PREVALENCE, RISK FACTOR AND MITIGATION STRATEGIES OF MALNUTRITION AMONG CHILDREN AGED 6 TO 59 MONTHS IN MANYOVU KIGOMA REGION, TANZANIA

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CERTIFICATION

The undersigned certifies that she has read and here by recommends for acceptance by the Open University of Tanzania a dissertation entitled: *"Prevalence and Risk Factors of Malnutrition among Children of Ages 6 to 59 Months and the Strategies for their Reduction in Manyovu Kigoma Region –Tanzania"* in partial fulfillment of the requirements for the award of Degree of Masters of Science in Human Nutrition of the Open University of Tanzania.

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DECLARATION

I, **Yvonne Tshiya Rotimi-Ine,** do hereby declare that, the work presented in this dissertation is original. It has never been presented to any other University or Institution. Where other people's works have been used, references have been provided. It is in this regard that I declare this work as originally mine. It is hereby presented in partial fulfillment of the requirement for the Degree of Masters in Human Nutrition (M.Sc. HN).

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Signature

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Date

DEDICATION

I dedicate this work with all my love to my husband Dr Henry Rotimi Ine who supported me from day one of this second step of my academic journey. And our children Jesse Chikamgeso Rotimi-Chidoberem, Tiffany Rebecca Rotimi-Chidoberem and Michaela Tricia Rotimi-Chidoberem for understanding my being away from them sometimes and for their support. May God bless and be with you always. I LOVE YOU ALL.

ACKNOWLEDGEMENT

ABSTRACT

This cross-sectional study was conducted in Manyovu, Kigoma region of Tanzania. This was to assess prevalence, risk factors and mitigation strategies of malnutrition among children aged 6 to 59 months. Convenient and random sampling was used to choose a mother- child pair. Data were collected using a structured questionnaire. Child nutritional status was assessed based on anthropometric measurements. The potential risk factors to malnutrition were also assessed. These included: socio-demographic/economic characteristics, access to clean water, breastfeeding practices, 24 hrs food recall, number of food groups consumed by both mother and child and food frequency. The survey data were analyzed using IBM SPSS statistics 20 (2016). The anthropometric data were analyzed using the WHO Anthro version 3.2.2.1 – 2018 software. An expert focus group discussion was used to identify strategies for mitigation of malnutrition in the community. The study enrolled 362 mother-child pairs from Heri Adventist Hospital. Only one child was selected from all the children that were eligible in families. The number of families that had more than one eligible child was 85%. It was found that 94.5% of the children were exclusively breastfed for six months. Prevalences recorded in this study were: of underweight 9.7%, stunting 43.1 %, and wasting 3.6%. The educational status and the earnings of parents correlated positively with the nutritional status of the children. The number of crops grown by families correlated positively with the weight for height of the children. The study is very informative and provides a reason for nutritional intervention unit in the community. The focus group identified education of young girls, economic empowerment of women and establishing of nutritional units in health care institutions.

Keywords: Manyovu, Kigoma, risk factor, mitigation strategies of malnutrition

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LIST OF ABBREVIATIONS

ADCOM	Administrative Committee
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Product
HAZ	Height for age Z-score
ICN2	International Conference on Nutrition
IFPRI	International Food Policy Research Institute
MCN	Mother and Child Nutrition
MFS	Malnutrition Fact Sheet
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MUAC	Mid-Upper Arm Circumference
N4G	Nutrition for Growth
NCDs	Non-Communicable Diseases
OUT	Open University of Tanzania
RCH	Reproductive and child Health
SPSS	Statistical Package for the Social Sciences
TDHS	Tanzania Demographic and Health Survey
TFNC	Tanzania Food and Nutrition Center
UNICEF	The United Nations Children's Fund
WASH	Water, Sanitation, and Hygiene
WAZ	Weight -for –Age Z-score
WHZ	Weight -for –Height Z-score

LIST OF OPERATIONAL DEFINITIONS

Food frequency: Food frequency in this study was used to assess individual dietary intake of foods and nutrients.

Malnutrition: In this study malnutrition was defined using anthropometric indicators of weight-for-age, height-for-age and weight-for-height.

Weight-for-Age Z-score: This compares the weight of child with the weight of a healthy child of the same age in the reference population. All children in this study with weight for age of -2SD were considered moderately malnourished/ underweight and those with -3SD were considered severely underweight.

Height-for-Age Z-score: This compares the height or length of a child to the reference height of a child of the same age in the reference population. It is a measure of stunting due to chronic Malnutrition. All children in this study with height-for-age less than -2SD and -3SD were considered moderately and severely stunted respectively.

Weight-for-Height Z-score: This compares the weight of a healthy child with the reference Weight of a child of the same height in the reference population. It reflects recent weight loss or gain and is an indicator of wasting. All children in this study with weight-for-height of -2SD were considered moderately malnourished/wasted and those with -3SD were Considered severely wasted.

CHAPTER ONE

INTRODUCTION

1.1   Background of the Study

Malnutrition is a global problem particularly in the developing countries. Malnutrition is any condition caused by any excess or deficiency of food energy or nutrient intake or by an imbalance of nutrient (Whitney and Rolfe, 2008). Tanzania has one of the world's highest rates of chronic malnutrition measured as stunting (Robinson *at al,* 2014). Stunted growth refers to low height-for-age, when a child is short for his/her age but not necessarily thin (MCHET, 2017).   Wasted refers to low weight-for-height where a child is thin for his/her height but not necessarily short (MCHET, 2017). Underweight refers to low weight-for-age, when a child can be either thin or short for his/her age (MCHET, 2017).

Malnutrition affects 42% of children under five in Tanzania and this rate has fallen only two percentage points since 2005 (Robinson and Nyagaya, 2014). The most common form of malnutrition in developing countries is undernutrition with its many long-term effects included. Apart from the serious consequences on a person's health, the economy is also affected by undernutrition, because the high prevalence of this condition hinders economic development and perpetuates poverty both directly, through a loss of productivity due to poor physical condition, and indirectly, through poor cognitive function and learning deficits (Martins et al.*,* 2011*).*

A lot of work has been done around the world, in developing countries including in

Tanzania to determine the prevalence and risk factors of malnutrition (Abinya 2012, Ahmed *et al.,* 2016, Akombi *et al.,* 2017, Ali et *al.,* 2016, Asfaw *et al*., 2015, Kandala *et al., 2011,* Muller and Krawinkel *2016,* Sulaiman *et al*., 2018, Ubesie *et al., 2012)*. The findings in all these studies prove that child malnutrition is still a big challenge. While a lot has been done in Tanzania in the area of malnutrition, there is limited documented information available on Manyovu.

The study was aimed at assessing the level of malnutrition amongst children ages 6 to 59 months old in Manyovu and to determine mitigation strategies acceptable to the communities of Manyovu.

1.2   Statement of Research Problem

Tanzania made significant progress in improving nutrition among children under 5 years of age During the period 1992– 2015 there was a tangible reduction in the number of underweight children and in those suffering from chronic malnutrition. However, despite these gains concerns persist reading the high rates of stunting among children and the stark disparity in nutritional status (UNICEF, 2017).

Food and Nutrition Technical Assistance report in 2014 stated the estimated deaths in Tanzania attributable to various nutritional problems between 2014 and 2025 if Nutritional Challenges do not improve. These projections are: Deaths amongst under-fives due to stunting is 580,687. It further projects that deaths amongst children aged below two years due to suboptimal breastfeeding practices is 360,487 (Ash et *al.,* 2014). These estimates were for the whole Tanzania and do not give

specific estimates for Manyovu. However, if this is broken down using malnutrition statistics across the Country Manyovu will have its own share of these estimated mortalities. There is scanty if any documented data on malnutrition in Manyovu and no evidence that the community knows about the challenges of malnutrition.

Tanzania nutritional fact sheets indicate that 57 % of babies are not breastfed exclusively (Ash *et al* 2017). Prevalence of stunting among children of aged 6 to 59 months was 34%. Prevalence of Underweight was 14% and wasted 5% (MoHCDGEC *et al.,* 2016). In Kigoma region the prevalence of stunning children of the same age group was 37.9%. Prevalence of underweight was 19.4% and wasted was 6.0% (Ash *et al* 2017). These are all above national average. There is no interventional Nutritional unit in the whole Kigoma region.

This study intended to find out the prevalence, risk factors of malnutrition among children of aged 6 to 59 months in Manyovu and find ways to combat it. Helping mitigate it will contribute to the efforts that the Tanzania Government and other agencies in Tanzania are making to reduce the prevalence and impact of malnutrition in the country.

