semi-Arid Lands

CCP: Childcare Practices

CDC: Centre for Disease Control

CHVs: Community Health Volunteers

DHS: Demographic and Health Survey

ENA for SMART: Emergency Nutrition Assessment software for Standardized Monitoring
Assessment of Relief and Transitions

FAO: Food and Agriculture Organization

FSAU: Food Security Analysis Unit for Somalia

FGDs: Focus Group Discussion

GAM: Global Acute Malnutrition

HAZ: Height for Age z-scores

IRIN: Integral Region Information Networks

IYCF: Infant and Young Child Feeding

KDHS: Kenya Health & Demographic Survey

KNBS: Kenya National Bureau of Statistics

MAM: Moderate Acute Malnutrition

MUAC: Mid-Upper Arm Circumference

NDMA: National Drought Management Authority

SAM: Severe Acute Malnutrition

SPSS: Statistical Package for Social Sciences

SQUEAC: Semi-Quantitative Evaluation of Access and Coverage

UNICEF: United Nations Children's Emergency Fund

USAID: United States Agency for International Development

WASH: Water, Sanitation and Hygiene

WAZ: Weight-for-Age z-scores

WHZ: Weight for Height z-scores

WHO: World Health Organization

OPERATIONAL DEFINITION OF TERMS

Attitude: A way of thinking or feeling about someone or something and is not always directly observable (UNICEF, 2014).

Caregivers: The person who takes primary responsibility of the child in absence of the mother

Childcare: Feeding practices, health seeking practices and hygiene practices among others that enhance child health and survival.

Complementary feeding: The provision of semi- solid and solid foods to children from 6 months of age in addition to breast milk to meet their nutrient requirement on a daily basis.

Dietary Diversity: Number of different foods or food groups consumed over a given reference period (FSAU, 2005).

Exclusive breastfeeding: Feeding a child below six months with breast milk only, be it directly from breast or expressed, with no addition of any liquid or solids apart from drops or syrups consisting of vitamins, mineral supplements or medicine, and nothing else.

Feeding practices: These refer to habits/practices (both breastfeeding and complementary feeding) in feeding infants and young children based on WHO/UNICEF recommendations.

Nutritional knowledge: Set of facts, information, and ideas acquired by a person on nutrition through learning and practice (UNICEF, 2014).

Nutritional status: The anthropometric status for children expressed in weight for age, weight for height and height for age indices.

Stunting: Refers to height-for-age below -2 Z score or below 80% of the median height for age for reference population. When a child is too short for his/her age but not necessarily thin, also known as chronic malnutrition (WHO, 2006)

Underweight: Refers to weight-for-age below -2 Z score or below 80% of median weight for age for reference population. Underweight children are too light for their age. It reflects a combination of acute and chronic malnutrition (WHO, 2006).

Wasting: Refers to weight-for-height below -2 Z score or below 80% of median weight for height of the reference population. It's a form of acute malnutrition. Wasted individuals are too light for their height (WHO, 2006).

LIST OF TABLES

<i>Table 1: Some selected socio-demographic characteristics of the study population.....</i>	<i>23</i>
<i>Table 2: Selected characteristics of the study household heads.....</i>	<i>24</i>
<i>Table 3: Maternal age and level of education.....</i>	<i>25</i>
<i>Table 4: Distribution of the study children according to sex and age in Maikona Ward, Marsabit County.....</i>	<i>25</i>
<i>Table 5: Water and sanitation facilities among the study households in Maikona ward.....</i>	<i>27</i>
<i>Table 6: Maternal hand washing practices.....</i>	<i>28</i>
<i>Table 7: Prevalence of acute malnutrition according to weight-for-height z-scores and by sex...29</i>	
<i>Table 8: Prevalence of underweight measured by weight-for-age z-scores and by sex of the study children.....</i>	<i>30</i>
<i>Table 9: Prevalence of stunting based on height-for-age z-scores and by sex.....</i>	<i>31</i>
<i>Table 10: Breastfeeding practices for children 6-24 months old.....</i>	<i>32</i>
<i>Table 11: Association between breastfeeding status and underweight.....</i>	<i>33</i>
<i>Table 12: Frequency of food consumption by children 6-59 months old in the past 7 days.....</i>	<i>35</i>
<i>Table 13: Morbidity status and nature of illnesses among children 6-59 months old.....</i>	<i>36</i>
<i>Table 14: Maternal health seeking behavior.....</i>	<i>36</i>
<i>Table 15: Vaccination coverage among children 6-59 months old.....</i>	<i>38</i>
<i>Table 16: Pearson correlation coefficient of some selected variables and nutritional status.....</i>	<i>41</i>
<i>Table 17: Cross tabulation of maternal education level and nutritional status.....</i>	<i>42</i>
<i>Table 18: Dietary diversity and nutritional status cross tabulation.....</i>	<i>43</i>
<i>Table 19: Association between frequency of food consumption and nutritional status.....</i>	<i>43</i>
<i>Table 20: Morbidity patterns and nutritional status cross tabulation.....</i>	<i>44</i>

LIST OF FIGURES

<i>Figure 1: Marsabit County map showing Maikona ward.....</i>	<i>13</i>
<i>Figure 2: Sampling procedure of households in Maikona ward.....</i>	<i>16</i>
<i>Figure 3: Global acute malnutrition rates by age categories.....</i>	<i>30</i>
<i>Figure 4: Prevalence of underweight by age categories.....</i>	<i>31</i>
<i>Figure 5: Prevalence of stunting by age categories.....</i>	<i>32</i>
<i>Figure 6: Dietary diversity scores of the study children.....</i>	<i>34</i>
<i>Figure 7: Immunization status of the study children aged 6-59 months old.....</i>	<i>37</i>
<i>Figure 8: Coverage of vitamin A supplementation for children aged 6-59 months.....</i>	<i>38</i>
<i>Figure 9: Frequency of vitamin A supplementation for children 12-59 months old.....</i>	<i>39</i>

ABSTRACT

Despite substantial presence of humanitarian and other aid agencies, Global Acute Malnutrition rates remain high in arid and semi-arid regions of Kenya including Marsabit County. Children below five years are at the greatest risk of malnutrition with dire consequences yet the causes are largely preventable. Trends in malnutrition status have shown deterioration in the recent past in Marsabit County. In order to address this problem there is need to identify the specific factors contributing to the high Global acute malnutrition rates. It was against this backdrop that this study was designed.

A Cross-sectional study was conducted among 204 children aged 6-59 months old. Multistage cluster sampling procedure was used to select the study households. Maikona ward was purposively selected. Maikona and Kalacha locations were conveniently sampled. Proportionate to size sampling was employed to determine the number of households to be interviewed in all the villages within the two locations. Structured questionnaire, Key informant interviews, observation checklists and Focus Group Discussion Guides were the tools used for data collection. Statistical Package for the Social Sciences version 20 was used for data entry and analysis. Data analysis included use of descriptive statistics for socio-demographic data, proportions and simple counts for categorical data and measures of central tendency (means and median) and dispersion (range, standard deviation) to summarize continuous data. Chi-square tests and Fishers Exact Tests (where applicable) were used to test for significant differences between proportions of categorical variables. Pearson correlations coefficient described the relationship between continuous variables with continuous outcome variables (nutritional indicators) in terms of Z-scores. Odds ratio were used to test the likelihood of malnutrition depending on different exposure factors. All statistical tests were considered significant at $p < 0.05$.

The mean household size was 5 people and the ratio of male to female in the study population was 1:1. Dependency ratio of the study population was 1:6. Majority (70.8%) of the study population had no formal education. Over a third (41.4%) of the caregivers/mothers were aged between 25-34 years. Literacy levels was low among the caregivers with most (86%) having no

formal education. The main household source of water was protected wells (65%) and 62.3% of the respondents did not treat water for consumption by the children. Over a third (43%) did not have access to latrines and most of them used bushes. Global acute malnutrition rate at 29.9% was high and presents a critical nutritional situation. Underweight was 27.9% and stunting was 18.1%. Early initiation to breast milk was a common practice at 85%. The mean dietary diversity score of the children was 3.07 (SD 1.1) food groups, which is below the recommended threshold of at least 4 food groups. More than two thirds (67%) of the children had low dietary diversity scores. Fruits, vegetables and eggs were the least consumed food groups.

Morbidity prevalence among the children was 38% based on a two week recall. The most common illnesses was Upper respiratory tract infections (61%) followed by diarrhea (24.5%). Majority (69%) of the caregivers were conscious and positive about health seeking behavior with low than a third (30.8%) not seeking medical help for their children. Over a third (38%) of the caregivers had low nutritional knowledge with 46% having average knowledge scores. The qualitative discussion revealed that inadequate household income, lack of enough food and cultural barriers were major constraints to availability and utilization of complementary foods for children.

In conclusion, factors that are significantly but negatively associated with the nutritional status of the study children include; low dietary diversity scores ($p=0.046$), poor nutritional knowledge ($p=0.045$), lack of continued breastfeeding ($p=0.023$) and lack or poor consumption of vitamin A rich fruits and vegetables ($p=0.001$). Socio-demographic factors, morbidity status, water sanitation and hygiene seem to have no influence on the nutritional status of the study children.

The study recommends therapeutic and supplementary feeding programmes as a short term alternatives to address the high Global acute malnutrition rates observed; for the long term capacity building on appropriate complementary feeding and nutritional interventions such as water sanitation and Hygiene and agricultural practices for dietary diversification is recommended. Other recommendations include nutrition/health education aimed at discouraging cultural practices that prohibit consumption of foods that are beneficial to the nutritional status as well as health of young children.

CHAPTER ONE: INTRODUCTION

1.1 Background Information

Care practices is a multifaceted concept that includes a diversity of behaviors and practices of caregivers that ensure food, healthcare, and emotional support required for child's growth, survival and development are provided (Dickson et al.,2014). Being part of childcare practices feeding and healthcare underlies dietary sufficiency and protection from disease (UNICEF, 1992). Optimal care practices that could impact on child nutrition comprise of care practices for expectant and lactating women, breastfeeding and complementary feeding, care for children during illness and psychosocial care (Ramji, 2009).

Malnutrition in children manifests its self in two forms; Under-nutrition and over-nutrition. The former is the most common in Kenya and particularly in ASAL areas. Under-nutrition is having a low weight for age (underweight), too short for age (stunting), low weight for a certain height (wasting). On the hand, over-nutrition is defined as abnormal or excessive fat accumulation that may impair health which is presented as overweight and/or obesity (WHO, 2012).

Under-nutrition in children remains a main challenge globally and in developing countries such as Kenya. The initial UNICEF conceptual framework for malnutrition promoted child nutrition and health through emphasizing the importance of childcare practices (UNICEF, 1992). Children under-five years old are likely to have an improved nutritional status when they have access to inexpensive, diverse, nutrient rich food; suitable health care practice and a healthy environment (UNICEF, 2013).

In Kenya, the under-five mortality rates are increasing due to poor childcare practices resulting from unsuitable infant and young child feeding practices and inappropriate health care practices (Kihagi, 2012). Poor child care practices affect the child's nutritional intake hence leading to malnutrition (Kuria, 2010). In Kenya, based on Kenya Demographic and Health Survey (2014), Eleven percent of children below five years are underweight, four percent are wasted, and twenty-six percent are stunted (KNBS, 2015).

According to findings of a study carried out on the nutritional status of children under five years in the Informal settlement of Nairobi, poor child care practices was found to contribute significantly to malnutrition leading to higher morbidity and mortality rates in this age group (Ayieko, 2014). In addition, the reports of other surveys done in Kenya have also documented poor childcare practices and deprived nutritional status. For instance a Semi-Quantitative Evaluation of Access and Coverage (SQUAEC) report in Chalbi Ward, Marsabit County by Concern Worldwide (Kirichu, 2013) highlighted prolonged food insecurity, poor dietary diversity and inappropriate health care practices as the key factors contributing to high malnutrition rates in the ward.

As much as factors that are associated with nutritional status of children under five years are explicit they differ depending on the context/setting. Hence, there is need to explore in greater depth those factors specific to ASAL areas where this problem seems to persist in order to address the issue in totality.

1.2 Statement of the Problem

The Global Acute Malnutrition (GAM) rates are high in arid and semi-arid regions of Kenya. These regions include parts of Marsabit, Wajir, Samburu and Garissa, which are inhabited by pastoralists. In Marsabit County the trends in nutrition status have been worsening in the recent past. The percentage of children below five years at-risk of malnutrition in Marsabit County increased from 19% in October 2013 to 29% in January 2014; a better understanding of the underlying factors of malnutrition is yet to be established. This includes the impact of water-borne disease, access to safe water and access to sanitation facilities (OCHA, 2014). According to Surveys conducted in May 2011 and June 2012, the Global Acute Malnutrition [GAM] rates were **27.4%** and **10.7%** respectively in Marsabit County. A similar study in Chalbi showed a GAM rate of 15.9 percent which is critical as per the Sphere standards (Kirichu, 2013).

Kenya Demographic and Health survey that was carried out in the larger Marsabit County in 2014, established that **26.5%** of children under five years are stunted, **30%** are underweight and **16.3%** are wasted (KNBS, 2015). Despite linking high risk of malnutrition' rates to acute and chronic food shortages at the household level, illnesses like cholera and malaria, and poor

childcare practices and inappropriate hygiene practices have also heightened the higher than normal rates of child malnutrition in this region (IRIN, 2015).

For sustainable solutions to this perpetual problem of malnutrition, the root causes need to be identified for a positive impact to be realised in this area. However, the probable causes behind the increasing trends in malnutrition rates despite a lot of interventions by both local and international agencies remain unknown. Therefore, the current study was designed to establish factors associated with nutritional status of children under five years in Maikona ward, Marsabit County for informed decision making and programme planning.

1.3 Justification

The alarming levels and the deteriorating trends in malnutrition in Marsabit County calls for urgent measures to ameliorate the situation. According to the recent global nutrition report, putting an end to malnutrition is key component in spearheading the sustainable development agenda (International Food Policy Research Institute., 2015) Understanding factors that are related to poor nutrition status is critical in order to break the vicious cycle of malnutrition and poverty. Further, children especially under five cannot realize their full growth potential which has far much negative implication in their productive capacity, human development as well as socio-economic progress of a country (UNICEF, 2011). Further, children represent humanity's future (UNICEF, 2014) and unless the factors that predispose them to malnutrition are correctly identified and tackled, human growth and sustainable development targets will not be achieved (International Food Policy Research Institute, 2015). In the light of this information, there is need to carry out such a study to clearly elucidate the factors that affect nutrition status for this vulnerable age group (6-59 months).

1.4 Aim of the Study

The aim of the current study was to contribute towards improvement of infant and young child nutrition and health care in Marsabit County.

1.5 Purpose of the Study

The purpose of the study was to generate information on nutritional status and associated factors in arid and semi-arid areas that will be useful in guiding the planning of feasible intervention strategies.

1.6 Overall objective of the Study

The overall objective of the study was to determine the factors associated with nutritional status of children aged 6-59 months in Maikona Ward, Marsabit County.

1.6.1 Specific objectives

The specific objectives of the study were to:

1. Determine demographic characteristics, sources of water, sanitation and hygiene status of the study households in Maikona ward, Marsabit County.
2. Assess the nutrition status of children aged 6-59 months in Maikona ward, Marsabit County.
3. Determine the feeding practices of children aged 6-59 months in Maikona ward, Marsabit County.
4. Determine morbidity patterns and health seeking behavior among children aged 6-59 months in Maikona ward, Marsabit County.
5. Assess caregiver's knowledge, attitude and extent of optimal childcare practices in Maikona ward, Marsabit County.
6. Determine constraints to obtaining appropriate childcare and feeding practices among care givers in Maikona ward, Marsabit County.
7. Determine the factors associated with nutritional status of children aged 6-59 months in Maikona Ward, Marsabit County.

6.7 Hypotheses

1. H₀₁ There is no relationship between household demographic characteristics, water sanitation and hygiene status of the study households and nutritional status of children aged 6-59 months in Maikona ward.
2. H₀₂ There is no relationship between feeding practices and nutritional status of children aged 6-59 months in Maikona ward.
3. H₀₃ There is no association between morbidity patterns, health seeking behavior and the nutritional status of children aged 6-59 months in Maikona ward.
4. H₀₄ There is no association between the caregiver's knowledge, attitude, and the nutritional status of children aged 6-59 months in Maikona Ward.

CHAPTER TWO: LITREATURE REVIEW

2.1 General Overview of Childcare Practices

Child care practices play a major task in improving the nutritional status of children under-five year old. Poor child care practices have been found to contribute significantly to malnutrition leading to higher morbidity and mortality rates in this age group (Ayieko, 2014). Where various organizations are in support of community development activities childcare has received little emphasis perhaps due to the fact that it has rarely been reported as one of the underlying causes of malnutrition (Kogi-Makau et al., 2004).

Among the ranges of the caring behaviors that affect child nutrition and health, the most significant include: feeding, psychological support, care and support for mothers, hygiene practices and health seeking behaviors (UNICEF, 1998). According to the UNICEF Conceptual framework health care and food intake are all essential, although none alone is sufficient for a health growth and development (UNICEF, 1990).

2.2. Infant and Young Child Feeding Practices

2.2.1 Optimal breastfeeding practices and its importance

2.2.1.1 Exclusive breastfeeding

Optimal breastfeeding practices comprise of exclusively breastfeeding the infant for the first six months of life, followed by breast milk and complementary feeding from about six months of age on, and continued breastfeeding up to two years of age and above, while at the same time receiving appropriate complementary foods (UNICEF, 2016).

Exclusive breastfeeding for the first 6 months of life provides the infants with nutrients for healthy growth, development and also improves the functioning of the immune systems. Studies have shown evidence that proves exclusive breastfeeding protects young children against gastrointestinal infections and iron deficiency anemia (Ssemukasa & Kearney, 2014). Infants who are exclusively breastfed are less likely to die from respiratory tract infections, diarrhoea, and other illnesses. Studies have also shown that exclusive breastfeeding protect the

infants from chronic illnesses like diabetes and obesity later in life through supporting their immune systems (UNICEF, 2014).

WHO/UNICEF recommends that mothers should start breastfeeding their infants within the first one hour of birth, and continue to breastfeed them exclusively for the first 6 months of life and also breastfeed on demand in order to sustain exclusive breastfeeding for 6 months (WHO, et al., 2010). A child who is exclusively breastfed is 14 times less likely to die in the first six months of life compared to a non-breastfed child. Breastfeeding also significantly reduces child mortality that occur as a result of acute respiratory infection and diarrhea (Black, et al., 2008). Inappropriate infant feeding practices causes' significant risk for malnutrition among children less than 5 years (Kumar et al., 2006).

Globally, only 39% infants are exclusively breastfed in the first 6 months of their life (UNICEF, 2014). In Kenya there is an increase in the proportion of children who are exclusively breastfed from 32 percent in the 2008-09 KDHS to 61 percent, and in Marsabit County, 68.2% of children below 6 months are exclusively breastfeed (KNBS, 2015)

2.2.1.2 Early initiation of breast milk and its benefits

World Health Organization (WHO) and UNICEF recommend initiation to breast milk within the first hour after birth and breastfeeding exclusively for the first 6 months followed by continued breastfeeding up to the age of 2 years or beyond along with suitable complementary feeding (WHO/UNICEF, 2003).