1.3   Justification and Significance of Study

The data available on prevalence of malnutrition was for kigoma region. In a bid to understand the problem better and to seek for solution, the author had to embark on this study in Manyovu. This study provides the status of malnutrition, risk factors as well as the mitigation strategies for the reduction of the malnutrition rates in Manyovu. The author had worked in Heri Adventist Hospital for over four years

was worried about the number of children that were seen in the Hospital with malnutrition and resultant health challenges. A number of these children died and this was worrisome. Heri Adventist Hospital is the only Hospital in the district. Having well documented data on malnutrition and workable strategies provides a basis for justification of establishing a nutritional intervention unit in Heri Hospital that will serve people of Manyovu and beyond, and this will be the first Nutritional unit in the region.

This research will raise awareness on the challenges of malnutrition in children aged 6 to 59 months to mother in the community. Health care providers in the district will become aware of the statistics of malnutrition in the district for focused work in this area. The research findings will be provided to: policy makers, funding agents / organizations, and institutions involved in health care provision in the district with the much-needed tool to formulate plan to reduce nutritional challenges amongst children aged 6 to 59 months in Manyovu.

1.4   Research Objectives

1.4.1 General objective

The general objectives of this study was to determine the prevalence of malnutrition, risk factors and the strategies for reducing malnutrition in children aged 6 to 59 months in Manyovu, Kigoma Region–Tanzania.

1.4.2 Specific objectives

i)   To assess prevalence of malnutrition among children aged 6 to 59 months in Manyovu.

ii) To determine risk factors for malnutrition among children aged 6 to 59 months in Manyovu.

iii) To identify the strategies for reduction and control of malnutrition amongst children aged 6 to 59 months in Manyovu.

1.4.3 Specific questions

i) What is the prevalence of malnutrition in children aged 6 to 59 months in Manyovu?

ii) What are the risk factors for malnutrition in children aged 6 to 59 months in Manyovu?

iii) What are the strategies that could be used to reduce malnutrition among children aged 6 to 59 months in Manyovu?

CHAPTER TWO

LITERATURE REVIEW

2.1   Overview

This chapter presents conceptual definitions, types of under nutrition, global and regional status of malnutrition, studies in African countries, empirical studies of Tanzania, and risk factors of malnutrition. It also presents WHO/UNICEF efforts in mitigating malnutrition in children, Tanzania government strategies for mitigation of malnutrition, summary of strategic plan, and research gap identified from literature review.

2.2   Definitions and Conceptions of Malnutrition

Malnutrition includes both undernutrition and overnutrition. Undernutrition can result in underweight, wasting, stunting or micronutrient deficiencies. It is caused by a diet lacking in enough of the nutrients (energy, protein, vitamins and minerals) that the body needs for good health and/or by disease, poor childcare and feeding, poor sanitation and inadequate access to health services and clean water (URT, 2016).

Under nutrition occurs when the body's requirements for nutrients are not met as a result of under consumption or impaired absorption and use of nutrients. Under nutrition commonly refers to a deficit in energy intake from macronutrients (fats, carbohydrates and proteins) and/or to deficiencies in specific micronutrients (vitamins and minerals). It can be either acute or chronic. Under nutrition is commonly referred to as malnutrition (URT, 2016).

2.3   Types of Under Nutrition

Types of under nutrition that affect children ages 6 to 59 months all over the world include:

i)   Stunting refers to a child who is too short for his or her age. Stunting is the failure to grow both physically and cognitively and is the result of chronic or recurrent malnutrition. The devastating effects of stunting can last a lifetime (UNICEF/WHO/WB, 2017).

ii)   Wasting refers to a child who is too thin for his or her height. Wasting, or acute malnutrition, is the result of recent rapid weight loss or the failure to gain weight. A child who is moderately or severely wasted has an increased risk of death, but treatment is possible (UNICEF/WHO/WB, 2017).

iii)   Underweight children with low weight-for-age are known as underweight. A child who is underweight may be stunted, wasted, or both (WHO, 2017).

iv)   Micronutrient deficiencies are when there is an inadequate long-term intake of nutritious food or infections such as worms. Worm infestation is one of the major causes of childhood malnutrition. Essential vitamins or minerals such as vitamin A, iron and zinc are lacking and women and children are high-risk populations (URT, 2016).

2.4   Global and Regional Status of Malnutrition

Stunting continues to affect children globally and regionally; it was estimated in 2016 that 22.9 percent or 154.8 million children under five years globally. In the same 2016, wasting continued to threaten the lives of an estimated 7.7 percent or nearly 52 million children under five years globally (WHO, 2017). In the same year

(2016), Stunting affected 37.6 percent of children under five years in East Africa, and the prevalence of wasting among children under five years in East Africa in 2016 was 6.5 percent (WHO, 2017).

Few challenges facing the global community today match the scale of malnutrition, a condition that affects one in three people. Malnutrition manifests itself in many different ways: as poor child growth and development; as individuals who are skin and bone or prone to infection; as those who are carrying too much weight or who are at risk of chronic diseases because of excess consumption of sugar, salt, or fat; or those who are deficient in important vitamins or minerals. Malnutrition and diet are by far the biggest risk factors for the global burden of disease: every country is facing a serious public health challenge from malnutrition. The economic consequences represent losses of 11% of gross domestic product (GDP) every year in Africa and Asia, whereas preventing malnutrition delivers $16 in returns on investment for every $1 spent. The world's countries have agreed on targets for nutrition, but despite some progress in recent years the world is off track to reach those targets. (IFPRI, 2016)

2.5   Studies on Prevalence of Malnutrition across Africa

In sub-Saharan Africa, the prevalence of malnutrition was highest within countries in East Africa and West Africa compared to the World Health Organization (WHO) Millennium development goals target for 2015. Appropriate nutrition interventions need to be prioritized in East Africa and West Africa if sub-Saharan Africa is to meet the WHO global nutrition target of improving maternal, infant and young

child nutrition by 2025 (Akombi *et al.*, 2017). This was based on their findings which noted that, Stunting was highest in Burundi (57.7%) and Malawi (47.1%) in East Africa; Niger (43.9%), Mali (38.3%), Sierra Leone (37.9%) and Nigeria (36.8%) in West Africa; Democratic Republic of Congo (42.7%) and Chad (39.9%) in Central Africa (Akombi *et al.*, 2017). A similar study done in rural South Sudan reported the level of stunting at 42.5% (Sulaiman *et al.,* 2018). Stunting was also reported to be high in Ethiopia at 47.6% (Asfaw *et a.l,* 2015). All these studies were done on the children of the same age group as this study.

Wasting was highest in Niger (18.0%), Burkina Faso (15.50%) and Mali (12.7%) in West Africa; Comoros (11.1%) and Ethiopia (8.70%) in East Africa; Namibia (6.2%) in Southern Africa; Chad (13.0%) and Sao Tome & Principle (10.5%) in Central Africa. Underweight was highest in Burundi (28.8%) and Ethiopia (25.2%) in East Africa; Niger (36.4%), Nigeria (28.7%), Burkina Faso (25.7%), Mali (25.0%) in West Africa; and Chad (28.8%) in Central Africa (Akombi *et al.*, 2017). All these findings were very scary and should be a challenge to Federal, Regional and District Governments, communities, organizations and individuals. All hands need to be on deck to make sure interventional programs are put in place and available so that mothers, indeed parents and caregivers are well educated on child health care and feeding.

2.6   Malnutrition among Children in Tanzania

Malnutrition is a serious health problem amongst under 5 years children in Tanzania. In 2015, more than 2.7 million Tanzanian children under 5 years of age

were estimated to be stunted and more than 600,000 were suffering from acute malnutrition, of which 100,000 were severe cases (UNICEF Tanzania, 2014). According to 2014 Tanzania profiles deaths attributable to various nutritional problems between 2014 and 2025 if nutritional challenges do not improve include: under 5 deaths due to stunting 580,687, infant deaths due to low birth weight 148,873, child deaths due to Vitamin A deficiency 209,638, deaths amongst children aged under 2 yrs due to suboptimal breastfeeding practices 360,487 (Ash *et al.,* 2014).

Tanzania nutritional fact sheet indicates that 57 % of babies are not breastfed exclusively, 37% of women of reproductive age groups in urban areas are overweight, 34% of children under 5 years are stunted, 33% of same under 5 population are vitamin A deficient, 14% are underweight and 5% are wasted (TDHS, 2015-16). In Kigoma region amongst children of aged 6 to 59 months 37.9% are stunted, 6.0% are wasted, 19.4% are underweight (Ash *et al.*, 2017). These are all above national average.

2.7   Risk Factors of Malnutrition

As stated at the beginning of this study, malnutrition has short- and long-term consequences on the health and growth of children aged 6 to 59 months. A study done in Nzega identified the following as risk factors: child feeding practices, socio-demographic characteristics, access to water, and sanitation (Safari *et al.,* 2015). A Study in Uganda found that lower socio-economic status of the family, education of mother among others were risk factors of malnutrition in children

(Kikafunda *et al.,* 2020). Parental education, childhood illness, short birth interval, open defecation, type of weaning and complimentary food given to children were some of the significant determinants of underweight that were found in a study in India (Ansuya *et al.,* 2018). A study done in Ghana reported that children from homes with lower socio-economic factors are more prone to malnutrition (Anderson *et al.,* 2010). A study in India found risk factors associated with severe acute malnutrition to be parental illiteracy, large family size, poverty, non-exclusive breast feeding and recurrent diarrhea. (Jamro *et al.,* 2012).Q

Figure 2.1 (UNICEF, 2015) is a UNICEF conceptual framework of the determinants of child under nutrition. The schematic diagram outlines the causes of malnutrition and their consequences. The basic causes stem from sociocultural, economic and political settings. These lead to deficiencies in financial, human and social capital which in turn result to household insecurity, inadequate care and feeding practices, unhealthy household environment and inadequate health services.
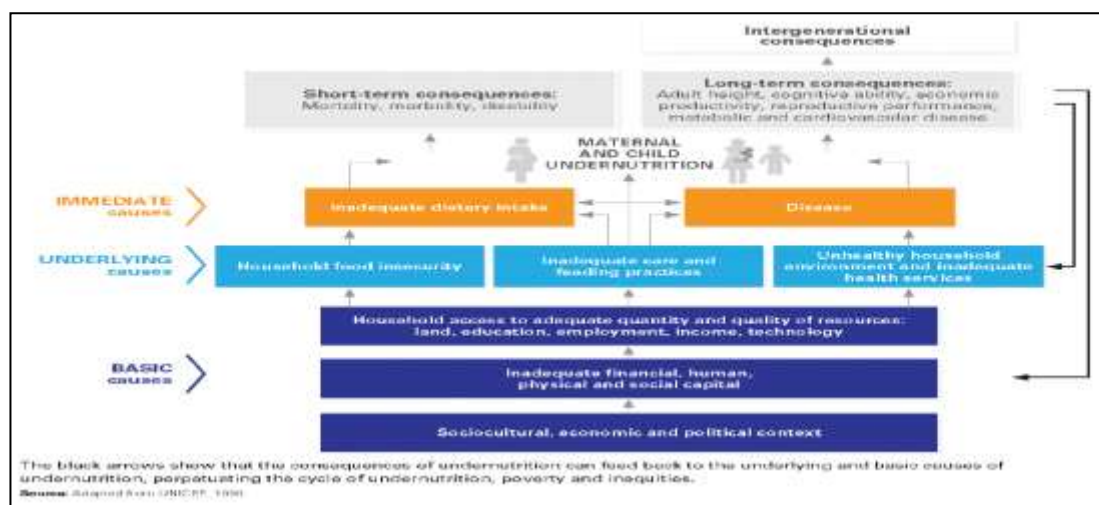
Figure 2.1: UNICEF conceptual framework of the determinant of child undernutrition

Source: UNICEF, 2015

The preceding leads to inadequate dietary intake and disease. The short-term consequences of these are morbidity, mortality and disability while long term consequences impact on adult height, cognitive ability, economic productivity reproductive performance and metabolic and cardiovascular diseases.

2.8   WHO / UNICEF Efforts in Mitigating Malnutrition in Children

In 2012 the World Health Assembly adopted the 2025 Global Targets for Maternal, Infant and Young Child Nutrition, and for non-communicable diseases (NCDs), including those relevant to nutrition. In 2013, at first Nutrition for Growth (N4G) Summit, donors committed $23 billion to actions to improve nutrition. The Second International Conference on Nutrition (ICN2) in 2014 and with the recent naming of 2016–2025 as the United Nations Decade of Action on Nutrition, more and more people have begun to recognize the importance of addressing malnutrition in all its forms. In 2015, the UN Sustainable Development Goals enshrined the objective of "ending all forms of malnutrition," challenging the world to think and act differently on malnutrition to focus on all its faces and work to end it for all people, by 2030.

Major opportunities to translate this commitment into action was brought in 2016, this included countries' adoption of their own targets in relation to the Sustainable Development Goals, the ongoing Nutrition for Growth process, and Japan's growing leadership on nutrition in the lead-up to the 2020 Tokyo Olympics and Paralympics (IFPRI, 2016).   The global nutrition report is a multi-partner initiative that holds a mirror up to our successes and failures at meeting intergovernmental

nutrition targets. It documents progress on commitments made on the global stage, and recommends actions to accelerate that progress. The Global Nutrition Report provides examples of change and identifies opportunities for action. The 2016 focuses on the theme of making SMART commitments to nutrition and identifying what it will take to end malnutrition in all its forms by 2030 (IFPRI, 2016).

UNICEF's actions in nutrition are governed by the following overarching principles, which are fundamental to upholding our equity focus and promoting a rights-based approach to nutrition programming (UNICEF, 2015).

- **Rights-based approach**: UNICEF adopts a human rights-based approach to programming in nutrition. The right to food is included as a human right in the Universal Declaration of Human Rights of 1948, and the 1989 Convention on the Rights of the Child (CRC) reiterates the right to health and underlines the obligation of governments to combat malnutrition and disease in order to fully realize this right (UNICEF, 2015).

- **Equity-focus: inequalities**, including gender inequality, may prevent disadvantaged populations from accessing nutrition services or adopting optimal nutrition practices. Applying an equity-focused approach to programme design and implementation, and targeting actions, will enable vulnerable populations to better benefit from access to nutrition services and information. Gender equality is a key element in the refocus on equity, and UNICEF will promote gender-sensitive and gender-transformative approaches as guided by the forthcoming UNICEF Gender Action Plan 2014–2017 (UNICEF, 2015).

- **Evidence-based interventions and strategies**: UNICEF supports and advocates for implementation of evidence-based interventions and strategies those that have been proven effective (to some degree) through outcome evaluations through both efficacy and programme effectiveness studies, using not only randomized control trials but also operations and implementation research that informs programmes (UNICEF, 2015).

- **Multisectoral actions**: Working across sectors and disciplines ensures better integration and coordination for nutrition. Within UNICEF, nutrition programming is undertaken in close collaboration with other sectors including health, WASH, education and early child development and in cross-cutting areas including, gender equity and empowerment (for women and adolescent girls), and children with disabilities. While it is critically important to work with these sectors, improving nutrition will create dividends for them as well. UNICEF will work through existing coordination platforms – including nutrition cluster and nutrition sector coordination platforms – and will support and strengthen those platforms (UNICEF, 2015).

- **Active engagement and participation**: UNICEF have a unique capacity and mandate to link in-country national-level work with global developments and policies. At the global level, UNICEF works closely on wide scale nutrition initiatives and movements. Regional bodies and efforts are also supported and linked to national policies and plans. At the country level, UNICEF supports national governments in strengthening their nutrition policies and programmes down to sub-national levels. At the local, community and household levels, community participation is emphasized as a way to create local, sustainable

solutions and healthy nutrition practices and to reach the most vulnerable (UNICEF, 2015).

- **Monitoring and corrective actions**: UNICEF's approach to monitoring, not only provides feedback to countries on nutrition outcomes stemming from programmes, but also provides an opportunity to resolve, refine and shift approaches to solve problems and bottlenecks at the national and sub-national levels. UNICEF will continue to ensure that corrective actions are linked to data collection and analysis in real-time, using new technology and improved data platforms to strengthen results-based management. Also, UNICEF plays a pivotal role in assisting countries with the collection and analysis of national-level nutrition data using the Multiple Indicator Cluster Surveys, which serves as a major source of data that are measured against global targets (UNICEF, 2015).