The first breast milk (Colostrum) secreted within the first few days of delivery provides the infants with natural immunity from the mother that help in preventing infections. Consequently, it is also of great importance to the health of newborns who are breastfed immediately after birth (Exavery et al., 2015). Trials have shown that early initiation of breast milk could decrease neonatal mortality by 22% (Kumar et al., 2006), which would further contribute to achievement of the Sustainable Development Goals. Regardless of these recommendations, only 43 and 39 percent of new-born are breastfeed within the first one hour of birth globally and in the developing countries respectively (UNICEF, 2014).

2.2.1.3 Status and benefits of continued breastfeeding for two years or beyond

The first two years of life are the most crucial stages for a child's growth and development. Nutritional deficiencies at this phase could cause severe damage that affects cognitive development and compromised learning achievement (Cesar, et al., 2008). Increased incidence of diarrhea, pneumonia and high mortality among children have been linked with suboptimal breastfeeding. However, prevalence of breastfeeding in almost all the countries in the world continues to fall significantly compared to what WHO and other infant nutrition experts have recommended (Roberts, et al., 2013).

Breastfeeding the infants into the third year of life or even longer has not shown any evidence of psychological or developmental harm (AAP, 2012). Nutritional composition of human milk varies. Some of its components include bioactive factors, growth factors, and prebiotics which make it different from infant formula that are standardized within narrow range of composition. (Ardythe & Ballard, 2013).

According to KNBS and ICF Macro (2010) results, the average duration of breastfeeding among the general population in Kenya was 21 months and continued breastfeeding at 2 years or beyond was 57%. A study carried out in urban informal settlements in Nairobi on patterns and determinants of breastfeeding and complementary feeding established that, 85% of children are still breastfed at 1 year (Kimani-Murage et al., 2011). A SMART survey that was conducted in Marsabit County indicated that 88.8 % and 50.5% of children between 12-15 and 20-23 months respectively are breastfed (UNICEF, 2013). This slowly declines as the child's age progresses.

2.2.2 Complementary feeding practices and its benefits

Complementary feeding refers to feeding solid or semisolid foods in addition to and not in replacement of breast milk to meet child's increased nutritional requirements (WHO, 2016). Besides breast milk infants should also be given complementary foods at the age of 6 months as recommended by WHO, at first the child should be fed two-three times in a day, three-four times at 6-8 months, and continue increasing to 3-4 times daily between 9-11 months and 12-

24 months, snacks should also be offered once or twice per day. The new WHO indicators for complementary feeding practices assesses whether infants aged 6 to 8 months are receiving solid or semi-solid foods regardless of being breastfed or not (WHO *et al.*, 2010). Kenya Demographic & Health Survey report (2009) shows that 84.9% of infants aged 6-8 months old are introduced to solids, semi-solids or soft foods in accordance with WHO recommendations compared to 79.6% in 2014 (KNBS, 2015)

When introducing infants to complementary feeding meals should include adequate quantities of proteins (meat, poultry, fish or eggs) and also vitamin A-rich fruits and vegetables every day in order to achieve dietary diversity. A minimum of four out of the recommended 8 food groups is viewed as sufficient to meet the child's nutritional needs. In Kenya 41% of children aged 6-23 months had an adequately diversified diet (KDHS, 2015) compared to 58% in 2010 (KNBS & ICF Macro, 2010). Enriched (fortified) complementary foods and mineral/vitamin supplements should be used where necessary to ensure adequacy of particular nutrient intakes (Bhan, 2010). Complementary foods must be given at appropriate time, it should be adequate and innocuous to meet the child's nutritional requirements. The food must also be offered more frequently and consistently depending on their age so as to attend to the child's feelings of hunger (Parada *et al.*, 2007).

2.3 Psychological and Emotional State of the Caregiver

Studies have found out that mothers/caregivers of severely malnourished children are usually those with low literacy levels and low self-esteem. In contrast, other studies have shown that mothers of children who develop well despite hostile socio-economic constraints are highly motivated and spend most of their time on quality care (Zeitlin *et al.*, 1993). Reviewing of policies/strategies that could be used to improve maternal self-esteem and confidence in developing and developed countries is recommended. Giving consideration to maternal or caregiver personality characteristics, attitudes, and beliefs that may have a positive or negative influence on quality of child care.

Children living in households headed by women are more likely to be malnourished compared to those living in male headed households as such households often face financial challenges (FENTAW et al., 2013). The presence of more than one child in the household usually results in unequal child nutritional outcomes as a result of resource constraints and also competition among the siblings

The crucial component of feeding behavior in children is the association between the young child and the primary caregiver. The first three years of a child's life are very important because the child's feeding needs change with cognitive (mental) and social development (Stein et al., 2013). Family size also affects under-five years nutritional status a study that was done in rural Hissar, found that majority of the cases of malnutrition had a family size of 5 – 8 members (Anuradha, et al., 2014)

2.4. Under-nutrition and Water, Sanitation and Hygiene.

Lack of safe drinking water and poor hygiene practices are directly related to malnutrition in children through three significant ways: via diarrheal diseases, intestinal parasite infections and environmental enteropathy (Cumming et al., 2015). Walking long distances in search of water and sanitation facilities also diverts the caregivers time away from child care hence impacting negatively on their nutritional status (WHO, 2015).

In Kenya, inadequate water and sanitation increase the risk of diarrhoea, which affects nearly 30% of children aged 6-11 months (KNBS & ICF Micro, 2010). In Marsabit access to water, both for domestic and livestock uses, is severely limited and is the single most critical issue facing Maikona ward population. The average amount of water available for household use in 2010-2011 was only 46 liters/day which translates to only 7.7 liters/day/person against the recommended 15liters/day/person according to SPHERE standards (Kuria, 2010)

Water sources and treatment, disposal of stool and hygiene at the household level are important to health. According to Nutrition survey that was carried out by Food for The Hungry (FHI) Kenya, in Marsabit June 2010 (Kuria, 2010), there was no major difference between

source of household water and source of drinking water. Improved sources of drinking water include; piped water, tap water, borehole, protected well/spring and rain water collection (WHO/UNICEF, 2015). On the other hand, use of flush toilet, ventilated pit latrine (VIP) and pit latrine with a slab were classified as improved sanitation facilities whereas unimproved sanitation are shared toilet/latrine facilities, no facilities, pit latrine without a slab and bucket (WHO/UNICEF, 2015). According to the nutrition survey that was carried out in Maikona ward of Marsabit County in June 2010 those who had access to toilet/latrine facility were 44.6% of the households, while 55.4% have no access to a toilet facility. This is likely to negatively influence sanitation and hygiene and consequently the nutritional status.

2.5 Health Care Access and Seeking Behaviour

Millions of children die of preventable and treatable conditions each year mostly in developing countries due to lack of access to a timely treatment (WHO, 2007). Lack of timely and adequate medical care is a significant contributor to mortality and morbidity in these resource-poor settings (Abubakar et al., 2013).

Community based studies show that poor access to health care, which results in delayed attendance at a health facility or none at all, may be a key determinant of mortality in children below five years of age in developing countries (Merrin, et al., 2009). Other Studies have also shown that timely and appropriate healthcare seeking behaviors by the caregivers can have a significant impact on child survival (Adesuwa et al., 2015). Timely and proper treatment of childhood illnesses usually depends on caregiver's perception of and prompt recognition of signs and symptoms of the illness in addition to being able to access appropriate healthcare services.

Poor access to formal health care services in Maikona ward of Marsabit County has led to the proliferation of a largely unregulated health care system. With the high levels of morbidity and mortality in this area, it is likely that inappropriate healthcare-seeking practice is rampant therein. Understanding health care practices is therefore essential in improving the health care systems that serve the rural population (Kuria, 2010).

2.6 Importance of Immunization and its Coverage in Marsabit County.

Universal immunization of under-five year old children against six common preventable diseases, that is tuberculosis, diphtheria, whooping cough (pertussis), tetanus, polio, and measles, is crucial to reducing child mortality (KNBS, 2015). Immunization being a key public health intervention, it prevents more than 2.5 million child deaths worldwide every year (WHO, 2016). Immunization during infancy has been confirmed to be the most effective approach to prevention of many infectious diseases (Mutua et al., 2011). Kenyan epidemiological profile indicates that disease burden is still high and it's a barrier to economic growth (MOH, 2013).

Division of Vaccine and Immunization (DVI) in Kenya recommends that by the age of 12 months, a child should receive bacillus Calmette–Guerin (BCG), three doses of polio vaccine, three doses of a pentavalent vaccine (this is a combination of five vaccines, namely diphtheria, pertussis, tetanus, *Hemophilus influenzae type b*, and hepatitis B) and one measles vaccine (MOH, 2012). More than thirty million children are not immunized either because vaccines are not available, because health services are inadequately provided or not accessible, or because families are uninformed or misinformed about when and why they should take their children for immunization (UNICEF, 2015). In Marsabit county only 67.5 percent of children aged 12-23 months are fully immunized which is lower than the national levels of 74.9 percent (KNBS, 2015).

2.7 Gaps in Knowledge

No documented data on factors associated with nutritional status of children below five years is available from this area of Maikona ward. Given that this area is located in a desert (Chalbi Desert) it remains to be the most vulnerable in terms of food security. As much as there's routine data collection on nutritional status through SMART surveys, the underlying associated factors remain unknown. Moreover, nutritional status also varies from one year to another due to changing climatic conditions especially severe drought. The present study, therefore sort to find out factors associated with nutritional status of children aged 6-59 months in this area of Marsabit County.

CHAPTER THREE: STUDY DESIGN AND METHODOLOGY

3.1 Study Setting

The study was conducted in North/Horr sub-county, Maikona ward in two locations (Maikona and Kalacha). The Sub County is bordered on the North by Ethiopia, on the East by Sololo, on the Southeast by Isiolo County, Southwest by Loyangalani ward, and to the South by Marsabit Central and Laisamis Sub County. The region has two (bimodal) rainy seasons in a year. The main source of livelihood in the study area is sell of livestock and their products.

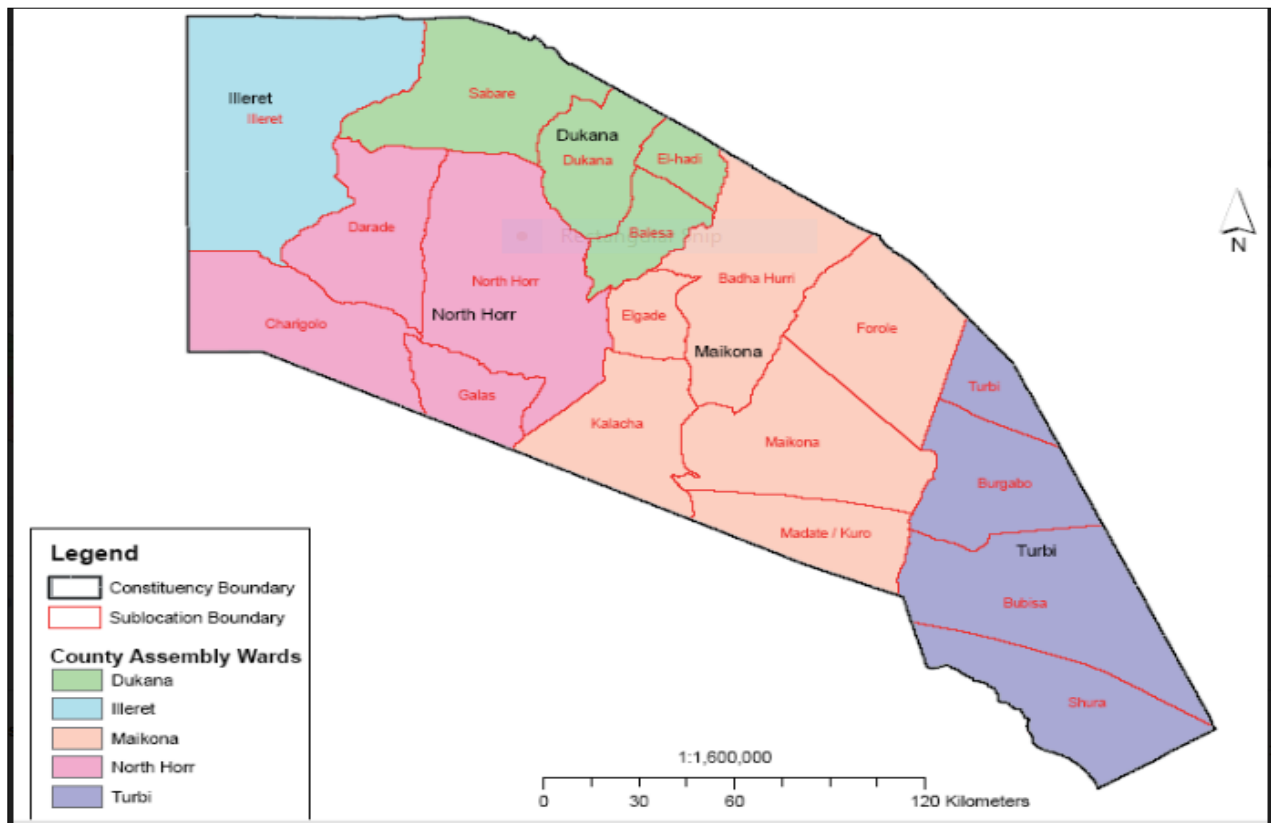


Figure 1: North/Horr sub county map showing Maikona ward (IEBC, 2012)

3.2 Study Population

Maikona ward has an estimated population of approximately 32000. The percentage of children under the age of five is 13% (KNBS 2009). The main source of livelihood in the ward is pastoralism. Subjects of the current study consisted of primary caregivers and their children aged 6-59 months in Maikona and Kalacha locations, Marsabit County.

3.3 Study Design

The study design was cross-sectional in nature, covering two locations in Maikona ward, North/Horr Sub-County, Marsabit County. The study design was adopted due to time constraints as well as the fact that it provides a snapshot of the nutritional situation of a particular population at a specific point in time.

3.4 Sampling

3.4.1 Sample size determination

Fisher et al.,(1991) formula was used to calculate the required sample size.

$$(n = Z^2 pq \div d^2)$$

Where:

n= desired sample size

Z = standard normal deviation which is 1.96

p = proportion of the target population estimated to have characteristics being measured (15.9% prevalence of GAM) according to SQUEAC report by Concern Worldwide, (2013).

q = population lacking the features being measured (1-0.159=0.841)

d= Degree required for precision (Set at 0.05).

The formular ($n = Z^2 pq \div d^2$) substituted as $n = 1.96^2 * 0.159(0.841) / 0.05^2 = 205$.

Minimum Sample Size =205 (Households sampled)

3.4.2 Sampling procedure

Multistage sampling procedure was used as systematically presented in Figure 2. The first and the second stages were purposive sampling of Marsabit County and North/Horr sub-county. The third stage was purposive selection of Maikona ward. In the fourth stage convenient

sampling was used to select Maikona and Kalacha locations for security reasons and accessibility. Proportionate to size (No. of households) sampling was used to select 104 and 101 households in Maikona and Kalacha locations, respectively. There were 9 and 7 villages in Maikona and Kalacha locations respectively. Proportionate to size (No. of households) sampling method was employed to select the specific number of households to be included in the study per village in the two locations. The respective sample spread of each village was calculated as a ratio of the total number of households in the village over the required number of sampled households, for example in village one Gamura 110/9 which was a sample spread of 11 households. A random start household was selected from the existing households on the ground and the sample spread size was used to identify the consecutive household, for example in Gamura village the random start household was the 5th household in the village. A child under five years was purposively selected for the study from each of the selected households. In a household that had more than one under five year old child, only one was selected for the assessment by simple random. Two pieces of paper were written numbers 1 and 2, folded and the mother/care-giver was asked to pick one, which was subsequently included in the study. The assumption was that children living in the same household are exposed to the same condition. one household was not interviewed due to inaccessibility.

Two focus group discussions (FGD) were conducted in Maikona and Kalacha locations (1 in each location). A total of 20 (10 in each location) mothers/caregivers were selected from the two locations with the help of the community health volunteers (CHVs). The selection criteria included mothers/caregivers of children aged 6-59 months. During the selection process it was ensured that all the villages were equally represented. A total of 2 key informants interviews were conducted in the two locations. In each location a nutrition officer and a public health officer were interviewed. The nutritional officer was interviewed on areas such as current nutritional issues affecting the area while the public health officer gave details on water, sanitation and hygiene status.

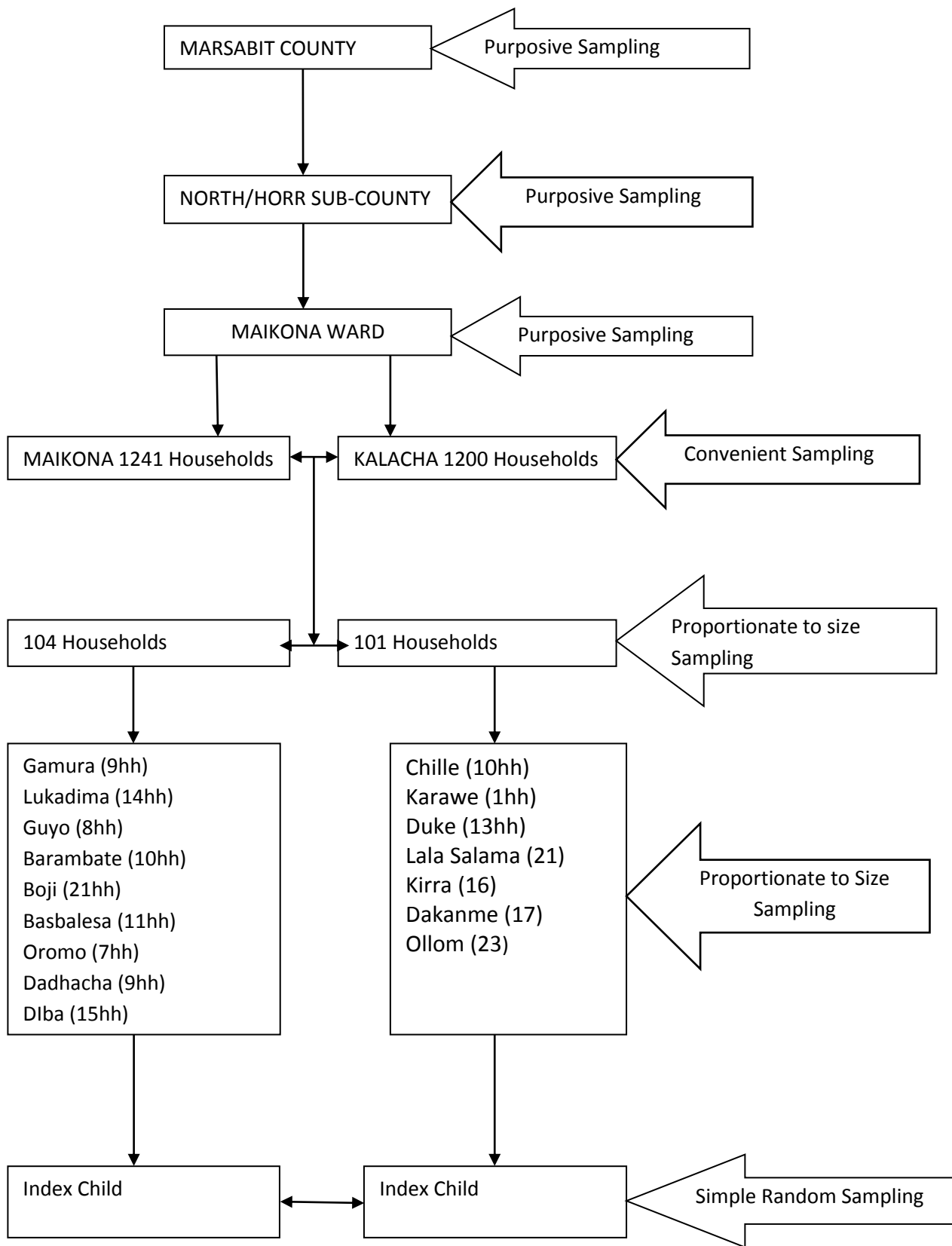


Figure 2: Sampling Procedure for households in Maikona ward.