The United Nations (UN) General Assembly (2016) proclaimed 2016–2025 the United Nations Decade of Action on Nutrition. The Decade is an unprecedented opportunity for addressing all forms of malnutrition. It sets a concrete timeline for implementation of the commitments made at the Second International Conference on Nutrition (ICN2) to meet a set of global nutrition targets and diet-related NCD targets by 2025, as well as relevant targets in the Agenda for Sustainable Development by 2030—in particular, Sustainable Development Goal (SDG) 2 (end hunger, achieve food security and improved nutrition and promote sustainable agriculture) and SDG 3 (ensure healthy lives and promote wellbeing for all at all ages). Led by WHO and the Food and Agriculture Organization of the United

Nations (FAO), the UN Decade of Action on Nutrition calls for policy action across 6 key areas:

i) Creating sustainable, resilient food systems for healthy diets;

ii) Providing social protection and nutrition-related education for all;

iii) Aligning health systems to nutrition needs, and providing universal coverage of essential nutrition interventions;

iv) Ensuring that trade and investment policies improve nutrition;

v) Building safe and supportive environments for nutrition at all ages; and

vi) Strengthening and promoting nutrition governance and accountability, everywhere (WHO, 2018).

2.9 Tanzania Government Strategies for Mitigation of Malnutrition

In the 1970s Tanzania set up the Tanzania Food and Nutrition Center (TFNC) to oversee Nutritional matters in Tanzania. This was as many countries established multi-sectoral bodies to coordinate policy and action on nutrition. Over the years the agency has played a significant role in the promotion and advocacy of good nutrition and nutrition related activities (TFNC, 2014).

The following are Strategies of the Tanzania Food and Nutrition Center:

2.9.1 Financial Perspective

i) Mobilize Resources towards financial sustainability

ii) Improve efficiency, effectiveness and accountability of financial systems and controls

2.9.2 Partners and Stakeholders

i) Develop and review food and nutrition guidelines, strategies, protocols, regulations and standards

ii) Strengthen planning and budgeting for nutrition at national and council levels

iii) Strengthen coordination of nutrition and nutrition related activities

iv) Establish and maintain a National Nutrition Information System

2.9.3 Internal Processes

i) Improve information management system

2.9.4 Learning and Growth

i) Improve capacity of both existing and new staff on new developments

ii) Improve staff performance management system

iii) Improve staff welfare and incentive mechanism

The strategies for control of malnutrition in Tanzania identify a set of eight priority areas that are key to improving nutritional status. These include: Infant and young child feeding, Vitamin and mineral deficiencies, Maternal and child malnutrition, Nutrition and HIV and AIDS Children, women and households in difficult circumstances, Diet-related non-communicable diseases, Household food security Nutrition surveillance, surveys and information management.

The eight priority areas are as follow (TFNC, 2014):

i) Accessing quality nutrition services

ii)   Advocacy and behavior change communication:

iii)   Legislation for a supportive environment:

iv)   Mainstreaming nutrition into national and sectoral policies, plans and
      programs

v)   Institutional and technical capacity for nutrition

vi)   Resource mobilization

vii) Research, monitoring and evaluation

viii) Coordination and partnerships

Figure 2.2 shows the summary of the strategic plan which highlights TFNC'S
vision, mission, values, and strategic objectives together with their actions (TFNC
2014).
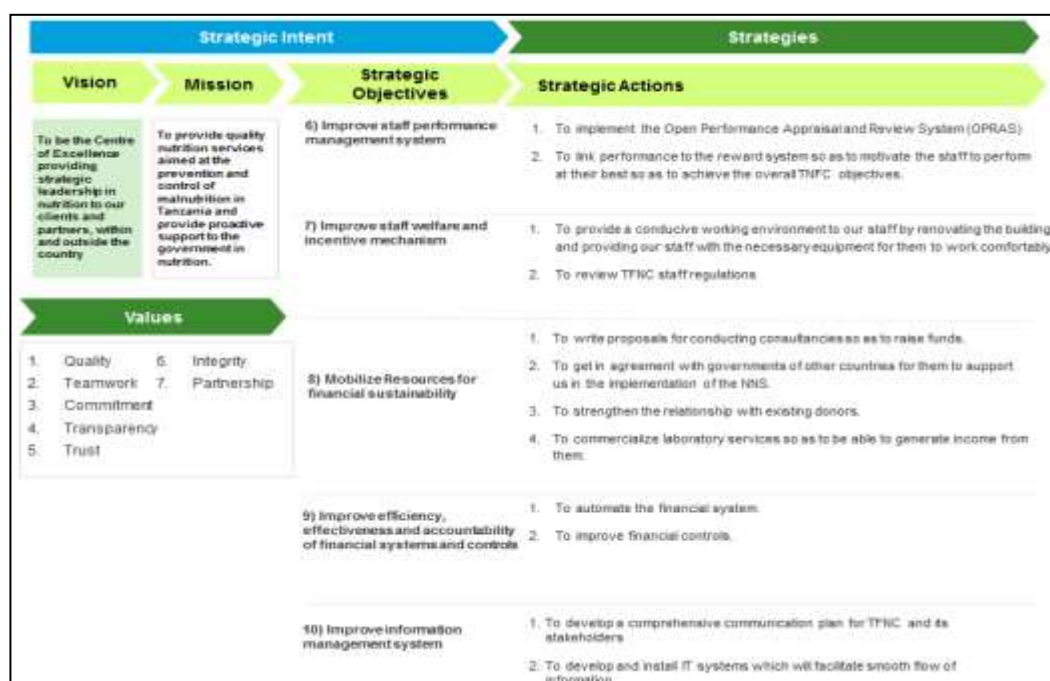
**Figure 2.2: Summary of Strategic Plan with Strategic Actions Tanzania Food
and Nutrition Centre**

Source: TFNC, 2014

National Nutrition Strategy (MoHCDGEC, 2011) further elaborates on these strategies thus:

Strategy 1: Accessing quality nutrition services

1.1: Increase access to nutrition services at community and facility level

1.2: Strengthen the quality of nutrition services

Strategy 2: Behaviour change communication

2.1: Enhance behaviors, customs and traditions of men, women, caregivers, family and community members, and those who influence them which impacts positively on nutrition.

Strategy 3: Legislation for a supportive environment for optimal nutrition

3.1: Strengthen the implementation, monitoring and enforcement of legislation.

Strategy 4: Mainstreaming nutrition interventions into national and sectoral policies, plans and programs

4.1: Mainstream nutrition into national and sectoral policies, plans and programs.

Strategy 5: Technical capacity for nutrition

5.1: Build strategic and operational capacity for nutrition

5.2: Improve the knowledge, skills and competencies of service providers at all levels to give adequate support in nutrition

Strategy 6: Advocacy and resource mobilization

6.1: Establish and maintain nutrition high on the development agenda at all levels and mobilize adequate and sustainable financial resources to support implementation of the NNS

Strategy 7: Research, monitoring and evaluation

    7.1: Develop framework/plans for monitoring, evaluation and research for nutrition

    7.2: Obtain timely data on the nutritional status of the population through nutritional surveillance, HMIS, periodic surveys, and other routine and non-routine data systems.

    7.3: Strengthen the evidence-base for nutrition policy and programming

Strategy 8: Coordination and partnerships

    8.1: Enhance coherence and synergy in the delivery of nutrition interventions through coordination at all levels

    8.2: Strengthen partnerships for nutrition.

Apart from Tanzania government agencies there are also other international organization and non-governmental organizations working in collaboration with the Tanzanian Government. Some of among others are U.S. Agency for International Development (USAID), United Nations and other international organizations: World Food Programme (WFP), Food and Agriculture Organization of the United Nations (FAO), World Health Organization (WHO), United Nations Renewed Efforts against Child Hunger and Undernutrition (UN REACH), UNICEF, World Bank, Global Alliance for Improved Nutrition (GAIN), Save the Children and Hellen Keller International (Ash et al., 2014).

CHAPTER THREE

STUDY METHODOLOGY

3.1   Study Design

This was a cross-sectional study that enrolled children aged 6 to 59 months that attended Heri Hospital who met inclusion criteria. A written consent was obtained from their mothers/caregivers. A thumb print was gotten from non-literate mothers/ caregivers.

3.2   Description of the Study Area

The study was conducted in Manyovu. Manyovu is one of the two divisions in Buhigwe district of Kigoma Region. This study was done in Manyovu and Heri Adventist Hospital used as a data collection site because it is the only district hospital. Some children had come to the hospital very sick with malnutrition as primary diagnosis and died because the hospital does not have a nutritional unit that would have helped these children. A lot of children who come to the Hospital for immunization were anecdotally observed to be malnourished.

This added to the reason why the Hospital was used as data collection center as the children who come to Heri are mostly from Manyovu area. Mayonvu is at the latitude of -4.4739, longitude of 29.8361 and elevation of 1363 (MHCDGEC, 2018). It is made up of 30 villages and the local language in all these villages is Kiha. Most people in villages around Manyovu are peasants; they are more engaged in farming crops such as: maize, beans, cassava, coffee, sweet potatoes, cocoa yam

and different kind banana plantation. They also grow different kind of vegetables such as: amaranths (mchicha,) cabbages, tomatoes, garden egg, and different other kinds of traditional vegetables. People exchange trade with Burundi where they have markets for food and other things three days in a week including Sundays, Tuesdays and Thursdays at Mnanila. The data collection was done at Heri Adventist hospital. Heri Hospital is located in Mnanila village in Manyovu. Mnanila is five kilometers to Burundi boarder, and a distance of 70 kilometers to Kigoma town (Butler, 2010).

Figure 3.1: Map of Kigoma specifying the study area
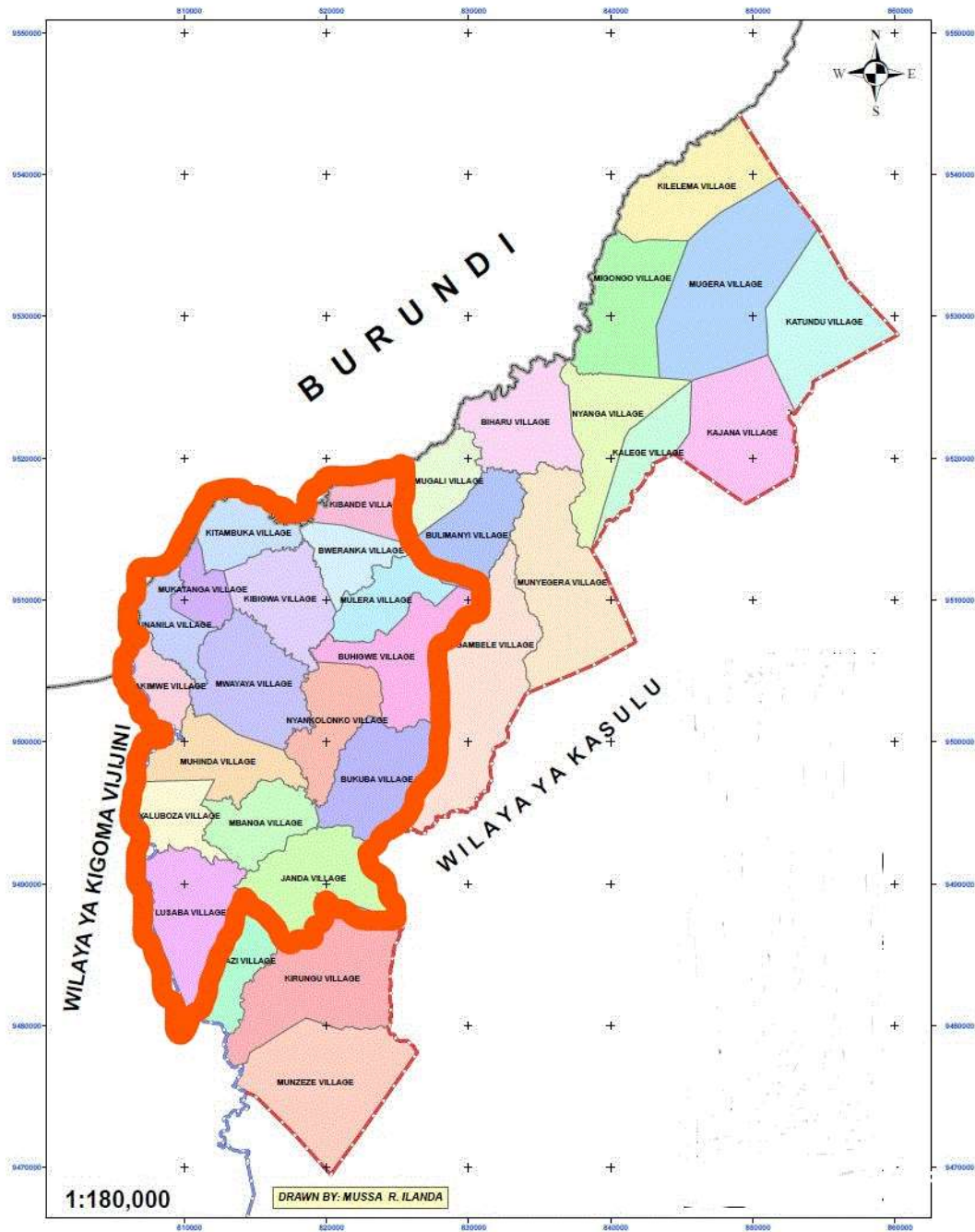
Figure 3.2: Manyovu area marked out in red on Buhigwe District Map

3.3   Selection Criteria

In order to eliminate confounding factors that may affect the result of the study we

had to set criteria for including and excluding subjects in this study.

3.3.1 Inclusion Criteria

The following were the inclusion criteria in this study

  i)   Children of 6 to 59 months of age.

 ii)   Being born with a normal birth weight ($\geq$2.5 kg).

iii)   Children who were breastfed or were breastfeeding and Mothers who lactated.

iv)   Children whose mothers/guardians gave their consent to participate in the study.

 v)   Children admitted at Heri Hospital and those seen in outpatient's department.

3.3.2 Exclusion Criteria

The following are exclusion criteria used in this study

i)   Low birth weight (Birth weight<2.5kg)

ii)   Children who were born with any malformation that could have affected their nutrition.

iii)   Children whose mothers/guardians did not give their consent to participate in the study.

3.4   Study Population and Sample Size

Mother-child pairs with children aged 6 to 59 months seen in Heri Hospital (Inpatients and outpatients) who met inclusion criteria were enlisted in this study.

The following Fisher's formula was used to determine the sample size (Fisher 1998, Charan, *at al.,* 2013).

n = z² p (1 − p) d²

Where,

n = Minimum sample size.

Z =is the table value for standard normal deviate corresponding to 95% significance level (= 1.96).

p = Prevalence of characteristic being estimated (in this case, prevalence of malnutrition, = 0.194%) (WHO 2009).

d = Margin error, set at ± 0.05

$$n = \frac{1.96^2 \times 0.379 \times (1 - 0.379)}{0.05^2}$$

= 362 + 15 allowance for attrition= 377

3.5   Sampling Frame and Sampling Procedure

The sampling frame was the children aged 6 to 59 months of age together with their caregivers who were seen in Heri Adventist Hospital from 1st July 2018 to 31st August 2019. Convenient and random samplings were both used. Convenient sampling because our respondents were those who came to the hospital and were easy to reach. About 90% of them where children who came for immunization. Random sampling because about 80% of the mothers had more than one child that met the inclusion criteria. One child was selected randomly per family.

3.6   Data Collection Method

This section presents the data collection methods based on the specific objectives stated in this study.

3.6.1 Recruitment of Research Assistants and Data Quality Control

Two nurses were recruited from Heri hospital to work with the researcher on data collection. The two research assistants had competency in carrying out interviews and taking the anthropometric measurements. The researcher and data collection assistants did pretest the questionnaire for 3 days on a pair of mother child who would have qualified for inclusion criteria. But because the study had not yet started, they were not included in the study. This was aimed at familiarizing the research assistants with the information needed and method of collecting it to minimize errors in the process. It was also aimed at ensuring the clarity of the questions to the respondents for them to give appropriate responses.

The quality of data was ensured by this process as data collection method was standardized. Continuous close attention was given to the procedure through supervision of data collection. Project monitoring and evaluation was done quite often by the researcher to ensure completeness and internal consistency of data was carried out. Data was collected with the assistants helping over a period of time. It was important that throughout the period there was close supervision to ensure data quality was maintained.   The weighing scale was calibrated and all measuring equipment was checked periodically through the course of data collection to prevent instrumental errors that could arise due to faulty equipment.

3.6.2 Determination of Prevalence of Malnutrition

To assess malnutrition status, anthropometry measurements were taken. These included; Weight and height/length of the selected sample were taken upon

admission for those admitted and those seen in the out patients' department. Salter weighing scales model 235 6S manufactured by Salter England and donated to Heri Hospital by UNICEF, was used for record the weight of the children, a wooden height measuring board donated to Heri Hospital by UK aid, was used for taking length/height of the children. The height of children below 2 years of age was taken with them in a recumbent position while that of those above 2 years was taken with them standing.