3.5 Data Collection

3.5.1 Data collection tools

The main study tool was a structured questionnaire (Appendix 3). The questionnaire was used to collect information on socio-demographic characteristics, child care and feeding practices, morbidity experiences, nutritional status, water sanitation and hygiene practices, Knowledge and attitude. Data on feeding practices was collected using a 7-day food frequency questionnaire and individual dietary diversity questionnaire.

A focus group discussion guide was used to guide the discussions in the FGD sessions (Appendix 3). Similarly, Key informant guide and observation checklist was also used to gather information on health care services, constraints and other significant concerns related to this study. The key informants consisted of health workers (Nutritionist, Public Health Officer) from the health facilities in Maikona and Kalacha wards.

3.5.2 Selection and training of interviewers

The study was carried out in Maikona and Kalacha locations on all the sampled households with children aged 6-59 months old. A total of 5 college students with background knowledge on nutrition were selected as interviewers based on their experiences of conducting nutritional surveys. The interviewers were residents in the area which made it easier for them to communicate with the caregivers. The interviewers also spoke the community language and were all physically fit to move from one household to another.

Research assistants were introduced to the project, study tools and the study objectives. Training was conducted by the principal investigator explaining the aim, objective and purpose of the study. Method of data collection and how to build a good rapport with the respondent was also discussed in details (Appendix 4). The research assistants were closely monitored during the actual data collection for quality assurance.

3.5.3 Pre-testing

Ten households with children under-five years were randomly selected in Majengo Sublocation in Marsabit town for the purpose of a pilot study before the actual survey was initiated. This

helped in testing the research instruments and also in evaluating the skills of the research assistants in measuring height and weight and recording the results appropriately. Close monitoring of data collection was also considered at this stage.

3.5.4 Data collection procedure

3.5.4.1 Demographic and socio-economic data

Structured questionnaire was used to collect data on household composition, age, sex, level of education and marital status of the household members. The respondents were also asked to provide information on the sources of water, sanitation and hygiene.

3.5.4.2 Nutritional Status

Anthropometric Assessment

Weight measurement

Weight was measured in Kilograms using a Seca[®] electronic scale (Seca GmbH & CO.KG Hamburg, Germany) from Marsabit general hospital. The electronic weighing scales were reset during each measurement to obtain correct readings adjusted for absolute errors. For infants and those children who were unable to stand, the mother was first made to stand on the weighing scale; the scale was then tared she was then made to hold the baby who was lightly dressed, and the weight was subsequently recorded.

Height Measurement

The height/Length of the children was measured in centimeters using height/length board with an accuracy of 0.1 centimeters. Length was taken for children below 2 years or those below 84cm while height was taken for the rest of the under-five year old children. The readings were taken twice and their average recorded in the questionnaire to increase accuracy levels.

Oedema assessment

An assessment of bilateral edema was also done. Using their thumbs, the researchers applied a mild pressure on the feet (both) of the child for at least three seconds. Children showing the print of the thumbs were considered to have edema.

3.5.4.3 Child feeding practices

Dietary diversity

7 day Food frequency data

To assess usual food consumption, one week (7 day) food frequency questionnaire (FFQ) was administered. The 14 food groups commonly available in the study area which include grains, roots and tubers, legumes and nuts, flesh meats, vitamin A rich fruits and vegetables, other fruits and vegetables and dairy products were considered. The caregivers/mothers were asked the number of times the child consumed the foods from the 14 food groups in the previous 7 days. The frequency of consumption responses included “Never in the past 7 days”, “less than 4 times in a week” and “more than 4 times in a week”. The caregivers were allowed to choose only one answer for each food group consumed by the child.

Individual dietary diversity

Data on Individual dietary diversity for the index child was collected through a 24 hour dietary recall tool that consisted of 8 food groups as recommended by FAO (FAO, 2011).

3.5.4.4 Immunization, morbidity patterns and health seeking behaviour

The information on morbidity, health seeking behavior, immunization, and deworming practices was obtained from the mothers/caregivers through a structured questionnaire. Some of the information so obtained was verified using the mother & child health (MCH) booklet.

3.5.4.5 Maternal knowledge and attitude assessment

Knowledge on nutrition mostly on feeding practices for the children below 5 years was sought focusing on nutrition for a healthy living. A total of ten (10) questions some with multiple answers were administered (Appendix 3).

Attitudes was assessed by asking the caregiver’s questions related to desired nutritional practices, health or nutritional problems, food preferences and food taboos to judge whether they are positively or negatively inclined towards it. The total numbers of attitude questions were 9 offering three response options which were adopted from FAO (2014) one positive response, middle option response that is neutral and captures attitudes that are still uncertain and one negative response (Appendix 3).

3.5.4.6 Constraints to obtaining appropriate childcare

Constraints to obtaining optimal childcare and feeding practices among the caregivers were assessed through focus group discussion. Two focus group discussions comprising of eight caregivers was conducted in Maikona ward. Both the group had two community health extension workers to vividly explain some of the challenges faced by the caregivers.

3.6 Data Quality Control

The research assistants were properly trained on data collection procedures, how to use equipment's and accurate recording of answers to minimize errors. A pilot study was done in Marsabit central and all the research assistants were closely monitored by the principal investigator to ensure they asked the questions correctly in their mother tongue without changing their meanings.

Digital weighing scales used to minimize errors in weight taking. On-sport supervision checks were done in the field by the principal investigator. All the questionnaires filled per day were checked to ensure all the questions had been answered appropriately and reviewed by the principal investigator before leaving the village. Re-interviews were done in one selected household in each village by the principal investigator to check for consistency of the data collected by the research assistants. Data was coded and entered into SPSS. Before analysis frequencies were run to check for any outliers. Anthropometric data cleaning was done by use of ENA FOR SMART to check for any outliers in weight and height measurements.

3.7 Data Analysis

The collected raw data was entered and analyzed using Statistical Package for Social Sciences (SPSS) version 20. Descriptive analysis was done to analyze socio-demographic data like age of the child, age of the caregiver and household size. Frequencies and proportions were used to analyze categorical data like sex, level of education, marital status, food groups consumed, dietary diversity, nutritional knowledge and nutritional status. The means, median (Measures of central tendency) and dispersion (range, standard deviation) were used to summarize continuous data.

Anthropometry data was analyzed using Emergency Nutrition Assessment for Standard Monitoring and Assessment of Relief and Transition (ENA for SMART 2012). The indices of interest were weight for height (W/H), Height for age (H/A) and weight for age (W/A). Based on world health organization (WHO) 2006 child growth standards the anthropometric data was categorized into normal and malnourished children. The individual dietary diversity scores were categorized into high, medium and low dietary diversity scores based on FAO guidelines (2011). Morbidity patterns were categorized into either presence or absence of a disease based on the recall period (two week) prior to the survey. Chi-square tests were performed to evaluate the association of the dependent and the independent variables at significance level of 0.05. Fishers exact Tests were used for explanation in variables that had less than 5 frequencies.

The aggregate score for nutritional knowledge for all the caregivers was converted to percentages. The percentage scores were categorized into three as follows to assess the nutritional knowledge levels of the caregivers: 70%-100% (high), 50-69 (average), 0-49 (low). The categorizing scale was designed by the researcher as literature reviewed did not have a comparable scale. Chi-square test was performed to determine any statistical significance between the caregiver's nutritional knowledge and the child's nutritional status.

Total scores of the positive attitudes of an individual were divided by the total number of attitude questions (9) and multiplied by a hundred to get the percentage scores of the individuals. Association between the caregiver's attitude and other factors like nutritional knowledge and the child's nutritional status was tested using bivariate correlations and multiple linear regressions. Correlations test was performed to show associations between continuous variables such as the caregiver's attitude scores and age of the child with nutrition status. All statistical tests were considered significant at $P < 0.05$.

Qualitative data from focus group discussions and key informant interviews were analyzed according to themes particularly on constraints to obtaining optimal childcare. Key informant interviews data was used to validate the information given by the caregivers/mothers during the household level data collection.

CHAPTER FOUR: RESULTS

4.1 Households Socio-Demographic Characteristics

Table 1 shows a summary of selected socio-demographic characteristics of the study population. The mean household size was 5. The smallest house had 2 people and the largest 9. The total population in the two locations constituted of 1029 persons; 52% female and 48% males, approximately a ratio of 1:1. Nearly a quarter (24.7%) of the population comprised of the target population (6-59 months). The dependency ratio of the study population was 1.6. Almost three quarters (70.8%) of those aged more than 15 years had never been to formal school while 14.6 % have attained primary education. 9.1% of the study population had attended secondary schools while the rest (5.5%) had attained tertiary levels.

Table1: Some selected socio-demographic characteristics of study population in Maikona ward, Marsabit County.

Characteristics	Statistics	
	N (1029)	%
Sex Distribution	<i>n</i>	
Male	495	48.1
Female	534	51.9
Sex ratio Male to female	1:1	
Dependency ratio	1:6	
Education Level of >15 yrs.	N	% (N=452)
University	5	1.1
College	20	4.4
Secondary	41	9.1
Primary	66	14.6
Never gone to a formal school	320	70.8

Table 2 shows selected characteristics of the study household heads. Most (91.7%) of the households were male headed with only a few (8.3%) headed by females. Nearly all (93.6%) of the household heads were married. Approximately three quarters (74.5%) of the household heads had no formal education.

Table 2: Selected characteristics of the study household heads in Maikona ward, Marsabit County

Households heads characteristics (N=204)	N	%
Sex		
Male	187	91.7
Female	17	8.3
Marital status		
Married	191	93.6
Divorced/separated	3	1.5
Widowed	10	4.9
Education Level		
Primary	24	11.8
Secondary	12	5.9
College	13	6.4
University	3	1.5
Never gone to a formal school	152	74.5

Maternal socio- demographic characteristics

Table 3 illustrates maternal level of education and age. More than four fifths (85.8%) of the mothers had not attained any formal education with only 8.8% having attended primary schools. The mean age was 29.30 \pm 7.18 years with the youngest and the oldest mother being 17 and 48 years respectively. Most of the mothers/caregivers (41.4%) were 25-34 years old. The proportions of mothers in each of the other two age categories i.e. 15-24 and 35-49 years was 29.5%.

Table 3: Maternal age and level of education, Maikona ward, Marsabit County

Maternal Education level	(N=204) N	%
Primary	18	8.8
Secondary	8	3.9
College	2	1.0
University	1	0.5
No formal schooling	175	85.8
Maternal Age in Years		
15-24	60	29.5
25-34	84	41.4
35-49	59	29.1

Distribution of the study children according to sex and age

The study covered 204 children of which 48% were males and 52% were females. One quarter (26%) of the children were aged below two years. Over a third (34%) of the children were aged 36-47 months with only 12.7 % being in 48-59 months age category. The ratio of boys to girls was equal in the age category 36-47 months. There were more girls than boys in the age category 6-11 and 48-59 months. Table 4 shows distribution of the study children according to sex and age.

Table 4: Distribution of the study children according to sex and age in Maikona Ward, Marsabit County

AGE (months)	Boys		Girls		N=204 Total		Ratio Boy: girl
	N=98 no.	%	N=106 no.	%	no.	%	
6-11	14	77.8	4	22.2	18	8.8	3.5
12-23	12	34.3	23	65.7	35	17.2	0.5
24-35	24	42.8	32	57.1	56	27.5	0.8
36-47	34	49.3	35	50.7	69	33.8	1.1
48-59	14	53.8	12	46.2	26	12.7	1.2

4.1.1. Water, Sanitation and Hygiene Status of the Study Households

Main Source of Household and Drinking Water

Majority (65.2%) of the households obtain water for household use from protected wells. with similar proportion (64.7%) using the same water for drinking. On the other hand smaller proportions (3.4% and 5.4%) of the households obtained water for consumption and domestic use respectively from unprotected well. More than half (62.3%) of the respondents reported that they did not treat water used for consumption by the children while 29.9% reported that they boiled drinking water for their children. Only 7.8% used chemicals for treating the drinking water.

Waste disposal

Six in every 10 people had access to some kind of a toilet compared to 42.6% who had no access to toilets. The majority (67.8%) of those who had no toilets used the bush to dispose their waste. Further, there was also no presence of hand washing facility near the toilets. Table 5 shows the distribution households according to water and sanitation facilities.

Table 5: Water and sanitation facilities among the study households in Maikona ward of Marsabit County

Water and sanitation facilities	Frequency N	(N=204)	Percentage %
Main sources of water for household use			
Tap water	60		29.4
Protected well	133		65.2
Unprotected well	11		5.4
Total percentage			100
Main sources of water for Drinking			
Tap water	64		31.4
Protected well	132		64.7
Unprotected well	7		3.4
Borehole	1		0.5
			100
Type of toilets			
Ventilated improved toilets	23		11.3
Traditional pit latrine	94		46.1
No toilets	87		42.6

Maternal Hand washing practices

The study results shows that majority (86.8%) of the mothers reported they wash their hands before eating and about half (52.5%) wash their hands before feeding the baby. Almost a third (32.4%) stated that they wash their hands after cleaning the baby's bottom. In addition most mothers (83.3%) stated that they cleaned their hands with soap and water before eating while only 34.3% wash their hands with soap before feeding the child. Table 6 shows a summary of mothers' hand washing practices.

Table 6: Maternal hand washing practices

Hand washing practices	(N=204) n	Percent (%)
Moments when hands are washed		
Before eating	177	86.8
Before feeding the baby	107	52.5
After cleaning babies bottom	66	32.4
Before breastfeeding	48	23.5
Others	19	9.3
Hand washing practices with soap		
Before eating	170	83.3
Before Feeding the baby	70	34.3
After cleaning babies bottom	75	36.8
Before breastfeeding	31	15.2
Others	19	9.3

4.2 Nutritional Status of Children 6-59 Months Old

Prevalence of malnutrition was measured by weight-for-age (underweight), weight-for-height (wasting) and height-for-age (stunting) z-scores. Children who fall below -2SD are regarded as undernourished. Those with Z score value of ≤ -2 are considered to be moderately malnourished and those with Z scores value of ≤ -3 are considered to be severely malnourished. The prevalence of wasting among the study children was 29.9% (24.0 - 36.5 95% C.I.), underweight 27.9 % (22.2 - 34.5 95% C.I.) and stunting rates of 18.1 % (13.5 - 24.0 95% C.I.) None of the children presented with edema. The findings show that wasting was the highest form of malnutrition recorded in the study (29.9%).

Weight for height (Wasting)

Table 7 shows the distribution of study children according to weight for height z scores and sex. In the current study, Global acute malnutrition rate (GAM) was 29.9% .Those severely wasted were 7.4% while moderately wasted were 22.5%. Prevalence of wasting was higher in boys (34.7%) as compared to girls (25.5%), although the difference was statistically insignificant ($\chi^2=2.11$, 1df p=0.343)

Table 7: Prevalence of acute malnutrition according to weight for height z-scores and sex

Types of wasting	All n = 204	Boys n = 98	Girls n = 106
Wasting (GAM) (<-2 z-score)	(61) 29.9 % (24.0 - 36.5, 95% C.I.)	(34) 34.7 % (26.0 - 44.5, 95% C.I.)	(27) 25.5 % (18.1 - 34.5, 95% C.I.)
Moderately wasted (<-2 z-score and >=-3 z-score)	(46) 22.5 % (17.4 - 28.8, 95% C.I.)	(22) 22.4 % (15.3 - 31.7, 95% C.I.)	(24) 22.6 % (15.7 - 31.5, 95% C.I.)
severely wasted (<-3 z-score)	(15) 7.4 % (4.5 - 11.8, 95% C.I.)	(12) 12.2 % (7.1 - 20.2, 95% C.I.)	(3) 2.8 % (1.0 - 8.0, 95% C.I.)

C.I: Confidence Interval

Global Acute Malnutrition rates (GAM) by age categories

Figure 3 shows GAM rates of the study children by age. The highest GAM rates were observed in children below 2 years of age (39% and 36%). Followed by age category 36-47 (32%).The lowest GAM levels were observed in children above 4 years. Generally, it was observed that more children were moderately malnourished in each of the age categories thus contributing to the high GAM rates.

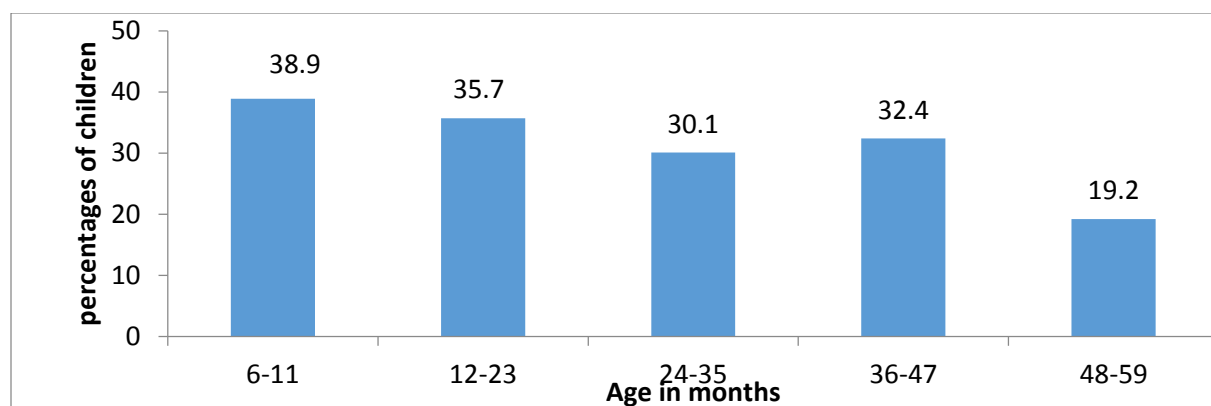


Figure 3: Global Acute Malnutrition rates (GAM) by age categories

Weight for Age (Underweight)

Table 8 describes the prevalence of underweight among the study children in Maikona ward. Slightly more than a quarter (27.9%) of the children aged 6-59 months were underweight of whom 19.6% were moderately underweight and 8.3% were severely underweight. There were more underweight boys than girls, however a Chi-square test on the differences in the prevalence of underweight between the two genders found no significant difference ($\chi^2=0.037$, 1df p=0.85).

Table 8: Prevalence of underweight measured by weight for age Z scores and by sex of the study children

Types of underweight	All n = 204	Boys n = 98	Girls n = 106
Underweight (<-2 z-score)	(57) 27.9 % (22.2 - 34.5, 95% C.I.)	(28) 28.6 % (20.6 - 38.2, 95% C.I.)	(29) 27.4 % (19.8 - 36.5, 95% C.I.)
Moderately underweight (<-2 z-score and >=-3 z-score)	(40) 19.6 % (14.7 - 25.6, 95% C.I.)	(17) 17.3 % (11.1 - 26.0, 95% C.I.)	(23) 21.7 % (14.9 - 30.5, 95% C.I.)
Severely underweight (<-3 z-score)	(17) 8.3 % (5.3 - 12.9, 95% C.I.)	(11) 11.2 % (6.4 - 19.0, 95% C.I.)	(6) 5.7 % (2.6 - 11.8, 95% C.I.)

C.I =Confidence Interval

Prevalence of underweight across the age categories

Figure 4 shows the prevalence of underweight among the study children by age. Prevalence of underweight was highest in children aged 36-47months (37.1%) followed by 48-59 months (30.7%) and 24-35 months (28.6%). Children aged 6-11 months had the lowest levels of underweight (16.7%).

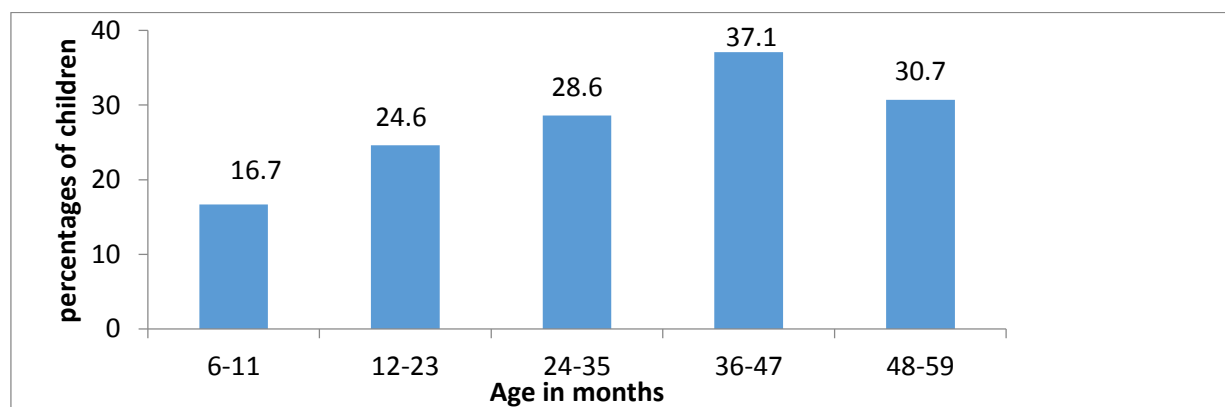


Figure 4: Prevalence of underweight by age categories.

Chronic malnutrition (Stunting)

Table 9 shows the prevalence of stunting based on height-for-age z-scores. The results show that 18.1% of the children studied were stunted of which 3.4 % were severely stunted, 14.7% moderately stunted while the rest (81.7%) had normal height for their age. The prevalence of stunting was higher in girls 18.9% than in boys 17.3% but the difference was not significant ($p>0.05$).

Table 9: Prevalence of stunting based on height for age z-scores and by sex

	All n = 204	Boys n = 98	Girls n = 106
Stunting (<-2 z-score)	(37) 18.1 %	(17) 17.3 %	(20) 18.9 %
	(13.5 - 24.0, 95% C.I.)	(11.1 - 26.0, 95% C.I.)	(12.6 - 27.4, 95% C.I.)
moderate stunting	(30) 14.7 %	(14) 14.3 %	(16) 15.1 %
(<-2 z-score and >=-3 z-score)	(10.5 - 20.2, 95% C.I.)	(8.7 - 22.6, 95% C.I.)	(9.5 - 23.1, 95% C.I.)
severe stunting	(7) 3.4 %	(3) 3.1 %	(4) 3.8 %
(<-3 z-score)	(1.7 - 6.9, 95% C.I.)	(1.0 - 8.6, 95% C.I.)	(1.5 - 9.3, 95% C.I.)

C.I=Confidence Interval

Prevalence of stunting by age groups

Figure 5 shows prevalence of stunting (by age categories) among the study children. The lowest stunting rates were observed in children 6-11 months old (6%) and those who were 36-47 months old (13%). Children aged 12-23 months had the highest level of stunting (31%).

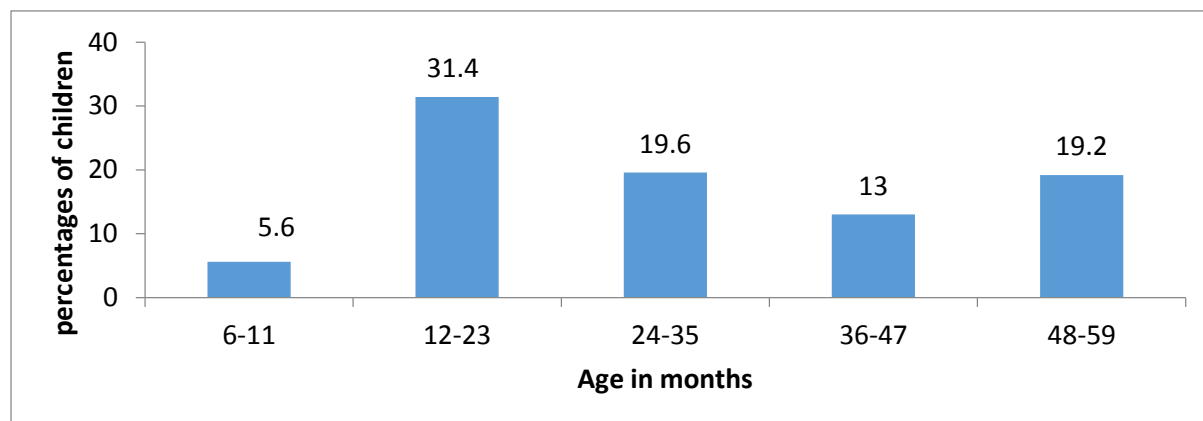


Figure 5: prevalence of stunting by age categories

4.3 Infant and Young Child Feeding Practices

Breastfeeding practices

Table 10 shows breastfeeding practices among the study children. Majority (84.6%) of the mothers began breastfeeding in the first hour of birth. The prevalence of continued breastfeeding up to 1 year was 85.7% while 75% of infants aged 13-24 months were still breastfeeding. Almost all (96.6%) of the mothers who were currently breastfeeding at the time of the study reported that they breastfed their children on demand.

Table 10: Breastfeeding practices for children aged 6-24 months in Maikona ward, Marsabit County

Breastfeeding practice	Frequency	%
Early initiation of breastfeeding (6-24mths) Within 1hour (N=65)	55	84.6
Continued breast feeding at 1 year for children 12-15 months (N=14)	12	85.7
Continued breast feeding at 2 years children 20-23 months (N=8)	6	75

Table 11 shows association between breastfeeding status and underweight. There was a significant ($p=0.023$) association between current breastfeeding status and the nutritional status based on underweight. Children who are not breastfed are twice likely to be underweight compared to those who are breastfed ($OR=2.08$, $CI=1.10-3.95$).

Table 11: Association between breastfeeding status and underweight

Nutritional status	Breastfeeding status n (%)		Test statistics
	Yes	No	
	N=204		
Underweight	38 (66.7)	19 (33.3)	$\chi^2=5.2$, 1df $p=0.023$
Normal	72 (49)	75 (51)	

Complementary feeding practices

Dietary diversity for the children aged 6-59 months

It is recommended that children under five years consume at least 4 out of the 8 food groups per day to achieve diversified diet (FAO, 2011). Figure 6 illustrates the distribution of the study children by the dietary diversity scores. The mean dietary diversity was 3.07 food groups ($SD=1.1$). The minimum number of food groups consumed was 2 while the maximum was 8 food groups. The most frequently consumed foods were cereals (97.1%), legumes and nuts (77.9%) and dairy products (69.6%). A third (33.3%) of the children consumed 3 food groups while only 0.5% consumed foods from 8 food groups. Only a very small proportion (1.5%) of children consumed eggs because of cultural issues. Similarly, fruits and vegetables that have high vitamin A content were also rarely consumed in this area. Only a small proportion (13.2%) reported to have consumed it. Just about a quarter (23.5%) consumed other vegetables and fruits which are not rich in vitamin A. The most consumed vegetables being cabbages.

Dietary diversity was analyzed out of 8 food groups commonly found in the study area. Slightly more than two thirds (67.2%) of the children had low diversity (<4 food groups) while nearly a

third (31.4%) had medium dietary diversity (4-5 food groups). Only a few of the children (1.5%) had a high dietary diversity score (6-7 food groups).

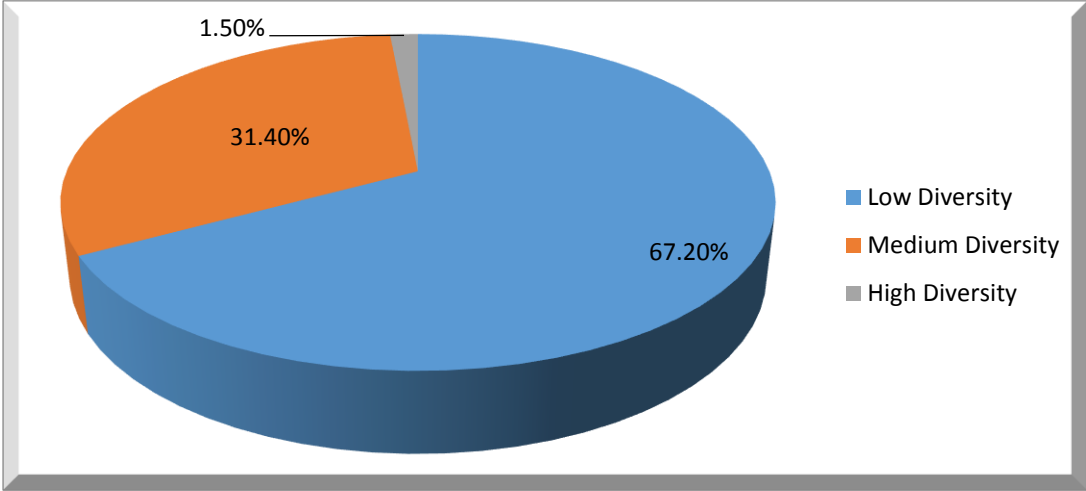


Figure 6: Dietary diversity scores for children aged 6-59 months

Food consumption frequency among children 6-59 months

Table 12 shows 7 day food frequency recall for 6-59 months old children one week preceding the study. Three quarters (76.5%) of the households provided their children with carbohydrates rich foods. Most (78.4% and 70.1%) of the study children had not consumed fruits and vegetables rich in vitamin A content, respectively in the 7 days before the study. Likewise the results further showed that most (87.7%) of the children had not consumed eggs in the 7 days before the study.

Table 12: Frequency of food consumption by children 6-59 months in the past 7 days

Foods	Never Consumed in the past 7 days	Consumed <4 times a week	Consumed >4 times a week
	%	%	%
Cereals	17	6.5	76.5
Legumes and nuts	17.2	23.1	59.7
Roots and tubers	10.3	70.6	19.1
Vitamin A rich fruits	70.1	26.9	53
Vitamin A rich vegetables	78.4	15.7	5.9
Any dark green leafy vegetables.	45.1	52.4	2.5
Any other fruits or vegetable.	64.2	27.8	8
Organ meat	66.7	28.8	4.5
Flesh meats	70.5	18.2	11.3
Eggs	87.7	10.3	2
Milk and milk products	36.3	19.8	43.9
Any sugary foods such as chocolates and candies	33.3	64.2	2.5
Fish and Sea foods	95	4	1
Spices, condiments and beverages	75	16.2	8.8

4.4 Morbidity Patterns and Maternal Health Seeking Behavior among Children 6-59 Months Old

Morbidity prevalence among children 6-59 months old

Table 13 shows morbidity prevalence among the study children. More than a third (38.2%) of study children were reported ill based on a two-week morbidity recall. The most common illness among the children was upper respiratory tract infection (61.3%) followed by diarrhea (24.5%), fever with chills (14.7%), clinical malaria (9.8%) and others. Among those with diarrhea, approximately two thirds (65.8%) did not get zinc supplementation with only 34.2% getting the supplementation. The duration of illness was between one to fourteen days. More

than a half (55.1%) of the mothers stated that the illness lasted for 3 to 4 days while illnesses such as upper respiratory tract infection lasted more than 6 days.

Table 13: Morbidity status and the nature of illnesses among children 6-59 months old in Maikona ward, Marsabit County.

Morbidity prevalence	Frequency (n)	%
Upper Respiratory Tract Infections (Coughing with difficulty, coughs and fever)	125	61.3
Fever with chills	30	14.7
Diarrhoea (watery and bloody diarrhoea)	50	24.6
Clinical Malaria (no laboratory confirmation)	20	9.8
Vomiting	4	2
Skin infection	3	1.5

Maternal health seeking behavior

Majority of the mothers (69.2%) took their sick children to the hospital while 30.8% did not seek medical attention as presented in Table 14. Most (90%) of the respondents said they sought help from a public health facility. Those that did not seek medical help felt that the sickness was mild.

Table 14: Maternal Health seeking behavior in Maikona ward, Marsabit County

Action taken when child was sick (N=78)		
	n	%
Sought medical help for the sick child	54	69.2
Did not seek medical help	24	30.8
Time within which help was sought (N=54)		
Within 24 hours	36	66.7
After 24 hours	18	33.3
Where medical assistance was sought (N=54)		
Government Dispensary	27	50
Government health centre	22	40.7
Private clinic	2	3.7
Marsabit general hospital	2	3.7

4.4.1. Immunization Coverage

Figure 7 show the immunization status of the study children. The current study revealed that 90.1% of the children were fully immunized for age with only 9.9 % not receiving all the recommended vaccines.

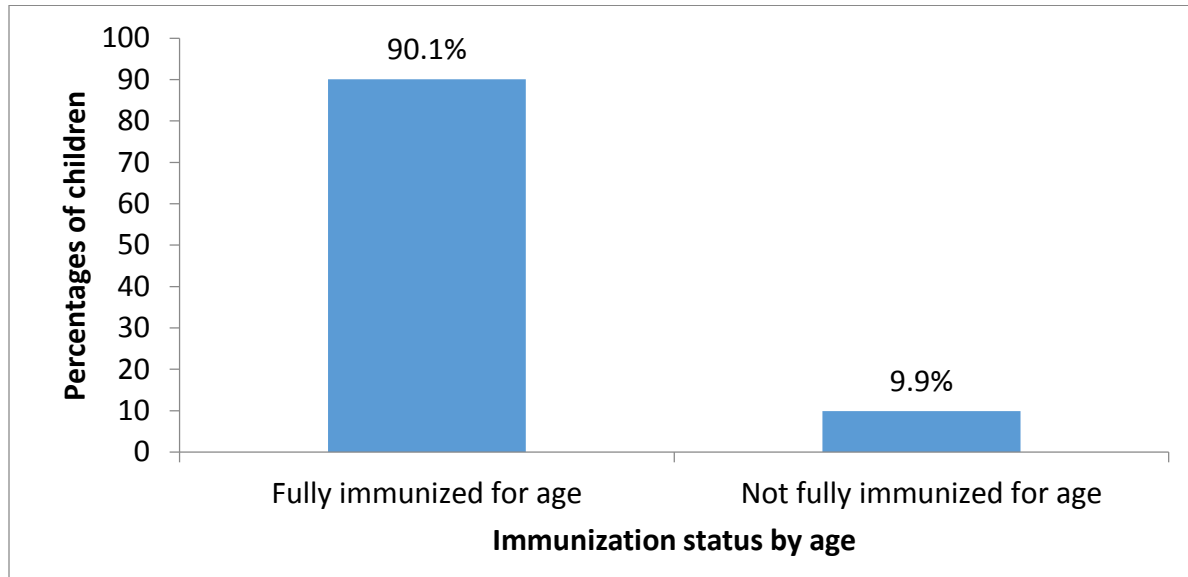


Figure 7: Immunization status for children 6-59 months

Distribution of children by the types of vaccines received

Table 15 shows types of vaccines received by the study children. Nearly all (99%) the children were reported to have received BCG vaccines. Majority of the children had received the recommended three doses of DPT-HepB-Hib, three doses of polio and the three doses of the pneumococcal vaccine. For children aged above 9 months, 93% were reported to have received measles vaccine. Nearly half (48%) of the children had received rotavirus vaccines.

Table 15: Vaccination coverage among children 6-59 months old in Maikona ward, Marsabit County

Types of vaccines	% Coverage (N=204)
BCG	99
OPV0	95
OPV1	94.1
OPV2	98.7
OPV3	95
DPT1-HepB-Hib	94.1
DPT2-HepB-Hib	98.7
DPT3-HepB-Hib	95
Pneumococco1	94.1
Pneumococco2	98.7
Pneumococco3	95
Measles (N=192)	94
Rotavirus (N=98)	48

Vitamin A supplementation for children 6-59 months old

The coverage of vitamin A supplementation for children aged 6-11 months was 100% (n=18) while those aged 12-59 months was 97% (n=186) in the study area as shown in figure 8.

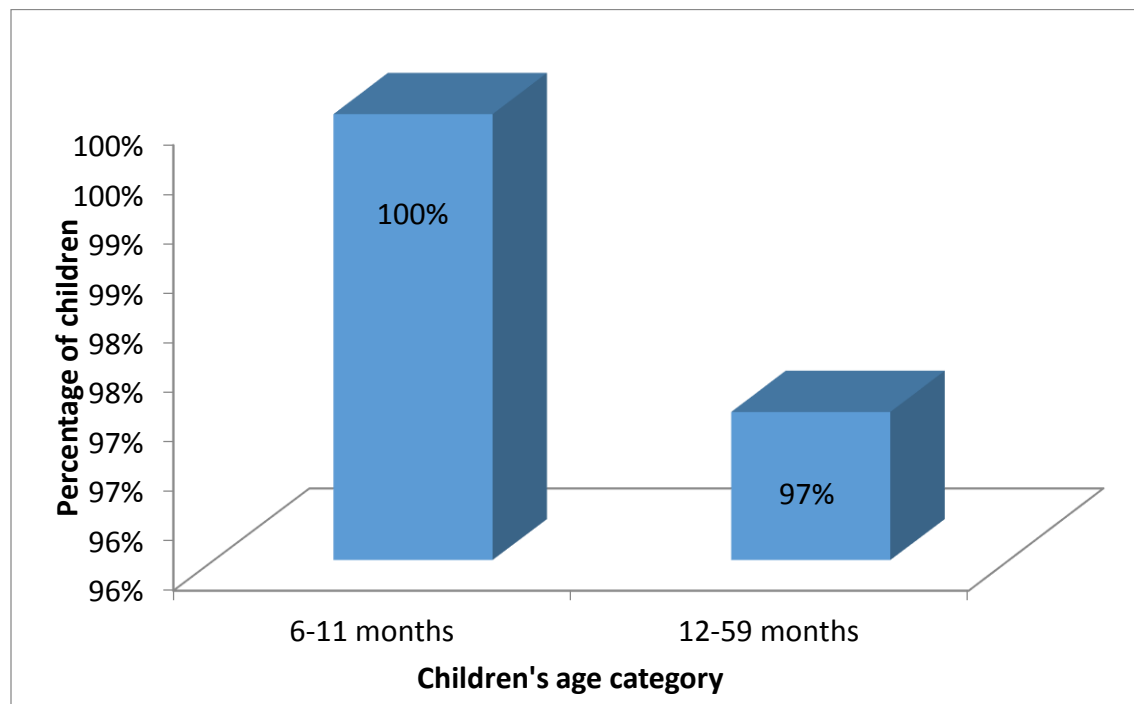


Figure 8: Vitamin A supplementation coverage among 6-59 months old children.

Frequency of vitamin A supplementation for children aged 12-59 months was assessed. One quarter (25.8%) of the children got the supplementation only once while 68.8% got it twice in the past one year (Figure 9).