3.6.3 Identification of Risk Factors of Malnutrition

Data was collected using a predesigned questionnaire. Socioeconomic status of all the families where these children come from was recorded. These included: education background, occupation and age of both parents, number of children in the family, earnings per month of both parents, type of housing, availability of resources like clean water, electricity, dispensaries and schools, and ownership of livestock.

3.6.4 Dietary Assessment

3.6.4.1 Twenty-Four Hour Dietary Recall

The following steps were followed to take and record 24 hr dietary recall (Gina *et al* 2013). Respondents were asked to mention all the foods mother and child had eaten within the previous 24 hrs (day and night). They were told to start from the first thing consumed – food or drinks the previous morning. The foods / drinks mention were written down on the questionnaire. After the respondents recalled all

the foods and beverages consumed and listed by the individual collecting the data, they were all grouped into appropriate food groups and the food groups consumed were indicated for each respondent. The respondents were also probed for snacks of any form consumed by child and recorded in our study as midmorning and midafternoon food. These are also included in the appropriately food groups accordingly. The recalls for mother and child were recorded separately.

3.6.4.2 Food Frequency

The following process was used to obtain the food frequency of the respondents: Respondents were asked to name all the foods/ beverages and drinks they and their children had consumed and the frequencies of consumption of each food / beverage and drink in the past one week. These were recorded by the interviewer in a food frequency questionnaire. (FAO, 2018).

3.6.5 Mitigation Strategies of Malnutrition

Mitigation strategies were identified by having expert focus group discussion (FGD) meetings. The group had 13 members with 1 medical doctor, 9 nurses and 3 nurse attendants. There were 7 males and 6 females. The age range of group members was 28 – 65 years. All the participants were parents except 2 while 6 of the group members were born and raised in this community and have therefore lived in Manyovu all their lives. These are significant facts as they were not novices to the lifestyle and practices of the community. Members of the groups have worked for between 2 and 35 years in this community. The purpose of FGD meeting was to identify mitigation strategies for the reduction of malnutrition that

could best work in this area. The FGD meetings were held twice at Heri Hospital. The first FGD meeting was to share and discuss the research findings and the second FGD meeting was to discuss strategies for mitigation. Their good understanding of the area and people in the area helped in deciding mitigation strategies.

3.7   Data analysis

Specific objective one: To assess prevalence of malnutrition among children aged 6 to 59 months in Manyovu. All the data were statistically analyzed using Statistical Package for Social Science (IBM SPSS statistics 20 - 2016) software. Data were presented in text description, tables and figures to ease understanding of data. The anthropometric data among children aged 6 to 59 months were distributed in z-score and analyzed using WHO growth standards of 2006. The anthropometric statistical programme (WHO Anthro 3.2.2.1 - 2018), WHO Anthropometric calculator version 3.2.2 was used to convert raw anthropometric measurements (weight, height or length of the children) into anthropometric indices of weight-for-age Z-score (WAZ), weight-for-height Z-score (WHZ), and height-for-age Z-score (HAZ) and was compared with the WHO reference data.

Specific objective two: To determine risk factors for malnutrition among children aged 6 to 59 months in Manyovu. Collected data were statistically analyzed using Statistical Package for Social Science (IBM SPSS statistics20 - 2016) software. Data was presented in text description, tables and figures to ease understanding of data.

Specific objective three: To identify the strategies for reduction and control of malnutrition amongst children aged 6 to 59 months in Manyovu, expert focus group meetings were conducted. Several steps were used to analyze the Focus Groups Discussion data. Phase 1, the written document notes taken during the meetings was transcribed. Phase 2 involved coding of the transcription. Inductive codes were established. These are codes that emerged from the analyzed text as described by Grand theory (Charmaz, 2006). Phase 3 of the analysis was the view of researcher's memo obtained during the FGD meetings. Phase 4 was the analysis and interpreting of qualitative data. The fifth and final step is establishing validity and reliability through consensus, coherence, triangulation and reflexivity. This involves presenting the findings to the participants to ascertain that they are in agreement with the conclusions (Eeuwijk *et al*., 2017).

Members of the groups have worked for between 2 to 35 years in this community. The purpose of this FGD meeting was to identify strategies that could best work in this area. The FGD meetings were held twice at Heri Hospital. The first FGD meeting was to share and discuss the research findings and the second FGD meeting was to discuss strategies for mitigation. Their good understanding of the area and people in the area helped in deciding mitigation strategies.

3.8 Ethical Consideration

The Open University of Tanzania issued a permission letter for this research. Permission to carry out the research at Heri Adventist Hospital was sought for and obtained from the administration committee (ADCOM) to conduct the research at

the Hospital.   Consent was also sought from all the parents/guardian of all the children who were included in this study. Confidentially of information / data obtained from recruited mother-child pairs was ensured

CHAPTER FOUR

RESULTS

4.1 Introduction

The total number of respondents that were enrolled in this study was 362. Further inferential statistics is highlighted showing how nutritional indicators; Weight -for- Age Z score, (WAZ), Weight- for- Height Z score, (WHZ) and Height- for -Age Z score (HAZ) scores interacts with the independent variables. This chapter covers the findings of this study. Findings are categorized as follows: sociodemographic/ socioeconomic characteristics of the respondents, nutritional status of the children, dietary pattern for children and mother, correlations of risk factors identified in the study.

4.2 Sociodemographic/Economic Characteristics of the Respondents

The results of sociodemographic characteristics of the respondents are presented in Table 4.1 below. This section describes the respondent's socio-demographic characteristics. Mothers' and fathers' ages, levels of education, occupation and marital status are described. The ages of mothers ranged from 17 to 50 years. The mean age of mothers was 30 ± 7 years. Mothers of the age range 25 to 35 year were 172 (47.5 %), thus representing the majority of the sample. Only 95 (26.3%) of mothers were > 35 years. The ages of fathers ranged from 20 to 82 years. The mean age of fathers was 35 ± 8 years. Fathers of the age range 25 to 35 years were 167 (46.2 %). Fathers of age range of > 35years were 147 (40.6%). Only 25 (7%) of the fathers were below 24 years.

Table 4.1: Demographic characteristic of the parents

Socio-Demographic characteristics	Numbers	Percentages
Maternal age		
<24 years	95	26.2
25 – 35 years	172	47.5
>35 years	95	26.3
Total	**362**	**100**
Maternal level of education		
No formal Education	96	26.5
Primary Education	220	60.8
Secondary Education	38	10.5
Certificate / Diploma Education	4	1.1
University Education	4	1.1
Total	**362**	**100**
Maternal Occupation		
Farming	333	92.0
Formal Employment	8	2.2
Self Employed	11	3.0
House wife	10	2.8
Total	**362**	**100**
Paternal Age		
< 24 years	25	6.9
25-35 years	167	46.1
> 35 years	147	40.6
Not given	23	6.4
Total	**362**	**100**
Paternal level of education		
No formal education	65	18
Primary education	211	58.3
Secondary education	51	14.7
Certificate/Diploma	11	3.0
University	10	2.8
Not given	14	3.9
Total	**362**	**100**
Paternal Occupation		
Farming	311	85.9
Formal employment	21	5.8
Casual labour	1	.3
Self employment	13	3.6
Unemployed student	1	.3
Not given	15	4.1
Total	**362**	**100**

Not given indicates information that were not offered by the respondents who were mostly mothers. These were in relation to paternal age, education and occupation. This information was not offered when the mothers were either not married or separated from the fathers and as in two cases when the mothers were widowed.

Most mothers 220 (60.8%) attended primary school. Only 4 (1.1%) attended university. The results show similar findings among the fathers with most 211 (58.3%) attaining primary education, and least 10 (2.8%) attended university. Most mothers 333 (92.0%) were farmers. The least group 8 (2.8 %) had formal employment. Amongst the fathers, most 311 (85.9 %) were also farmers and the least were 1 (0.3 %), this was a 23 years old young man who was not previously employed. Mothers numbering 340 (93.9%) were married, 9 (2.5%) were single, 11 (3.0%) were divorced and 2 (.6%) were widows.

The results of socio-economic status of the parents are presented on table 4.2 below. The economic status of the respondents was determined by using ownership of land, livestock owned by families and earnings per month. The results show the following: Majority of respondents 198 (54.7%) in the study owned livestock (cows, goats, chickens, and sheep). Respondents who did not own any livestock were 163 (45.3%). Most respondents 289 (79.8%) own a piece of land while 73 (20.2%) did not own any piece of land.

Table 4.2: Socio economic status of the parents

Socio economic of the parents	Number	Percentage
Owned livestock (cows, goats, chicken and sheep)	198	54.7
Did not own livestock	163	45
Owned a piece of land	289	79.8
Did not own a piece of land	73	20.2

The earnings per month were reported to range from two thousand to two million Tanzanian shillings.