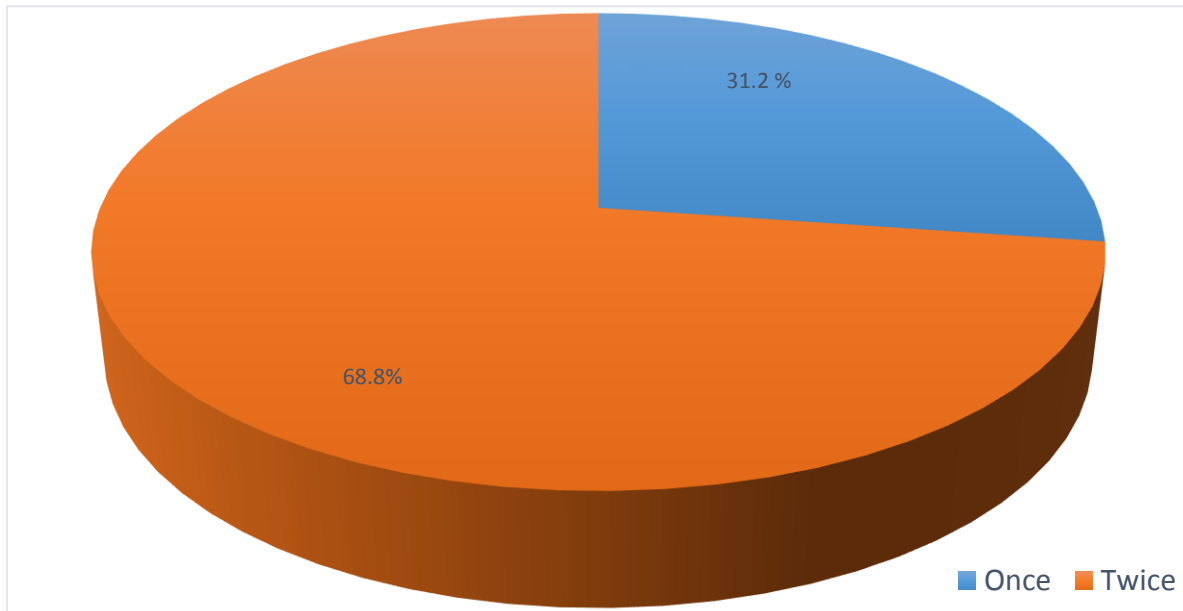


Figure 9: Frequency of vitamin A supplementation in the last one year for children 12-59 months old.

4.5 Caregivers Knowledge and Attitude

The mean percentage score of nutritional knowledge was 54.8 (*SD* 12.57), the minimum score was 23.8% and the maximum score was 81%. Generally, 16% of the respondents had a high knowledge level (70-100%), forty six percent had an average (50-69%) and 38% had low knowledge level (0-49%). This finding shows that only a few (16%) of the respondents had sufficient knowledge on the nutrition topics assessed. The aspects on which the caregivers demonstrated adequate know

-ledge included: age of introduction to complementary foods, duration of exclusive breastfeeding and time within which a child should be initiated to breast milk after birth. On the other hand they demonstrated poor knowledge on importance of animal source foods and some of the foods commonly used for enrichment of complementary foods.

Significant but weak positive correlations were established between Caregivers nutritional knowledge and weight for height z-scores ($r=0.139$, $p=0.045$) and weight for age z-scores ($r=0.141$ $p=0.047$). Focus group discussions and Key informant interviews indicated that the low levels of nutritional knowledge were due to lack of nutritional awareness.

The average attitude score was 73.3% (SD 9.72) while the median was 77.8%. The highest score was 100% and the lowest was 44.4%. Attitude was significantly related with the caregivers Knowledge ($r=0.22$, $p=0.01$) however no association was observed between the caregivers attitude and the nutritional status ($p=0.498$)

4.6 Constraints to Obtaining appropriate Childcare and Feeding Practices

From the focus group discussions limited household resources like income and lack of food were identified as major constraints to availability of appropriate complementary foods for children. Most of the caregivers indicated that they lacked soft foods like potatoes, rice and spaghetti commonly given to children. One of the caregivers stated that “even if they are available the prices are very high and we cannot afford them”.

Livestock migration was another major constraint on the pastoralist’s caregivers. Their livestock migrated in search of water and pasture during the dry season to distant places further depriving households the needed foods of animal origin such as milk and meat. Camel milk was the core component of complementary feeding diets for infants and young children in the study area hence infants were fed almost exclusively on this milk. The caregivers stated that When the camels migrated the little milk that was available was used by the family to cook tea hence the children drunk the tea instead of the milk.

Poor infrastructure such as roads was reported to hamper access to markets. A key informant interview with the Nutrition officer Kalacha location revealed that lack of awareness on the most basic nutrition information for instance, a well-balanced diet was another key constraint faced by the caregivers in Maikona ward. This is what he commented on the issue “most

mothers lack knowledge on basic nutritional information because majority of them are illiterate”. He further added that “There is a need to include components of community capacity building (nutrition education) in all interventions carried out by Ministry of Health or Non-governmental organizations”. The other challenge as cited by the caregivers in Maikona ward was traditional beliefs about food restrictions, reducing types of food available to children. Most caregivers indicated that they were uneasy about giving eggs to children due to cultural reasons.

4.7 Factors Associated with Nutritional Status of Children

Table 16 shows a summary of the relationship between selected variables and nutritional status of children aged 6-59 months. No association was found between the child’s age and the nutritional indicators based on WAZ, HAZ and WHZ ($r = -0.083$, $r = -0.136$ and $r = -0.010$ respectively). Caregivers nutritional knowledge was positively and significantly correlated to weight for height z-scores ($r=0.141$, $p=0.045$) and weight for age z-scores ($r=0.139$, $p=0.047$). There was also positive and significant correlation between the number of food groups consumed by the child and nutritional status based on weight for height z-scores ($r=0.129$, $p=0.046$).

Table 16: Pearson correlation coefficients of some selected variables and nutritional status

Variables	WAZ		HAZ		WHZ	
	R	P	R	p	R	P
Age of the child	-0.083	0.239	-0.136	0.053	-0.010	0.995
Age introduced to complementary feeding	-0.060	0.392	0.019	0.789	-0.100	0.154
Number of food groups consumed	0.129	0.046	0.094	0.634	0.129	0.046
Caregivers nutritional knowledge	0.139*	0.047	0.035	0.615	0.141*	0.045
Caregivers attitude percentage	-0.004	0.952	-0.023	0.746	0.000	0.995

On the other hand there was no significant association between maternal level of education and the nutritional status of children (Table 17). Almost all (85.5%) of the mothers were illiterate while only 14.5% have some form of formal education.

Table 17: Cross tabulation of maternal education level and nutritional status

Nutritional Status	Never been to formal school (n=175)	Formal school (n =29)	Total (N=204)	Chi-square test P-Value
	%	%	%	
Wasted	91.8	8.2	29.9	P=0.108
Normal	83.2	16.8	70.1	
Underweight	89.5	10.5	27.9	P=0.347
Normal	84.4	15.6	72.1	
Stunted	89.2	10.8	18.1	P=0.512
Normal	85	15	81.9	

Pearson chi-square tests were performed to determine whether there was a statistically significant association between dietary diversity scores and the nutritional status of the children. Majority of children (80.7%) who were underweight did not consume the recommended four or more food groups (Table 18). Likewise 75.4% of the wasted children were not also consuming the recommended four food groups. There was a significant relationship between the dietary diversity scores and nutritional status based on underweight (P=0.030). However, wasting and stunting did not show any significance. Children who consumed less than four food groups are more likely to be underweight compared to those consuming higher number of food groups (OR=1.75) [C.I: 0.89-3.44]).

Table 18: Dietary diversity scores and nutritional status

Nutritional Status	DDS not met(<4 food groups) n=137 %	DDS met(>=4 food groups) n=67 %	Total N=204 %	Chi-square test P-Value
Wasted	75.4	24.6	29.9	0.239
Normal	63.6	36.4	70.1	
Underweight	80.7	19.3	27.9	0.030*
Normal	61.9	38.1	72.1	
Stunted	75.7	24.	18.1	0.393
Normal	65.3	34.7	81.9	

DDS=Dietary diversity score

Table 19 shows the association between the frequency of food consumption and the nutritional status of children aged 6-59 months. There was a positive and significant relationship between frequency of consumption of vitamin A rich fruits, other fruits and vegetables with nutritional status based on underweight ($p<0.001$ and $p=0.031$ respectively). Similarly, a significant relationship was observed between consumption of other fruits and vegetables and stunting ($p=0.003$).

Table 19: Frequency of food consumption and nutritional status

Types of foods	Frequency of consumption (7 days)	Nutritional Status		Test Statistics
		Underweight N (%)	Normal N (%)	
Vitamin A rich foods	Never	53 (33.1)	107 (66.9)	Fishers Exact=15.0 P=0.001
	<4 times	2 (5.1)	37 (94.9)	
	>4 times	2(40)	3(60)	
Other fruits and vegetables	Never	33(36.3)	58(63.7)	Fishers Exact=6.76 P=0.031
	<4 times	20(19.8)	81(80.2)	
	>4 times	4(33.3)	8(66.7)	
Vitamin A rich foods	Never	32(20)	128(80)	Fishers Exact=5.14 P=0.061
	<4 times	3(7.7)	26(92.3)	
	>4 times	2(40)	3(60)	
Other fruits and vegetables	Never	20(22)	71(78)	Fishers Exact=11.46 P=0.003
	<4 times	11(10.9)	90(89.1)	
	>4 times	6(50)	6(50)	

Table 20 shows the relationship between morbidity and nutritional status. Almost two thirds (60.7%) of the children reported not to be sick were wasted, likewise 61.4% of children who were not sick were also underweight and 56.8% were stunted. There was no association between the morbidity patterns and the nutritional status of the children.

Table 20: Morbidity patterns and nutritional status cross tabulation-

Nutritional Status	Children Sick n=78 %	Children Not sick n=126 %	Total N=204 %	Chi-square test P-Value
Wasted	39.3	60.7	29.9	P=0.831
Normal	37.8	62.2	70.1	
Underweight	38.6	61.4	27.9	P=0.947
Normal	38.1	61.9	72.1	
Stunted	43.2	56.8	18.1	P=0.488
Normal	37.1	62.9	81.9	

CHAPTER FIVE: DISCUSSION

5.1 Demographic and Socio-economic Characteristics of the Study Households

The composition of the study population (male versus female) is consistent with that found in Kenya interagency rapid assessment conducted in Marsabit County (NDMA, 2014). The mean household size of 5.0 is higher than the national mean household size of 3.9 reported by KDHS (2015). The 24.7% population proportion of children below five years is above the expected 20.0% in developing countries and also higher than the national level of 14.4% (KNBS, 2015). There is a high dependent population of children below 18 years and adults above 65 years (61.9%) which is consistent with Kuria (2010) who reported that 63% of the population in Marsabit County was dependent. This implies that there is a small percentage of population that is engaged in income generating activity.

Maternal literacy level in the study area is low with only 14.5% attending formal schools. This finding is consistent with KDHS (2015) which reported Marsabit County as one of the Counties that had lowest proportion of literate women (36%). According to KDHS (2015) Children whose mothers did not complete primary school or those who had no education were more likely to be stunted than children of mothers with a secondary or higher education. Males headed most of the households (91.7%) while female headed only 8.3% compared to national level where a third of the households (KNBS, 2015) were headed by female. This discrepancy could be attributed to sample size differences where the study only focused on households with children 6-59 months old as opposed to the entire population. It could also be as a result of cultural issues where men are naturally considered to be household heads in this community.

5.1.1. Water Availability Hygiene and Sanitation Status.

Sufficient amount of water, sanitation and hygiene are very important components in provision of essential health services. Adequate Water, proper sanitation and hygiene mediates the nutritional status in two main ways the first one being reduction in the incidence of diarrheal diseases and also water, sanitation and hygiene interventions are able to reduce the pathogen load found in environments with poor water sanitation and hygiene status (USAID, 2015).

Adequate Water, proper sanitation and hygiene has the ability to prevent at least 9.1% of the global disease burden and 6.3% of all deaths (CDC, 2015).

The findings of the current study illustrate that most households obtained water from protected sources with only a few treating it prior to consumption which predisposes them to a myriad of water borne diseases including diarrhoea. In addition, this water is too salty and unsafe for human consumption.

The proportion of households (57.4%) with access to improved sanitation (Some form of a toilet/pit latrine) was lower compared to a national average of 66% in rural areas (KNBS, 2015). This could be due to the fact that this is a pastoralist community which is always moving from one place to another in search of water and pasture for their livestock's, hence they see no need of a permanent structure for a toilet. Instead, they mostly use the bush. This poses a health risk due to contamination of drinking water sources especially during heavy down pour that causes flooding. The low prevalence of diarrhoea in this study could be as a result of the positive impact of health interventions targeted to reduce diarrhoea which include; zinc supplementation, home-made and hospital based oral rehydration salts (ORS). Poor sanitation and improper hygiene practices in Marsabit County has also been reported by Concern Worldwide (2013).

The lower proportions (34.3% and 36.8%) of the caregivers who reported to practice hand washing with soap before feeding the child and after cleaning the baby's bottom could be attributed to poor or lack of information on the five critical hand-washing moments as recommended by World Health Organization. Proper hand washing practices before meals and after visiting the toilet can lower exposure to germs which further reduces chances of getting ill hence leading to a better nutrition intake (CDC, 2009).

5.2. Nutritional Status of Children under-five Years in Marsabit County: Recent trends

High levels of acute and chronic malnutrition have previously provoked a discussion regarding what should be considered normal and what is abnormal among pastoralist communities in Kenya (FEWSNET, 2006). Various nutrition surveys conducted in the larger Marsabit County have shown high malnutrition rate. For instance, data from Multiple Indicator Cluster Survey

(KNBS, 2009) for Marsabit County indicate that 29% of children aged 6-59 months are severely or moderately underweight, 20% are stunted and 14% are wasted. Similarly, a study that was carried out in May 2011 revealed an extremely critical GAM rate of 27.4%. Nevertheless, another study by Concern Worldwide and MOH revealed critical GAM rate of 15.9% (Kirichu, 2013). The Latest Kenya Demographic and Health survey findings (KNBS, 2015) state that 26.5% of children under-five years in Marsabit County are stunted, 16.3% are wasted and 30.1 are underweight. Hence based on WHO cut off, the nutrition situation in the Marsabit County has always remained critical with GAM rates of over 15%.

5.2.1 Nutritional status of children (6-59 months old) in Marsabit County

Nutritional status of children below five is frequently used as a proxy indicator of the nutritional status of an entire population. The main findings of the study indicate a serious situation with a high prevalence of both global (29.9%) and severe (7.4%) malnutrition in Maikona ward. This indicates a critical emergency nutrition situation in the region.

Wasting is a form of acute malnutrition that is represented by lack of adequate nutrition in the period immediately before the survey as well as the result of recent illness like diarrhea. The high rate of wasting (30%) observed in the present study is twice as high as the figure reported by KDHS 2015 (16%) which could be as a result of the smaller sample size used in the study. An additional reason could be that the data for this study were collected during dry season, when milk production, the most regarded complementary food, was scarce. Children below two years had the highest GAM rates which could be as a result of poor complementary feeding practices common in East African children including Kenya (Gewa & Leslie, 2015). This finding is consistent with Hunger safety net programme report (Carrie, 2012) which showed that GAM rates of Marsabit, Turkana, Wajir and Mandera are above 20%. The high prevalence of wasting among boys (34.7%) as compared to girls (25.5%) is similar to that from the finding of a study conducted in Isiolo (Muluki, 2012) and Mandera Counties (Save the Children, 2012). It could also be probably due to the fact that the girl child has received much attention in terms of feeding and care compared to a boy child. The low prevalence of wasting among children above 4 years could probably be due to the fact that these children are already old enough to consume a variety of family foods and also require less care.

The significant relationship observed between the caregiver's nutritional knowledge and weight for height z-scores could be probably due to the fact that caregivers in Maikona ward having adequate nutritional knowledge but with limited access to food since the study area falls in a desert with chronic food shortages. Other studies also established that factors such as sanitation, hygiene and diseases have a stronger influence on nutritional status than mothers' nutritional knowledge (Parul et al., 2016). The positive relationship observed between the number of food groups consumed by the children and weight for height z-scores was expected and is consistent with that of a study conducted in Ethiopia and Ghana that established Children who had low dietary diversity exhibited low scores in terms of weight for height z-scores (Achenef et al., 2015; Antwiwa, 2011).

Stunting is a form of chronic malnutrition that results due to the failure to receive adequate nutrition over a long period of time and can also be affected by chronic or persistent illness. The prevalence of stunting (18%) was lower than both the County and the national figures of 26.5% and 26% respectively (KNBS, 2015). The discrepancy might be due to small sample size compared to that of national data. More so, KDHS sample was also inclusive of children less than six months. This finding agrees with that of a study conducted in western Kenya which revealed high level of stunting among children below five years (Kwena & Baliddawa, 2012). On the other hand the stunting rate was similar with other neighboring counties such as Isiolo (KNBS, 2015).

The highest prevalence of stunting observed in children aged 12-23 months as compared to other age categories could be associated with late introduction to complementary feeding as well as poor complementary diet which are mostly cereal based and lack in diversity (Gewa & Leslie, 2015). Similarly to a study conducted in Vietnam infants aged 6-11 months had a significantly lower risk of being stunted than children in older age-groups (Mostafa, 2011). Boys and girls in this area are exposed to similar conditions including chronic food insecurity given that Marsabit County is part of the arid and semi-arid areas faced with perennial food shortages. In addition, the declining contribution of livestock to food and income sources because of the drought has left many households food insecure as revealed in the focus group

discussions and children are among the most affected. This could partly explain the reason for the similar stunting rates observed among them.

The proportion (28%) of underweight children closely compares with that of the whole Marsabit County (30%) although significantly higher than the national figure (11%) (KNBS, 2015). This might be due to differences in methods used and sample size variation. The high prevalence of underweight among the study children was similar with that of a study conducted in Northern Ethiopia (Yalew, 2014). Other parts of Kenya (Western) have shown lower rates (6.6%) of underweight among children of similar age group (Kisiangani et al., 2014). This might be due to differences in food security situation between the two study areas. The younger age group (6-11 months old) had the lowest prevalence of underweight which could be as a result of the positive impact of continued breastfeeding as well as complementary feeding among this age group. The older age categories (36-47 and 48-59 months old children) showed the highest percentage of underweight. This might be as a result of reduced attention by the caregivers as the child grows up or may be due to the arrival of a new infant.

The proportion of underweight among males and females was similar but differs with findings from other studies conducted in Ethiopia and Vietnam which observed more boys who were under-weight as compared to their female counterparts (Hien et al., 2009; Medhin, et al., 2010). On the other hand, other studies revealed underweight was more common in female than male children (Tadiwos et al., 2013; Anderson et al., 2001). The cause of this discrepancy in sex is not well established in the literature, but it is believed that boys are more influenced by environmental stress than girls (Hien & Kam, 2008).

5.3 Infant and Young Child Feeding Practices

5.3.1 Breastfeeding practices

Appropriate breastfeeding practices are the most successful ways to reducing childhood morbidity and mortality. Early initiation to breast milk ensures that the infant receive colostrum which is rich in protective factors (WHO, 2016). The proportion of children aged 6-24 months (84.6%) who were initiated to breastmilk within the first one hour of birth is similar (82.2%) to that of a previous study in the same County (Kuria 2010). On the other hand, the most common

pre-lactaeal feed given to the infants immediately after birth was camel milk which is considered a cultural practice. *“The first thing I gave my baby after birth is camel milk and I did not breastfed the baby until the following day”*, stated one of the participants during the focus group discussion. Camels being a key element in the economy and the tradition of the study population, the caregivers believe that camel milk is as important as breastmilk to a new born child. According to them, breast milk alone is not sufficient for the baby. This was clear in their discussions along this issue; *“The place (Maikona ward) is very hot and children cry excessively due to thirst and once they are given cold camel milk, they stop crying”* (FGD Participant).

Continued breastfeeding at one year was (86%) which agrees with the figure (85%) reported by Murage et al. (2011) among children under-fives in Nairobi urban slums. This finding is typical to that of developing countries (Patel, et al., 2010). From the FGDs the continued breastfeeding among older children (over two years) was attributed to perennial food shortages in the area. Therefore, the caregivers considered breast milk as an important enhancement to the diet to ensure the children meet their dietary requirements. Despite the extended duration of breastfeeding (beyond two years) in this area, the level of malnutrition seemed quite high which underscores the importance of additional foods during this important period in regard to child growth and development. Those breastfeeding at the time of the study were less likely to be underweight as compared to the children who were not due to the benefits/nutrients of breast milk in addition to dietary intake.

5.3.2 Complementary feeding practices

Complementary feeding refers to feeding solid or semisolid foods in addition to and not in replacement of breast milk to meet child’s increased nutritional requirements (WHO, 2010). Inappropriate feeding practices are the major causes of malnutrition in young children. Breastfed children who are 6-23 months old should receive animal-source foods and vitamin A-rich fruits and vegetables on daily basis (PAHO/WHO, 2001).

Nearly two thirds (65.7%) of the study children were introduced to semi-solid and solid foods at the recommended time of six months according to Global recommendations (WHO, 2003). The delay in introduction to complementary foods as confirmed from the FGDs was as a result of lack of soft foods as the caregivers waited for children to develop teeth so that they can eat family foods. The lower dietary diversity among the study children could be due to the limited variety of foods in the study area as revealed during the focus group discussions. This finding is similar to what has been observed in other ASAL Counties (Makueni and Machakos) in Kenya (Bukania, et al., 2014). Fruits and vegetables high in vitamin A were among the least consumed foods because they are not available as alluded to by one of the FGD participants *“it is hard to get these food groups (Fruits and vegetables) because we live in a desert area which is approximately 150km away from Marsabit town where they are available”*. This finding also agrees with that of Olumakaiye (2013) and Atuobi-Yeboah (2010) who found vitamin A rich fruits and vegetables as the least consumed food groups among children below five years. Contrary to that, a study conducted in Ghana reported a higher proportion (84%) of the study children consuming vitamin A rich fruits and vegetables among children of similar age (Tandoh, 2015).

The low frequency of consumption of eggs over one week reference period among the study children is probably due to cultural practices and taboos that forbid consumption of chicken including its products. From the focus group discussion most mothers do not feed their children eggs for fear that they will lose some ‘powers’ they were born with, a practice common among the Gabra community predominant in the study area. This observation was made in another study conducted in Nandi County, Kenya where consumption of eggs among children was rare (Mutua et al., 2015) although no explanation was given.

The lower consumption of animal organs (liver, kidney, and heart) which are rich in vitamin A and iron is due to the misconception that these food group causes a delay in the development of verbal or speech skills in children. A finding that is in complete agreement with the results of a study by Food Security Analysis Unit in Somalia (FSAU, 2007).

As much as the area faces chronic food shortages, the self-reporting of the dietary diversity and frequency of food consumption by the caregivers could potentially introduce bias in reporting where the respondents would want to portray a severe situation expecting to benefit from food support. The survey was also conducted during a dry season, if more dietary diversity assessments are done in different seasons better explanations of the true dietary diversity of the study population can be achieved.

5.4 Child Health

5.4.1 Morbidity experience for children 6-59 months old

Preventable diseases remain the main contributors to childhood morbidity and mortality in the world (WHO, 2016). Upper respiratory tract infections, diarrheal diseases and malaria are the major causes of morbidity among children less than 5 years in Maikona ward. These diseases are the most common diseases in children in the developing countries and thus they are not unexpected to coexist with other diseases (Ezeonwu et al., 2014). The high prevalence of morbidity (38.2%) observed in the present study was mostly due to illnesses such as upper respiratory tract infections, followed by fever, diarrhea and malaria. This finding was higher than that of a previous study (27%) conducted by Kuria (2010) in Marsabit County. This may be partly due to sample size differences as well as seasonality. Other studies in Marsabit County also noted that the most common diseases among under-fives and the general populations are diarrhea, malaria, and pneumonia (KFSSG, 2015). The high prevalence of diarrhea may be due to very higher proportion (92%) of the households consuming unsafe water which exposes them to a myriad of waterborne diseases.

5.4.2 Immunization coverage for children 12-24 months old

Immunization is one of the most cost effective public health interventions which directly or indirectly prevent the burden of mortality and morbidity in under-fives (Chaudhary et al., 2015). The high proportion of immunized children for age could be due to the targeted door to door immunization campaigns by the health workers in the study area as revealed from the key informant interviews.

5.5 Caregivers Nutritional Knowledge and Attitude

Caregiver's nutrition knowledge is one key factor that determines the health and wellbeing of infants. Good nutritional knowledge among caregivers improves their understanding of different types of foods, preparation methods and how they nourish the body and influence health (Temesgen et al., 2015). Nutritional knowledge among caregivers was generally poor in the current study and this corresponds to the low literacy levels among women in Marsabit County (KNBS, 2015). However, this finding strongly differs with that of Mundia (2012), Siaya County which revealed a higher nutritional knowledge among caregivers.

The observed poor knowledge on complementary feeding among the caregivers could be associated with low literacy levels in this community. The same results were reflected in a similar study conducted in Burkina Faso (Sawadogo, et al., 2010). The lack of knowledge on importance of animal source foods and enrichment of complementary foods requires special attention since these foods are crucial towards optimal child growth and development. The high Knowledge on appropriate age to initiate complementary feeding is consistent with the findings of a study conducted in Nairobi urban settlements (Kimani-Murage *et al.*, 2011). As much as the caregivers knew the appropriate time to introduce complementary foods most of them initiated at one year citing limited access to appropriate foods with only camel milk being easily available. In addition, the higher knowledge (67%) levels on appropriate breastfeeding practice (timing of introduction of breast milk as well as exclusive breastfeeding) reflects that of a similar study conducted in Nigeria that showed a good number of the mothers were adequately knowledgeable on appropriate breastfeeding practices (Sanusi et al., 2016). This reflects a positive effect of the health seeking behavior where breastfeeding messages are regularly conveyed to the caregivers in Maikona ward. Contrary to this finding, a study conducted in Erbil City (Sawsan et al., 2010) showed mothers had deficient knowledge concerning initiation of breast milk to new born babies (17.5%).

In this study generally majority of the mothers interviewed had positive attitude towards appropriate nutritional practices although when assessing attitude on egg consumption Almost all (97%) of them had a negative attitude towards giving their children eggs. This was probably

due to common traditional beliefs that children lose the 'powers' they were born with once they consume chicken and its products. Similarly to a study that was conducted in Ghana, majority (82%) of the caregivers in Maikona ward stated that they felt good to exclusively breastfeed their children for the first six months of life as well as breastfeeding them on demand (Mogre et al., 2016). Although the caregiver's attitude towards EBF was generally positive, only a few (18%) of them stated that they feel confident expressing and storing breast milk so that someone else can feed the child in their absence.

5.6 Factors Associated with Nutritional Status

The lack of association between gender of the child and the nutritional status of children is similar to that of a study conducted in urban slums of Mumbai (Bhavsar et al., 2012). This is an indication that malnutrition equally affects both male and female in the study area. This also highlights the need to focus on other underlying causes of malnutrition like food insecurity, care practices and hygiene as opposed to gender.

Lack of relationships between the child's nutritional status and the caregiver's educational level could mean that higher educational levels do not necessarily positively influence nutritional status of children and nutritional knowledge could have a more direct relationship. On the other hand, a study that was conducted in Nigeria showed that there was a positive association between maternal levels of education and nutritional indices (Lawal & Samuel, 2010). However, the Nigerian study had more literate mothers (70%) than the current one (15%). The observed positive relationships between weight-for-age z-scores, weight-for-height z-scores and caregiver's nutritional knowledge could be an indirect one; nutritional knowledge potentially influences aspects of appropriate feeding and care practices among young children which is expected to result in improved child growth and development.

The significant relationship observed between the current breastfeeding status and nutritional status based on underweight was similar to the findings of Muchina & Waithaka, (2010). Further, the authors of the said study observed that discontinuation of breastfeeding before two years of age is a significant risk factor for underweight. Other studies revealed that

breastfeeding was associated with weight gain (Saha et al., 2008). This highlights the beneficial effects of breastfeeding in regard to growth and development in young children.

The observed significant association between dietary diversity and caregiver's nutritional knowledge agrees with that of a study conducted by Al-Shookri et al. (2011) in Oman, Middle East. This underscores the importance of nutrition education among caregivers in improving dietary diversity of their children. Consuming a diet that comprises of variety of food items has been shown to increase intake of energy and micronutrients in developing countries (FANTA, 2004). The high frequency of consumption of cereals and low intake of fruits, and vegetable was expected in this study. This area is arid and hardly supports production of crops including fruits and vegetables. The positive and significant relationship observed between the consumption of vitamin A rich fruits, other fruits and vegetables and nutritional status was expected. This highlights the importance of these food groups in improving nutritional outcomes in young children.

Contrary to a study conducted in Mbeere South Sub-County, Kenya (Badake et al., 2014), this study found that children who consumed less than four food groups were twice likely to be underweight compared to those who consumed more than four food groups. This results are in complete agreement with the findings of Makau (2013). Consumption of at least four food groups in a day has been shown to be a proxy indicator for higher micronutrients adequacy, and an important dimension of diet quality (FAO/FHI 360, 2016).

The observed significant relationship between the caregiver's nutritional knowledge and underweight disagrees from the findings of other studies (Lakshmi et al., 2003; Tando, 2015). The discrepancy could be the fact that this studies used stunting as a measure of nutritional status which reflects a prolonged period of food stress as opposed to the measurements used in the current study (Weight-for-age) which results from a recent food shortage.

Despite the fact that diseases are among the important causes of malnutrition, the lack of relationship between morbidity and nutritional status of the study children could imply that inadequate food intake could be a more contributing factor to malnutrition as opposed to diseases in this area. This finding is similar to a study that was conducted in urban Dar-es-salaam, Tanzania (Kulwa et al., 2006).

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Based on the findings of this study, it can be concluded that; socio-demographic factors, water sanitation and hygiene and caregivers attitude have no influence on the nutritional status of the children. Generally the nutritional status of children in Maikona ward is critical based on sphere standards (GAM rate >15%) and warrants immediate attention. Wasting is more common among children below four years. Some of the factors contributing to this nutritional situation include; poor caregiver's nutritional knowledge, low dietary diversity and lack of continued breastfeeding up to two years. Complementary feeding is poor; mainly cereal based which further impacts negatively on the child's nutritional status. In addition, there is limited consumption of fruits and vegetables which means that the children in this area are lacking adequate supply of micronutrients.

Morbidity burden does not have any influence on the nutritional status of the study children which implies that inadequate food intake could be a more direct factor contributing to malnutrition as opposed to diseases in this area. The caregiver's nutritional knowledge is inadequate and affects feeding and care practices consequently resulting to poor nutritional status among the study children. Other factors such as unsuitable beliefs (i.e., consumption of eggs) and food insecurity are obstacles to successful childcare practices.

6.2 Recommendations

The following recommendations are made based on the conclusions.

1. Therapeutic and supplementary feeding programme should be stepped up in Maikona ward to address the high GAM rates observed in this study.
2. Capacity building for the caregivers focusing on complementary feeding, hygiene and sanitation, treatment and boiling of drinking water.
3. Hand washing facilities and toilets to be established/stepped up to improve on hygiene and sanitation of households including that of children under five years. In addition, projects to improve access to safe water for drinking and household use should be established
4. Households need to be supported to establish home gardens as a way of achieving dietary diversification which is likely to improve the micronutrient intakes of households including that of children under five. Furthermore, the care-givers should be advised to leave a few animals (goats and camels) to supply them with milk in times of migration in search for water and pasture.
5. Nutritional/health education and/or seminars should be conducted for community members in Maikona ward, Marsabit County. In particular, women who are the primary caregivers should be encouraged to regularly check on the nutrition status of their children by visiting a health facility for routine growth monitoring. In addition, interventions like nutrition education should also be integrated with other existing programmes and targeted to the caregivers in Maikona ward to improve on their nutritional knowledge.
6. Nutrition information and awareness should be provided to discourage misconceptions and cultural belief about consumption of certain foods (eggs) beneficial to the nutritional status and/or health of young children.

REFERENCES

- Antwiwaa , N. C. (2011). Dietary Diversity is Associated with Nutrient Intakes and Nutritional Status of Children in Ghana. *Asian Journal of Medical Sciences* , 105-109.
- AAP. (2012, March). Breastfeeding and the use of human milk. *American Academy of Pediatrics, Section on Breastfeeding.*, 129(3), e827–e841.
- Abubakar, A., Van, B. A., Fischer, R., Bomu, G., Gona, J., & Newton, C. (2013). Socio-Cultural Determinants of Health-Seeking Behaviour on the Kenyan Coast: A Qualitative Study. *PLoS ONE* 8(11), e71998.
- Achenef , M., Alemayuhu, W., & Abera, K. (2015). Stunting Is Associated with Food Diversity while Wasting with Food Insecurity among Underfive Children in East and West Gojjam Zones of Amhara Region, Ethiopia. *PLOS*, 133-542.
- Adesuwa, Q. A., Essy, C. I., & Alphonsus, R. I. (2015). Health seeking behaviour among caregivers of under-five children in Edo state, Nigeria. *South Eastern European Journal of Public Health*, 2014-41.
- Al-Shookri , A., Al-Shukaily , L., & Al-Tobi , L. (2011). Effect of mothers nutritional knowledge and attitudes on Omani children's dietary intake. *Oman Med Journal*(26), 253-257.
- Anderson , A. K., Sophie , W. W., & Soyiril, A. M. (2001). Malnutrition among pre-school children in Alexandria, Egypt. *Journal of Health, Population and Nutrition (JHPN)*, 275-280.
- Anuradha, R., Ranjit, S., Dashni, S. S., Roniya, F., Roopa, D., Sakdhi, S., . . . Ranjit, P. (2014). Nutritional Status of Children Aged 3-6 Years in a Rural Area of Tamilnadu. *Journal of Clinical and Diagnostic Research*, Jc01-Jc02.
- Ardythe, M. L., & Ballard, O. (2013). Human Milk Composition: Nutrients and Bioactive Factors. *Pediatric Clinics of North America*, 60(1), 49-74.
- Atuobi-Yeboah , A. (2010). *Determinants of nutritional status among children 6-24 months in communities in the Upper Manya Krobo district of Ghana*. Legon, University of Ghana, Legon. MPhil Thesis.
- Ayieko, W. (2014). *Childcare Practices and Nutritional Status of Children Under Five Years Old in Southland Informal Settlement Nairobi County*. Nairobi: University of Nairobi Repository.
- Badake, Q. D., Mwangi, M. A., Maina, I., M. G., Kihoro, E. M., Kihoro, E., . . . Mutea, K. (2014). Nutritional Status of Children Under Five Years and Associated Factors in Mbeere South District, Kenya. *African Crop Science Journal*, 22(4), 799-806.
- Bhan, R. (2010). Complementary Feeding. *Indian Journal for the Practicing Doctor*, 2004-2009.

- Black, R. E., Lindsay, A. H., Zulfiqar, B. A., Laura, C. E., Mercedes, d. O., Ezzati, m., . . . Juan, R. (2008, January 17). Maternal and child undernutrition: global and regional exposures and health consequences. *THE LANCET*, 371(9608), 243-260.
- Bukania, Z., Mwangi, M., Robert, K. M., Richard, M., Yeri, K., Lydia, K. U., & Timothy, J. (2014). Food Insecurity and Not Dietary Diversity Is a Predictor of Nutrition Status in Children within Semiarid Agro-Ecological Zones in Eastern Kenya. *Journal of Nutrition and Metabolism*, 9.
- Carrie, N. (2012). *How effective are the HSNP cash transfers in the current prolonged drought?* Nairobi: Hunger Safety Net Programme, Kenya.1-21.
- CDC. (2009). *Water, Sanitation and Environmentally Related Hygiene*. Retrieved April 7/04/2016, 2016, from Improving Child Development: A New CDC Handwashing Study Shows Promising Results: <http://www.cdc.gov/healthywater/hygiene/programs/child-development.html>
- CDC. (2015, December 17). *Global Water, Sanitation & Hygiene (WASH)*. Retrieved April 7/04/2016, 2016, from Center for Disease Control and Prevention: http://www.cdc.gov/healthywater/global/wash_statistics.html
- Cesar, G. V., Linda, A., Fall, C., Pedro, H. C., Reynaldo, M., Richter, L., & Sachdev, H. S. (2008). Maternal and child undernutrition: consequences for adult health and human capital. *THE LANCET*, 340-357.
- Chaudhary, V., Tiwari, M., & Ghoghare, M. (2015). Immunization Status of 1-5 Year Old Children and Factors Affecting It: A Hospital Based Study. *Pediatric Oncall journal*, 12(3), 54. Retrieved from <http://www.pediatriconcall.com/Journal/Article/FullText.aspx?artid=979&type=J&tid=&imgid=&reportid=514&tbltype=>
- Concern. (2013). *Five Year ASAL Water Hygiene and Sanitation Strategy For Marsabit County 2013-2018*. Nairobi: Concern Worldwide.16-18.
- Cumming, O., Watson, L., & Dangour, A. (2015). *Water, Sanitation and Hygiene - A Missing Link to Food and Nutrition Security*. London: Routledge: Routledge Handbook on Food and Nutrition Security.
- Dickson, A. A., Maurice, M. B., Anna, L., Matanda, J. M., & Helga, U. B. (2014). Influence of childcare practices on nutritional status of Ghanaian children: a regression analysis of the Ghana Demographic and Health Surveys. *BMJ*, 4(11), 4-11.
- Exavery, A., Almamy, K. M., Ahmed, H., & James, F. P. (2015, September 25). Determinants of early initiation of breastfeeding in rural Tanzania. *International Breastfeeding Journal*, 10(27), 1-9.
- Exavery, A., Almamy, M. K., Hingora, A., & Philips, J. F. (2015). Determinants of early initiation of breastfeeding in rural Tanzania. *International Breastfeeding Journal*, 10-27.