4.2.1 Demographic Characteristics of the Study Children

The distributions of study children by age and gender are presented on Table 4.3 below. The number of male children was 182 (50.3%) and female children were 180 (49.7 %). The ages of the children in the study ranged from 6 months to 59 months. The mean age of the Children was 26 ± 14 months.

Table 4.3: Distributions of study children by age and gender

Age in Months All= 362	Boys		Girls		Total	
	No	%	No	%	No	%
6-11	40	22	33	18.3	73	20.2
12-23	38	20.9	47	26.1	85	23.5
24-35	45	24.7	43	23.9	88	24.3
36-47	35	19.2	36	20	71	19.6
48-60	24	13.2	21	11.7	45	12.4
Total	**182**	**100**	**180**	**100**	**362**	**100**

4.3   Prevalence of Malnutrition among Under Five Years Old Children

Figure 4.1 below is a histogram showing $< - 3$ and < 2 standard deviations of wasting, underweight and stunting found in the children.

This section presents the results of the analyses of nutritional status of the children.
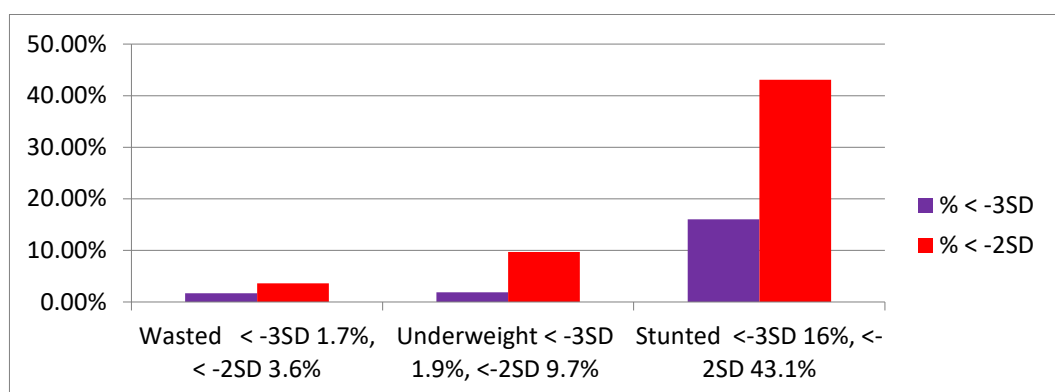
Figure 4.1: Nutritional status of children

4.4   Nutritional status of the children

The summary of nutritional status (WAZ, HAZ, and WHZ) of children per age is presented on Table 4.4. A detailed table of the same can be found in the appendices. As explained previously the nutritional status of children was assessed using the indicators of Weight -for- Age Z score, (WAZ), Weight- for- Height Z score, (WHZ) and Height- for -Age Z score (HAZ).

Table 4.4: The nutrition status of children per age group

Age groups in months	N	WAZ (%)		HAZ (%)		WHZ (%)	
		< -3 SD	< -2 SD	< -3 SD	< -2 SD	< -3 SD	< -2 SD
Total:	362	1.9	9.7	16	43.1	1.7	3.6
(6-11)	73	4.1	15.1	20.5	43.8	1.4	5.5
(12-23)	85	1.2	8.2	16.5	45.9	2.4	3.5
(24-35)	88	1.1	6.8	18.2	54.5	1.1	1.1
(36-47)	71	1.4	8.5	9.9	29.6	2.8	4.2
(48-60)	45	2.2	11.1	13.3	35.6	0	4.4

WAZ: weight for age Z-score HAZ: height for age Z-score   WHZ: weight for height Z-score.

Table 4.5 shows the nutrition status: weight for age Z-score (WAZ), height for age Z-score (HAZ) and weight of height Z-score (WHZ) of children per age per gender. A more detailed table is in appendix 2.

Prevalence of underweight (WAZ) < -2SD was 9.7 %,(95% CI; 6.5-12.9). The

prevalence of WAZ < -3SD was 1.9%, (95% CI; 0.4- 3.5). The most affected age

for both genders < -2SD and < -3SD were children between ages 6-11 months. The

least affected children were between ages 24-35 months. The prevalence of stunting

(HAZ) < -2SD was (43.1 %) (95% CI; 37.9- 48.3) the most affected children were

ages 24-35 months with the prevalence of (54.5%) (95% CI; 43.6-65.5).

Prevalence of stunting < -3SD was 16 %, (95% CI; 12.1-19.9). Children between

ages 6-11 months were the most affected with the prevalence of (20.5 %) (95% CI;

10.6-30.5). Prevalence of wasting < -2SD, was 3.6 %, (95% CI; 1.5- 5.6). The

prevalence of wasting < -3SD was 1.7 %, (95% CI; 0.2- 3.1). The most affected

children were between ages 36-47 months. Children with mild wasting were

between ages 6-11 months. The least affected for mild wasting were between ages

24-35 months.

Table 4.5: The Nutrition status (WAZ, HAZ and WHZ) of children per age per gender

Age group In months	MALE							FEMALE						
	No.	WAZ (%)		HAZ (%)		WHZ (%)		No.	WAZ (%)		HAZ (%)		WHZ (%)	
		< -3SD	< -2SD	< -3SD	< -2SD	< -3SD	< -2SD		< -3SD	< -2SD	< -3SD	< -2SD	< -3SD	< -2SD
Total:	182	2.2	10.4	13.2	44	2.2	4.9	180	1.7	8.9	18.9	42.2	1.1	2.2
(6-11)	40	5	20	17.5	47.5	2.5	10	33	3	9.1	24.2	39.4	0	0
(12-23)	38	2.6	5.3	10.5	44.7	2.6	5.3	47	0	10.6	21.3	46.8	2.1	2.1
(24-35)	45	0	4.4	13.3	55.6	0	0	43	2.3	9.3	23.3	53.5	2.3	2.3
(36-47)	35	2.9	11.4	8.6	31.4	5.7	5.7	36	0	5.6	11.1	27.8	0	2.8
(48-60)	24	0	12.5	16.7	33.3	0	4.2	21	4.8	9.5	9.5	38.1	0	4.8

WAZ: weight for age Z-score HAZ: Height for age Z-score WHZ: weight for height Z-score   < -3SD: - 3 standard deviation   < -2SD: - 2 standard deviation

Male children had higher prevalence of underweight WAZ <-2 SD at 10.4 % (95% CI; 5.7-15.2) and < -3SD 2.2 % (95% CI; 0-4.6) compared to female children who had prevalence of 8.9 % (95% CI; 4.5-13.3) and 1.7 % (95% CI; 0-3.8).

Prevalence of wasting < -2SD and < -3SD were higher amongst male children with 4.9% and 2.2% respectively compared to female children 2.2% and 1.1% . The affected male children with mild wasting were those between ages 6-11 months by 10% and severe wasting was ages 36-47 months by 5.7%. Female children of ages 48-60 months were the most affected with mild wasting at 4.8%. The most affected with severe wasting were ages 24-35 month at 2.3 %. Prevalence of stunting < -2SD was higher amongst male children 44 %, (95% CI; 36.5-51.4) compared to female children 42.2 %, (95% CI; 34.7- 49.7). Most affected male children were of ages 24-35 months. The least affected were those of ages 36-47 months. Prevalence of severe stunting was higher amongst female children of ages 6-11 months by 24.2%. The least affected children were ages between 48-60 months. A more detailed table is in Appendix 3.

4.5   Dietary Pattern for Children and Mothers

4.5.1 Breastfeeding

About 95% of mothers did exclusive breastfeeding. However, there was no correlation between breastfeeding with the nutritional status of the children.

4.5.2 Food Groups Consumed by Mothers in The Last 24 hours

Table 4.6 shows food groups consumed by mothers in 24hour recall. The food groups were adopted from FANTA (Swindale *et al* 2006) into eleven groups

namely: Cereals, roots and tuber, vegetables, fruits, meat and poultry, eggs, fish and sea food, pulse/legume/nuts, milk and milk products, oils/fats, sugar/honey. Cereals were consumed by 188 (51.9%) of mothers, 263 (72.7%) consumed roots and tubers, 143 (39.5%) consumed vegetables, 204 (56.6%) consumed fruits and 38 (10.5%) consumed meat and poultry. Only 12 (3.3%) mothers consumed eggs, 240 (66.3%) consumed fish and sea foods, 333 (92.0%) consumed pulse/legumes/nuts, 36 (9.9%) consumed milk or milk products, 357 (98.4%) consumed foods cooked in oils/fats and 121 (33.4%) of the mothers consumed sugar/honey.