- Ezeonwu, B., Chima, O., Oguonu, T., Ikefuna, A., & Nwafor, I. (2014). Morbidity and Mortality Pattern of Childhood Illnesses Seen at the Children Emergency Unit of Federal Medical Center, Asaba, Nigeria. *PMC Journal*, S239–S244.
- FANTA. (2004). *Increased number of different foods or food groups consumed. Measuring household food consumption. A technical guide*. AED: FANTA.5-8
- FAO. (2011). *Guidelines for measuring household and individual dietary diversity*. Rome, Italy: Food and Agriculture Organization of the United Nations.
- FAO. (2014). *Guidelines for assessing nutrition-related Knowledge, Attitude and Practices Manual*. Rome, Italy: Food and Agriculture Organization of the United Nations.9-20
- FAO/FHI 360. (2016). *Minimum Dietary Diversity for Women: A guide for measurement*. Rome: FAO/FANTA III.
- FENTAW, R., BOGALE, A., & ABEBAW, D. (2013). Prevalence of child malnutrition in Agro-Pastoral Households in Afar region state of Ethiopia. *Nutrition Research and practice*, 7(2), 122-131.
- FEWSNET. (2006). *Understanding nutrition data and the causes of malnutrition in Kenya*. Washington, DC: United States Agency for International Development Famine Early Warning System (FEWS NET).
- FSAU. (2007). *Knowledge, Attitude and Practices Study. Infant and Young Child Feeding and Health Seeking Practices*. Nairobi: FAO.
- Gewa, C. A., & Leslie, T. F. (2015). Distribution and determinants of young child feeding practices in the East African region: demographic health surveys data analysis from 2008-2011. *Journal of Health Population and Nutrition*, 34(6), 1-14.
- Hien N, , & Hoa N. (2009). Nutritional status and determinants of malnutrition in children under three years of Age in Nghean. Vietnam. *Pak J Nutr*, 958-64.
- Hien, N., & Kam, S. (2008). Nutritional status and the characteristics related to malnutrition in children under five years of age in Nghean, Vietnam. *Journal of Preventive Medicine and Public Health*, 232-240.
- IEBC. (2012). *Information Cradle*. Retrieved from Inspire Inform Involve: <https://informationcradle.com/kenya/north-horr-constituency/>
- International Food Policy Research Institute. (2015). *Global Nutrition Report 2015: Actions and Accountability to Advance Nutrition and Sustainable*. Washington, DC.: International Food Policy Research Institute.
- IRIN. (2015). *The role of culture in child nutrition*. Nairobi: IRIN. Retrieved from <http://www.irinnews.org/report/87454/kenya-role-culture-child-nutrition>

- KFSSG. (2015). *The 2015 Long Rains Season Assessment Report*. Nairobi: Kenya Food Security Steering Group (KFSSG).20-21
- Kihagi, W. G. (2012). *Childcare Practices, Nutritional status and Morbidity Prevalence Of Underfives Among Internally Displaced Persons In Kieni Forest, Gatundu District*. Nairobi: Kenyatta University Library.
- Kimani-Murange, E. W., Madise, N. J., Fotso, J.-C., Catherine, K., Martin, M. K., Tabither, G. M., & Nelly, Y. (2011). Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. *BMC Public Health Journal*, 11(396), 396.
- Kirichu, S. (2013). *SQUEAC REPORT: Chalbi District, Marsabit County, Kenya*. Nairobi: Concern Worldwide.
- Kisiangani, I., Mbakaya, C., Makokha, A., & Magu, D. (2014). Prevalence of malnutrition among preschool children (6-59 months) in Western province, Kenya. *Journal of Public Health and Epidemiology*, 398-406.
- Kissa, B. K., Kinabo, L. J., & Beata, M. (2006). Constraints on good child-care practices and nutritional status in urban Dar-es-Salaam, Tanzania. *Food and Nutrition Bulletin*, 27(3).
- KNBS & ICF Macro. (2010). *Kenya Health and Demographic Survey*. Calvarton, Maryland: Kenya National Bureau of Statistics & ICF Macro.
- KNBS. (2003). *Kenya Health and Demographic Survey*. Calverton, Maryland, USA: KNBS & ICF MACRO.
- KNBS. (2009). *Kenya-Eastern Province, Marsabit District-Multiple Indicator Cluster Survey*. Nairobi, Kenya: Kenya National Bureau of Statistics.
- KNBS. (2015). *Kenya Demographic and Health Survey 2014*. Nairobi: Kenya National Bureau of Statistics.
- KNBS. (2015). *Kenya Health and Demographic Survey 2014 Key Indicators*. NAIROBI: Kenya National Bureau of Statistics.
- Save the Children (2013). *Knowledge Attitude and Practice survey on Infant and Young Child Feeding*. Burma: Save the Children.
- Kogi-Makau, Macharia, C. W., & Muroki, N. M. (2004). Dietary intake, Feeding and Care Practices Of Children in Kathonzweni Division, Makueni District, Kenya. *East African Medical Journal*, 81(8), 402-403.
- Kulwa, K. B., Kinabo, L. J., & Modest, B. (2006). Constraints on good child-care practices and nutritional status in urban Dar-es-Salaam, Tanzania. *Food and Nutrition bulletin*, 27(3), 236-244.
- Kumar, E., Zandoh, C., Quigley, M., Amenga, E., Owusu-Aqyei, & Kirkwood. (2006). Delayed breastfeeding initiation increases risk of neonatal mortality. *National Institute of Health*, 380-386.

- Kuria, E. N. (2010). *NUTRITION SURVEY*. Nairobi: Fh-Kenya.
- Kwena, A., & Baliddawa, J. (2012). Nutritional Status of Children aged 6-59 Months in Community Based Education and Service Centres (Cobes) In Western Kenya. *African Journal of Food, Agriculture, Nutrition and Development*.
- Lakshmi, A., Begum, K., Saraswathi, G., & Prakas. (2003). Nutritional status of rural preschool children- mediating factors. *Medical Journal of India*. 49(2), 45-46.
- Lawal, O., & Samuel, F. (2010). Determinants of nutritional status of children in farming households in Oyo State, Nigeria. *Afr J Food Agric Nutr Dev*, 4235–53.
- Makau, N. M. (2013). *Feeding Practices and Nutritional Status of Children Aged 0-59 Months Accompanying Incarcerated Mothers In Selected Women's Prisons In Kenya*. Nairobi: Kenyatta University Institutional Repository.
- Medhin, G., Hanlon, C., Dewey, M., Alem, A., Tesfaye, F., & Worku, B. (2010). Prevalence and predictors of undernutrition among infants aged six and twelve months in Butajira, Ethiopia: the P-MaMiE birth cohort. *BMC Public Health*, 10-27.
- Merrin, R. E., Dockerty, J. D., Joseph, M., Stephen, R. H., Peter, H., David, J. J., . . . Philip, H. C. (2009). Access to health care and mortality of children under 5 years of age in the Gambia: a case– control study. *PubMed Central*, 3(87), 216-224.
- Mogre, V., Dery, M., & Gaa, K. P. (2016). Knowledge, attitudes and determinants of exclusive breastfeeding practice among Ghanaian rural lactating mothers. *Int Breastfeed J*.
- MOH. (2012). *Ministry Of Public Health & Sanitation Division of Vaccines and Immunization (Dvi) Multi Year Plan 2011-2015*. Nairobi: Ministry of Public Health & Sanitation. Retrieved From http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=eb&cd=6&cad=rja&ved=0CFcQFjAF&url=http%3A%2F%2Fwww.gavialliance.org%2Fcountry%2Fkenya%2Fdocuments%2Fcmyps%2Fcomprehensive-multi-year-plan-for-2011-2015%2F&ei=Q2tIUoGYMofk9gTk5YHgCQ&usg=AFQjCNGAv_6vdqsu
- MOH. (2013). *Division of Vaccines and Immunisation Comprehensive Multi Year Plan 2013-2017*. Nairobi: Ministry of Public Health and Sanitation.
- Mostafa, K. S. (2011). Socio-economic determinants of severe and moderate stunting among under-five children of rural Bangladesh. *Malays J Nutrition*, 105-118.
- Motee, A., Deerajen, R., Prity, P.-G., & Rajesh, J. (2013). An Assessment of the Breastfeeding Practices and Infant Feeding Pattern among Mothers in Mauritius. *Journal of Nutrition and Metabolism*.
- Muchina, E., & Waithaka, P. (2010). Relationship Between Breastfeeding Practices and nutritional Status of Children Aged 0-24 Months In Nairobi, Kenya. *African Journal Of Food Agriculture Nutrition And Development*, 2358-2378.

- Muluki, A. (2012). *Integrated Health and Nutrition Smart Survey*. Nairobi: International Medical Corps.
- Mundia, N. D. (2012). *Nutritional Knowledge, Attitudes and Practices of Primary Caregivers of Home Grown School Feeding Programme Pupils at Sauri Millennium Village Siaya, Kenya*. Nairobi: Kenyatta University Library.
- Mutua, M. K., Murage, E. K., & Remare, E. R. (2011). Childhood vaccination in informal urban settlements in Nairobi, Kenya: Who gets vaccinated? *BioMed Central*, 11-16.
- Mutua, N. M., Onyango, D. A., Wakoli, A. B., & Mueni, H. N. (2015). Factors Associated With Increase in Undernutrition Among Children Aged 6-59 Months in Kamoriongo Village, Nandi County, Kenya. *International Journal of Academic Research and Reflection*, 30-56.
- NDMA. (2014). *Kenya Interagency Rapid Assessment*. Nairobi: National Drought Management Authority.
- OCHA. (2014). *KENYA: Humanitarian Briefing Note (as of June 2014)*. Nairobi: UN OCHA.
- Olumakaiye, M. (2013). *Dietary diversity as a correlate of undernutrition among school age children in southwestern Nigeria. Paper presented at the Annals of Nutrition and Metabolism*. Lago.
- Olwedo, A. M., Mworozzi, E., Bachou, H., & Garimoi, O. C. (2008). Factors associated with malnutrition among children in internally displaced person's camps, northern Uganda. *African Health Sciences*, 244-252.
- PAHO/WHO. (2001). *Guiding Principles for Complementary Feeding of The Breastfed Child*. Geneva: WHO.
- Parada, M., Carvalhaes, A., & Milena, J. (2007). Complementary feeding practices to children during their first year of life. *Revista Latino-americana de Enfermagem*, 282-9.
- Parul , C., Abbi, R., Sunder , G., & Tara , G. (2016, October 18). *United Nations University website*. Retrieved from The role of maternal literacy and nutrition knowledge in determining children's nutritional status: <http://archive.unu.edu/unupress/food/8F104e/8F104E06.htm>
- Patel, A., Badhonia, N., Khadse, S., Senarth, U., Aqho, K., MJ, D., & Dibley, M. (2010). Infant and young child feeding indicators and determinants of poor feeding practices in India: secondary data analysis of National Family Health Survey 2005-06. *Publicmed Journals*, 314-333.
- Ramji, S. (2009). Impact of Infant & young child feeding & caring practices on nutritional satus and health. *Indian J meds*, 130, 624-626.
- Roberts, T., Emily, C., & Emmanuela, G. (2013, July 9). Can breastfeeding promote child health equity? A comprehensive analysis of breastfeeding patterns across the developing world and what we can learn from them. *BMC Medicine*, 11(254).
- Safari, C. J., Kimambo, C. S., & Lwelamira, E. J. (2013). Feeding practices and nutritional status of infants in Morogoro Municipality, Tanzania. *Tanzania Journal of Health Research*, 1-10.

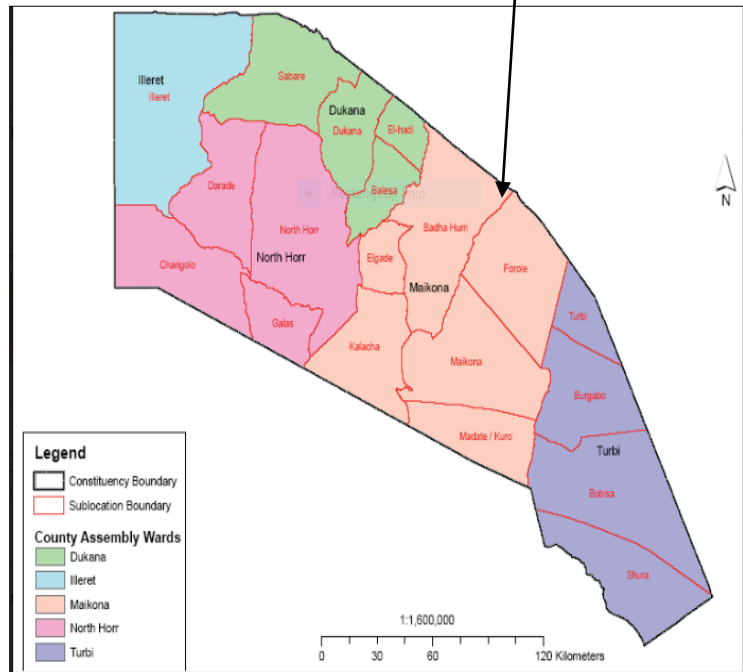
- Saha , K., Persson , L., Rasmussen , K., & Arifeen , S. (2008). Appropriate infant feeding practices result in better growth of infants and young children in rural Bangladesh. *Am J Clin Nutr.*, 1852–1859.
- Sanusi , R. A., Leshi , O. O., & Agada , U. N. (2016). Mother’s knowledge and practice of breastfeeding and complementary feeding in Enugu State, Nigeria. *Journal of Research in Nursing and Midwifery (JRNM)*, 021-029.
- Sawadogo, S. P., Yves, M., Claire, M., Alain, B. A., Alfred, T., Serge, T., & Francis, F. (2010). Applied nutritional investigation: Late introduction and poor diversity were the main weaknesses of complementary foods in a cohort study in rural Burkina Faso. *Journal of Nutrition*(26), 746–775.
- Sawsan , I. A.-A., Kareema , A. H., & Norhan , Z. S. (2010). Assessment of Breastfeeding Knowledge among Mothers in Erbil City. *Zanco J. Med. Sc.*, 1-6.
- Ssemukasa, E. L., & Kearney, J. (2014). Six Months of Exclusive Breastfeeding Recommendation:How Applicable is The Universal Exclusive Breastfeeding Recommendation Policy? *African Journal of Food, Agriculture, Nutrition And Development*, 9073.
- Stein, M., Martin, T., & Yi, H. L. (2013). *Feeding Behaviour of Infants and Young Children and Its Impact on Child Psychosocial and Emotional Development*. USA,San Diego: Encyclopedia on Early Childhood and Development.
- Tadiwos , Z., & Degnet , A. (2013). Determinants of Child Malnutrition: Empirical Evidence from Kombolcha District of Eastern Hararghe Zone, Ethiopia. *Quarterly Journal of International Agriculture*, 357-372.
- Tandoh, I. (2015). *Association Between Household Food Consumption and Dietary Intake of Children (3-6 Years) in The Asesewa Sub-District*. Accra: University of Ghana.
- Temesgen , H. D., Habtamu, F. G., & Dessalegn , W. (2015). Nutritional Knowledge and Determinant Factors Among Lactating Mothers in Nekemte Referral Hospital and Health Centers, East Wollega, Ethiopia. *Food Science and Quality Management*, 60-70.
- UNICEF. (1990). *Strategy for Improved Nutrition of Children and Women In Developing Countries*. New York: UNICEF.
- UNICEF. (1992). *Strategy for Improved Nutrition Of Children And Women In Developing Countries*. New York: UniceF.
- UNICEF. (1998). The state of the worlds children. *Oxford university press*, 13-18.
- UNICEF. (2011). *Infant and Young Child Feeding. A programming guide. IYCF and its role in Child Survival, Growth and Development*. New-York: UNICEF.
- UNICEF. (2013). *Improving Child Nutrition*. New York: UNICEF.

- UNICEF. (2014). *Study of Parental Knowledge, Attitudes and Practices Related to Early Childhood Development*. Geneva: UNICEF Pacific and Solomon Islands Ministry of Education and Human Resources.
- UNICEF. (2014). *The State of the World's Children 2014 In Numbers*. New York: UNICEF.
- UNICEF. (2015, December 1st). *Why are children dying?* Retrieved January 21st, 2016, from Immunization: http://www.unicef.org/immunization/index_why.html
- UNICEF. (2016, January 20). *The Breastfeeding Initiatives Exchange*. Retrieved June 20, 2016, from The Challenge. While progress to date has been encouraging, significantly more than half of the world's children are not as yet being optimally breastfed.: <http://www.unicef.org/programme/breastfeeding/challenge.htm>
- USAID. (2013). *Integrating Water, Sanitation, And Hygiene Into Nutrition Programming*. Washington DC: USAID.
- USAID. (2014). *Kenya: Nutrition Profile*. NAIROBI: USAID .
- USAID. (2015). *WASH & NUTRITION. Water and Development Strategy*. Washington DC: USAID.
- Wamani , H., Astrom , A., Peterson , S., Tumwine, J., & Tylleskär , T. (2007). Boys are more stunted than girls in sub-Saharan Africa: a meta-analysis of 16 demographic and health surveys. *BMC Pediatr*, 7-17.
- WHO. (2006). *Multicentre Growth Reference Study Group. WHO child growth standards: length/height-for-age, weight-for-age, weight-for-length/height and body mass index-for-age. Methods and development*. . Geneva: WHO.
- WHO. (2007). *The Millennium Development Goals Report 2007*. NEW YORK: United Nations.
- WHO. (2010, January). *WHO*. Retrieved August 21, 2016, from Infant and Young Child Feeding: <http://who.int/mediacentre/factsheets/fs342/en/>
- WHO. (2010). *World Health Statistics*. Genev: World Health Organization.
- WHO. (2011). *Guideline: Vitamin A supplementation in infants and children 6–59 months of age*. Geneva: World Health Organization.
- WHO. (2015). *Improving Nutrition Outcomes with Better Water, Sanitation and Hygiene*. Geneva: World Health Organization.
- WHO. (2016). *Child health and development*. Retrieved August 1, 2016, from WHO: <http://www.emro.who.int/child-health/community/family-practices/complementary-feeding>
- WHO. (2016, January). *Children: reducing mortality*. Retrieved April 12, 2016, from World Health Organization: <http://www.who.int/mediacentre/factsheets/fs178/en/>

- WHO. (2016, February 15). *Early initiation of breastfeeding*. Retrieved April 11, 2016, from e-Library of Evidence for Nutrition Actions (eLENA) : http://www.who.int/elena/titles/early_breastfeeding/en/
- WHO. (2016). *World Health Organization*. Retrieved January 20th, 2016, from Importance of immunization programmes: <http://vaccine-safety-training.org/Importance-of-immunization-programmes.html>
- WHO, UNICEF, IFRPRI, DAVIS, U., USAID, AED, & 2, F. (2010). *Indicators for assessing infant and young child feeding practices part 3 country profiles*. Geneva: WHO press.
- WHO/UNICEF. (2003). *Global Strategy for Infant and Young Child Feeding*. Geneva: WHO Press.
- WHO/UNICEF. (2015). *WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation*. Retrieved September 3, 2016, from Improved and unimproved water sources and sanitation facilities: <http://www.wssinfo.org/definitions-methods/watsan-categories/>
- Wycliffe, A. (2014). *Childcare Practices and Nutritional Status of Children Under Five Years Old in Southland Informal Settlement Nairobi County*. *University of Nairobi Repository*, UoN Repository.
- Yalew, B. (2014). Prevalence of Malnutrition and Associated Factors among Children Age 6-59 Months at Lalibela Town Administration, North WolloZone, Anrs, Northern Ethiopia. *Journal of Nutritional Disorders & Therapy*.
- Yalew, B. M. (2014). Prevalence of Malnutrition and Associated Factors among Children Age6-59 Months at Lalibela Town Administration, North WolloZone, Anrs,Northern Ethiopia. *Nutritional Disorders & Therapy*, 4-132.
- Zeitlin, M., Hossein, G., & Mansour, M. (1993). *Positive Deviance in Child Nutrition -With Emphasis on Psychosocial and Bbehavioural Aspects and Implications for Development*. New York: UNICEF.

APPENDICES

APPENDIX 1: Map of North/Horr Sub County showing Maikona Ward



APPENDIX 2: INTRODUCTORY NOTE AND INFORMED CONSENT FORM

FACTORS ASSOCIATED WITH CHILDCARE PRACTICES AND NUTRITIONAL STATUS OF CHILDREN AGED 6-59 MONTHS IN MAIKONA WARD MARSABIT COUNTY.

Hello. My names are Sabdio Galgallo. I am a post-graduate student at the University of Nairobi. I am carrying out a study on Factors associated with nutritional status of children aged 6-59 months in Maikona ward, Marsabit County. The purpose of this study is to determine the childcare practices and the nutritional status; therefore all the children between 6-59 months will be included. Your child is among them, if you don't mind you will be interviewed and the weight and height for your child will be taken. The questions usually take about 30 to 60 minutes. Your responses will be taken with a lot of confidentiality and will only be used for the sole purpose of this study. The results of the entire study will however be availed to any interested respondents. I would like to know if

1=Yes (If yes I kindly sign below)

2= No

Signature:

APPENDIX 3: DATA COLLECTING TOOLS/INSTRUMENTS

INSTRUMENT1: STRUCTURED QUESTIONNAIRE

CHILDCARE PRACTICES QUESTIONNAIRE IN MARSABIT COUNTY

Questionnaire No..... Name of Interviewer.....Date of Interview..... Name of the respondent.....

Division.....Location.....Sub location.....Village.....

SECTION1: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

I would like to ask you a few questions about your household.

Line No.	List all the household members starting with the household head.	Relationship to head of the household.	Sex	Age in years (For children refer to MCH card and record in months)	Marital status	Level of Education.	Eligibility: Circle line No. of all children aged 6-59 months
	1.1	1.2	1.3	1.4	1.5	1.6	
							01
							02
							03
							04
							05
							06

Codes for question 1.2: Relationship to head of the household

Question 1.3

- 1=head
- 2=Wife or Husband
- 3=Son/daughter
- 4=son in-law/daughter in-law
- 5=grandchild
- 6=other relative
- 98= don't know

Codes for question 1.5: Marital status

- 1=Married
- 2=Divorced/separated
- 3=widowed
- 4=Never married

Codes for question 1.6

- 1= Pre-primary
- 2=Primary
- 3=Secondary
- 4=College
- 5=University
- 1=Male
- 2=Female

SECTION 2: WATER, SANITATION AND HYGIENE

2.1 What is your main source of water for consumption?

1= River 2= Water tap 3= unprotected well 4=protected well 5=Borehole 6=others

2.2 What is your main source of water for Household use?

1= River 2= Water tap 3= unprotected well 4=protected well 5=Borehole
6=others specify.....

2.3 What do you do to the water before giving it to the baby?

1=Boiling 2=Use water treatment 3= Nothing

2.4 How do you clean the child's eating utensils?

1=cold water only 2=warm water only 3=cold water and soap 4=warm water and soap
5= others specify.

2.5 What type of toilet do you have?

1=Bucket 2=Traditional pit latrine 3=Flush toilet 4= others (Specify)

2.6 (If no toilet) How do you dispose the human waste

1=use neighbours toilet 2=Bury 3=Bush 4= (Others specify).....

2.7 (Observe) if there is hand washing facility near the toilet? 1=Yes 2= No

If yes is the water always available 1=Yes 2 =sometimes 3= Never

2.8 On what occasions do you usually wash your hands, (tick all that apply)

A= before eating B=before feeding the baby C=before breastfeeding D=after cleaning
Baby's bottom E=others (specify)

2.8.1 On what occasions do you usually use soap when washing hands?

A= before eating B=before feeding the baby
C=before breastfeeding D=after cleaning baby's bottom 6=others (specify)

2.8.2 How many times do you bathe your child in a day?

1=once 2=two times a day 3=2-6 times per week
4=once per week 5=once in two weeks

Questionnaire No.....

SECTION 3A: NUTRITIONAL STATUS

MEASURE ONLY THE SELECTED CHILD (AGED 6-59 MONTHS) IN THE HOUSEHOLD							
Child ID	Child sex 1 male 2 female	Date of birth dd/mm/yyyy	Age in months(MCH card or recall)	Weight measured to the nearest 0.1kg	Height measured to the nearest 0.1cm	Method of measurement 1=lying 2=standing	Bilateral oedema 1=present 2=Absent
3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8

Questionnaire No.....

SECTION 3B: IMMUNIZATION COVERAGE: For children aged 6-59 Months (Strictly refer to the mother and health child booklet)

(Information taken only from one child per household)

Has child received BCG? 1=Yes(card) 2=Yes(recall) 3=Yes (scar) 4=No 5=D.k	Has child received Penta 1 and OPV 1 1=Yes(card) 2=Yes(recall) 3=No 4=D.k	Has child received Penta 2 and OPV 2 1=Yes(card) 2=Yes(recall) 3=No 4=D.k	Has child received Penta 3 and OPV 3 1=Yes(card) 2=Yes(recall) 3=No 4=D.K	Has the child received Measles immunization? 1=Yes(card) 2=Yes(recall) 3=No 4=D.k	Has the child received deworming tablets in the last 6 months? 1=Yes(card) 2=Yes(recall) 3=No 4=Don't know	Has child received a rota virus vaccine? 1=Yes(card) 2=Yes(recall) 3=No 4=Don't know	Has the child received Vitamin A in the last 6 months 1=Yes(card) 2=Yes(recall) 3=No 4=Don't know	If yes how many times in the last 12 months? 1=once 2=twice 3=more than twice
3.9	3.10	3.11	3.12	3.13	3.14	3.15	3.16	3.17

Questionnaire No.....

SECTION 4: FEEDING PATTERN

Did you ever breastfeed(Name) 1= Yes(go to 4.7) 2= No 3=Don't know	If No why (see codes)	If yes how soon after birth. (see codes)	During the 1st three days after delivery was the child given anything else to drink other breast milk? 1=Yes, 2= No 3= Don't know	If yes what was given? Check codes below	Are you still breastfeeding (Name) 1= Yes 2= No	If yes, how many times in a day? 1.more than three times 2. 3-5 times 3.6 times 4.on demand	At what age was the child introduced to other foods other than breast milk? Give answer in months.
4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8

Codes for question 4.2

- 1= No milk
- 2= Did not want to breastfeed
- 3=Traditional beliefs
- 4=Had to go back to work
- 5= Mother with chronic illness
- 6= Child separated from mother

Codes for question 4.3

- 1=Within one hour
- 2=Less than 24 hours
- 3=Less than 2 days
- 4=Less than 2 days
- 5= Does not know

Codes for 4.5

- 1=Plain water
- 2=sugar water or glucose water
- 3=Powdered milk or fresh milk (Specify the milk)
- 4=Infant formula
- 5=Gripe water
- 6=Others (Specify).....

Questionnaire no.....

Individual dietary diversity scores (IDDS)

Was yesterday a feast day or a celebration day? If no did the child consume any of the following food groups from yesterday to today the time of the survey?

	Group	Food list	Yes how many times	No
4.9.1	Group 1: Grains, roots and tubers	Porridge, bread, rice, noodles or other foods made from grains		
		White potatoes, white yams, manioc, cassava or any other foods made from roots		
4.9.2	Group 2: Legumes and Nuts	Any foods made from beans, peas, lentils, nuts or seeds		
4.9.3	Group 3: Dairy products	Milk, such as tinned, powdered, fresh animal milk or infant formula Yogurt or drinking yogurt Cheese or other dairy products		
4.9.4	Group 4: Flesh foods	Liver, kidney, heart or other organ meats Any meat, such as beef, pork, lamb, goat, chicken or duck Fresh or dried fish, shellfish or seafood Grubs, snails or insects		
4.9.5	Group 5: Eggs	Eggs		
4.9.6	Group 6: Vitamin A fruits and vegetables	Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside Any dark green vegetables Ripe mangoes (fresh or dried [not green]), ripe Papayas (fresh or dried), musk melon.		
4.9.7	Group 7: Other fruits and vegetables	Any other fruits or vegetables		
4.9.8	Group 8: Others (not counted in the dietary diversity score)	Any oil, fats, or butter or foods made with any of these Any sugary foods, such as chocolates, sweets, candies, pastries, cakes or biscuits Condiments for flavor, such as chilies, spices, herbs or fish powder.		

Questionnaire No.....

7 day food frequency questionnaire

How often in the past 7 days did the index child eat the following foods?

	Foods	Never	Daily	1-2 Times Per Week	3-4 Times Per Week	More Than 5 Times Per Week
4.10A	Porridge, bread, rice, noodles, or other foods made from grains.					
4.10B	Any food made from beans, peas, lentils, nuts or seeds					
4.10C	Pumpkin, carrots & sweet potatoes that are orange or yellow inside. VITA-Vegetables					
4.10D	White potatoes, white yams, cassava or any other foods made from roots.					
4.10E	Any dark green leafy vegetables.					
4.10F	Ripe mangoes, ripe papayas or any other local vitamin A rich fruits. VITA rich fruits					
4.10G	Any other fruits or vegetable.					
4.10H	Liver, kidney, heart or other organ meat.					
4.10I	Any meat, such as beef, pork, lamb, goat, chicken or duck.					
4.10J	Eggs					
4.10K	Cheese, yoghurt or Milk products					
4.10L	Any sugary foods such as chocolates, sweets, candies, cakes or biscuits.					
4.10M	Sea foods like fish.					
4.10N	Condiments for flavour, such as chillies or spices.					

Questionnaire No.....

SECTION 5: MORBIDITY PATTERNS AND CARE PRACTICES

During the past 2 weeks did (Name) suffer from any illness or injury. 1=yes2=No (Go to the next child)	For how many days did (Name) suffer due to illness or injury during the past 2 weeks? No. of days	Can you describe the symptoms that (Name) primarily suffered from the major illness or injury during the past 2 weeks? Main symptoms	If diarrhea was zinc supplementation given 1 yes 2 no	Was anyone consulted for the major illness or injury during the past 2 weeks? 1=Yes (go to 5.11) 2=No (go to 5.8)	If yes How soon did you seek assistance? 1=within 24hrs 2=After 24hrs	Where was The first consultation during the past 2 weeks? 1=Private hosp/clinic 2=Govt hosptl 3=Govnmt health centre 4=Government dispensary 5=Missionary hosptl 6=Traditional healer	Why was no one consulted for the major illness? See codes below
5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8

Codes for question 5.3

5.8

- 5.3.1=watery diarrhoea
- 5.3.2=Bloody diarrhoea
- 5.3.3=Coughing with Difficulty in breathing
- 5.3.4=Fever
- 4=Others(Specify)
- 5.3.5=Fever with chills

- 5.3. 6=worms
- 5.3.7=Skin infection
- 5.3.8=Eye problem
- 5.3.9=Coughing
- 5.3.10=Malaria
- 5.3.1=Vomiting

Codes for question

- 1=mild illness
- 2=staff attitude
- 3=No medicine

Questionnaire No.....

SECTION 6: CAREGIVERS KNOWLEDGE & ATTITUDE ASSESSMENT

PART 1: KNOWLEDGE ASSESSMENT

6.1 What is the first food a newborn baby should receive?

- 1) Only breast milk
- 2) Other
- 3) Don't know

6.2 How soon after birth do you think the baby should be introduced to breast milk?

- 1) 1 hour after birth
- 2) More than 24 hours after birth
- 3) Don't know

6.3 How many months or years do you think a child should be exclusively breastfed without being introduced to any other form of food or fluids other than breast milk?

- 1) 1-3 months
- 2) 4-5 Months
- 3) Month

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

- 1) At six months
- 2) Other
- 3) Don't know

6.5 How many times should a child be feed in a day

- 1) Once or twice
- 2) Thrice
- 3) More than 3 times a days

6.6 Please look at these two pictures of porridges. Which one do you think should be given to a young child? (Show the images/pictures of thick and watery/thin porridges and tick one of the options here below depending on the respondent answer.)

- 1) Shows the thick porridge
- 2) Shows the watery
- 3) Does not know

6.7 To feed their children, many mothers give them rice, porridge or other foods please tell me some ways to make these foods more nutritious or better for your baby's health. Which foods or types of food can be added to rice porridge make it more nutritious?

- 6.7.1 Animal-source foods (meat, poultry, fish, liver/organ meat, eggs, etc.)
- 6.7.2 Pulses and nuts: flours of groundnut and other legumes (peas, beans, lentils, etc.), sunflower seed, peanuts, soybeans
- 6.7.4 Vitamin-A-rich fruits and vegetables (carrot, orange-fleshed sweet potato, Yellow pumpkin, mango, papaya, etc.)
- 6.7.5 Yellow pumpkin, mango, papaya, etc.)
- 6.7.6 Green leafy vegetables (e.g. spinach)
- 6.7.7 Energy-rich foods (e.g. oil, butter/ghee)

6.8 How can you recognize that someone is not having enough food? Probe if necessary: What are the signs of under nutrition?

- 6.8.1 Lack of energy/weakness: cannot work, study or play as normal
- 6.8.2 Weakness of the immune system-becomes ill easily
- 6.8.3 Loss of weight/thinness
- 6.8.4 Children do not grow as they should (growth faltering)
- 6.8.5 Other

6.9 How can you (caregiver) find out if the baby is growing well or not? Probe if necessary: Who can help the mother to find out if the baby is growing well? Where can she go?

- 6.9.1 Go to the health center/growth monitoring
- 6.9.2 Other
- 6.9.3 Don't know

6.10 What should we do to prevent under-nutrition among children below 5 yrs.

- 6.10.1 Give more food
- 6.10.2 Feed frequently
- 6.10.3 Give attention during meals
- 6.10.4 Go to the health centre/hospital and check that the child is growing (growth Monitoring services)
- 6.10.5 Other
- 6.10.6 Don't know

PART B: ATTITUDES ASSESSMENT

6.1 How good do you think it is to breastfeed your baby on demand-that is when the baby wants to feed?

- 1) Not good
- 2) You're not sure
- 3) Good

6.2 How confident do you feel in expressing and storing breast milk so that someone else can feed your baby?

- 1) Not confident
- 2) Ok/so-so (not sure)
- 3) Confident

6.3 How likely can your child become malnourished if fed once in a day?

- 1) Not likely
- 2) Not sure
- 3) Likely

6.4 How serious do you think under nutrition is for a baby's health?

- 1) Not serious
- 2) Not sure
- 3) Serious

6.5 How good do you think it is to give different types of food to your child each day?

- 1) Not good
- 2) Not sure
- 3) Good

6.6 How difficult is it for you to breastfeed your child exclusively for the first six months?

- 1) Not difficult
- 2) Neither difficult nor easy (unsure)
- 3) Difficult

6.7 How confident do you feel preparing food for your child in terms of cleanliness?

- 1) Not confident
- 2) Not sure
- 3) Confident

6.8 Some members of this community believe that it is not good for children to consume eggs because they believe that it makes the child lose some powers they are born with. Do you disagree with this belief, do you agree or you are not sure?

- 1) I don't agree
- 2) I am not sure
- 3) I agree

6.9 Do you believe that edema of both feet is a serious problem for a baby's health?

- 1) I don't believe
- 2) I am not sure
- 3) I believe

INSTRUMENT 2: KEY INFORMANT INTERVIEW SCHEDULE. (Strictly for health workers)

The interview will be recorded with a phone. Information obtained from the participant(s) will be treated with confidence and only used for the purposes of this study.

1. What is your position in the health centre?
2. How long have you worked in this health centre?
3. In total, how many staff works in this health centre?
4. What is the average number of children below 5 years who usually visit the centre due to illnesses in a week?
5. What is the **MAIN** illness that is prevalent in the area?
6. Do you have supplementary feeding programmes for malnourished children?
(1)Yes **(2) No**
7. What a consideration does the facility put in place as far as giving out the supplementary food is concerned?
.....
.....
8. Do you feel that the services available in terms of health and general welfare of the children are adequate? What else could be done to improve on the nutritional status of the children? PLEASE PROBE ON THE ROLE OF THE GOVT AND NON GOVERNMENTAL ORGANIZATION.
.....
.....
9. Does the facility face any challenges in terms of providing adequate health care services?
.....
.....
10. List **5 MAIN** services available at the health centre (Services dealing with under five children) A. D
B. E
C.
11. Are there any mortality? What are the possible causes in your view?

INSTRUMENT 3: FOCUS GROUP DISCUSSION GUIDE (Not for individuals)

1. Feeding practices

- a) What are the Challenges facing feeding practices in this community?
Probe for exclusive breastfeeding and continued breastfeeding
- b) What are the Challenges facing complementary feeding?
- d) What are the main types of foods offered to children in this area?

2. Health problems

- a) What the most common health issues affecting children under five in this community today
- b) What are the main causes of these health problems?
- c) How is the quality of the services?

Services	Good	Fair	Bad
Drugs availability			
staffing norm			
equipment, supplies			
Referrals			
procedure for accessing health care			
Cleanliness			
staff attitude			
client satisfaction			

INSTRUMENT 4: OBSERVATION CHECKLIST

Tick Appropriately

Observation	Yes	No
Are the children room clean?		
Are there beds for babies?		
Are the beddings clean		
Presence of a mosquito net and is it used?		
Presence of dish rack		

APPENDIX 4: FIELD ASSISTANT TRAINING PROGRAM

DAY 1					
Time		Session	Subject	Learning Method	Learning Tools
8.00-8.30 am		Introduction and welcoming remarks.	Participants and facilitators introduce themselves.		
8.30-9.00 am		Outlining the Purpose and objectives of the study	Problem statement, purpose of the study, main and specific objectives.	Lecture, discussion, questions and answer sessions.	Flipcharts and Hand-outs.
9.00-9.30am		Expected output of the study	Anthropometric and non-anthropometric data.	Lecture, discussion, questions and answer sessions	Flipcharts and Hand-outs.
9.30-10.00am		Introduction to study ethics	Seeking consent from the respondent.	Lecture, questions and answers.	Flipcharts and Hand-outs.
10.00-10.30am		10 OCLOCK TEA BREAK			
10.30-11.30am		Interpreting and administering questionnaire	Understanding each questions, how to ask in mother tongue without changing the meaning.	Lecture, demonstrations, role plays, questions and answers.	Flipcharts and Hand-outs.
11.30-1.00pm		Measuring and recording weight and height/length	Positing the child on the height/length board and scale reading measurement	Lecture, demonstrations, role plays, questions and answers	Flipcharts and Hand-outs.
1.00-2.00pm		LUNCH BREAK			
2.00-3.00pm		Interpretation and familiarization with the research tools	Interpreting the questions	Discussions	
3.00-4.00pm		Role play on FGDs and Key Informant Interviews.	Purpose of role play and performing role play	Lecture, demonstrations, role plays, questions and answers	Flipcharts and Hand-outs.
DAY 2					
8.00-8.30am		Recap	Demonstration of anthropometric measurement and administering questionnaires	Demonstration and role plays	
8.30-1.00pm		Pretesting tools and questionnaires	Asking questions, recording answers, identifying mistakes and gaps in the questionnaire	Practical work of asking questions and recording answers.	
1.00-2.00pm		LUNCH BREAK			
2.00-4.00pm		Feedback from the field	Assessing interviewer's accuracy and finalizing the questionnaire.	Done by the principal investigator.	