Table 4.6: Food groups consumed by mothers

Food groups consumed by mothers				
Food group	Mothers who consumed	Percentage	Mothers who did not consume	Percentage
Cereals	188	51.9	174	48.1
Roots and tubers	263	72.7	99	27.3
Vegetables mother	143	39.5	219	60.5
Fruits	204	56.3	158	43.7
Meat and poultry	38	10.5	324	89.5
24hr eggs	12	3.3	350	96.7
24hrs fish and sea foods	240	66.3	122	33.7
24hrs pulse/legumes/nuts	333	92	29	8
24hrs milk/milk products	36	9.9	326	90.1
24hrs oils/fats	357	98.6	5	1.4
24hrs sugars/honey	121	34.3	241	65.7
24hrs miscellaneous products (soft drink, juice, biscuits)	124	34.3	238	65.7

4.5.3 Food Groups Consumed by Children in the Last 24 Hours

Table 4.7 illustrates food groups consumed by children. The foods for children were grouped into eight groups adopted from FANTA (Swindale *et al* 2006). The groups include: grains/roots/tubers, Vitamin A rich plant foods (carrots, sweet potatoes, orange, and spinach), fruits/vegetables, meat/poultry/fish/ seafood, eggs, pulse/legumes/nuts, milk and milk products, and oils/ food cooked in oil. Grains/roots/tubers were consumed by 353 (97.5%) children, 70 (19.3%) consumed

vitamin A rich plant foods, 231 (63.8%) consumed fruits /vegetables, 220 (60.8%) of the children consumed meat/poultry/fish/seafood. Only 10 (2.8%) consumed egg, 316 (87.3%) consumed pulse/legume/nuts, 134 (37.0%) of the children consumed milk or milk product and 352 (97.2%) consumed food cooked in oils/fats.

Table 4.7: Food groups consumed by children

Food groups consumed by children				
Food group	Children who consumed	Perce ntage	Children who did not consume	Perce ntage
24hrs grains/roots/tuber	353	97.5	9	2.5
24hrs Vit A rich plants food (carrots, sweet potatoes, orange, spinach…)	70	19.3	292	80.7
24hrs fruits/vegetables	231	63.8	131	36.2
24hrs meat/poultry/fish/seafood	220	60.8	142	39.2
24hrs egg	10	2.8	354	97.2
24hrs pulse/legume/nuts	316	87.3	46	12.7
24hrs milk/milk products	134	37	228	63
24hrs food cooked in oil/fat	352	97.2	10	2.8

4.5.4 Mothers and Children Food Groups Consumed and Frequency

The number of food groups consumed by children and mothers by dietary diversity tercile is presented in Table 4:8. The table indicates that most children 246 (68%) consumed medium dietary diversity (4 &5 food groups) out of the eight groups. The same was also noted for the mothers. Majority of them 178(49%) consumed high dietary diversity ($\geq$ 6 food groups) unlike their mothers.

Table 4.8: Mothers and children food groups consumption by dietary diversity tercile

	Lowest Dietary Diversity ($\leq$ 3 Food groups)	Medium dietary diversity (4&5 food group)	High dietary diversity ($\geq$ 6 food groups)
Children	43 (12%)	246 (68%)	73 (20%)
Mothers	17 (5%)	167 (46%)	178 (49%)

4.6   Correlations of Risk Factors Identified in the Study

This section presents all the correlations of risk factors identified with the nutritional status of the children.

4.6.1 Correlation between Children Nutrition Status and Parental Factors

Table 4:9 presents the correlations of maternal and paternal level of education with the nutritional status of the children. The levels of education of both parents were found to significantly positively correlate with the nutritional status of the children with weight-for-age and height-for-age respectively. The children from families where mothers and fathers did not have formal education or were primary school leavers were negatively affected on the weight-for-age and height-for-age of the children. Ages of both mothers and fathers was found not to correlate with the nutritional status of the children. The children whose parents especially mothers had secondary education and above, were less malnourished compared to those whose parents who had no education or only had primary school level education.

Table 4.9: Pearson correlations Sig. (2-Tailed) of maternal and paternal level of education with Nutritional status of the children

Maternal and paternal level of education correlation	Weight for age Z score	Height for age Z score	Weight for height Z score
No formal education Mother	-.071	-.116	.023
Primary Mother	-.074	-.013	-.080
Secondary Mother	.152**	.116*	.070
Certificate/Diploma Mother	.062	.106*	-.010
University Mother	.136**	.105*	.082
No formal education Father	-.049	-.147**	.074
Primary Father	-.125*	-.011	-.112*
Secondary father	.059	.070	.023
Certificate/Diploma Father	-.025	-.019	.007
University Father	.029	.014	.046
*. Correlation is significant at the 0.05 level (2-tailed)			

4.6.2 Correlation between Children Nutrition Status and Socio- Economic Factors'

Table 4:10 reveals that children of parents who had higher earnings were better in terms of weight-for-age and height-for-age compared to those whose parents had low earnings. Earnings per month were found to significantly and positively correlate with weight-for-age, and height-for-age of the children respectively. There was a positive correlation with number of crops with weight-for-eight of the children and negative with height-for-age. Occupation of the parents and marital status were also found not to correlate with the nutritional status of the children. There was also no significant correlation between owning piece of land, access to clean water, type of housing, own livestock with the nutritional status of the children.

Table 4.10: Pearson correlation Sig. (2-Tailed) of maternal and paternal level of education with Nutritional status of the children

Maternal and paternal demographics	Weight for Age Z score	Height for Age Z score	Weight for Height Z score
Age of Mother/guardian	-0.046	-0.056	0.009
Age of Father/Guardian	-0.028	-0.035	0.01
Maternal Education	.185[**]	.197[**]	0.048
Paternal Education	.158[**]	.206[**]	0.017
Maternal occupation	0.099	0.095	0.027
Paternal occupation	-0.023	-0.043	0.013
Marital status	-0.023	0.009	-0.017
Maternal and paternal socio economic			
Number of children	-0.087	-.131[*]	0.019
Earn per Month	.161[**]	.172[**]	0.036
Own piece of land	-0.023	0.088	-0.085
Access to clean water	0.031	0.049	-0.008
Type of housing	-.111[*]	-0.098	-0.043
Number of crops	.038	-.114[*]	.114[*]
Own livestock	-0.059	-0.06	-0.024
*. Correlation is significant at the 0.05 level (2-tailed)			

4.6.3 Correlation of Number of Food Groups Consumed by Children, Exclusive Breastfeeding and the Nutritional Status of Children

Table 4.11 shows the results on the correlation of number of food groups consumed by children and exclusive breast feeding with their nutritional status. There was no correlation between the numbers of food groups consumed by the children and exclusive breastfeeding with their nutritional status.

Table 4.11: Correlation of number of food groups consumed by children, exclusive breastfeeding and the nutritional status of children

	Weight for age Z score	Height for age Z score	Weight for height Z score
24hrs recall number of food groups child	.088	.019	.069
Exclusive breastfeeding	-.010	.014	-.013
*. Correlation is significant at the 0.05 level (2-tailed)			

4.7   Mitigation Strategies for Malnutrition

The following were the strategies identified based on prevalence and risk factors:

i)   Health and Nutrition promotion to encourage behavior change.

The FGD came up with the behaviour change because a lot of people in the community sell their farm produce, the livestock and produce from their livestock and use the funds to meet other family needs. They do not take appropriate advantage of most of what they produce to the nutritional benefit of the family. They need to be thought on the food groups and their nutritional advantages on their health and that of their children.

ii)   The district government to reinforce regulations that mandates parents to educate their female children up to a minimum of secondary level. This

study observed negative effect of the mothers' education with the nutritional status of their children. The FGD felt that it will be helpful to the children to find a way to encourage young girls in the community to attain a minimum of secondary level education as this will positively impact on the health and nutritional status on their future children and families

iii) Advocate for and support all referral Hospitals to have nutritional units and ensure the availability of all the necessary supplementary feeding programs. Given the fact that there is no functional nutritional unit in the Manyovu area, the wider district and in Kigoma region, having such units will go a long way in assisting children in with acute and chronic nutritional problems in the communities. When this happens, the women in the community will have the chance to be taught how to feed their children properly while in the hospital. They will also be taught different kinds of recipes made from the available food so that when they leave the hospital, they can continue feeding their children in healthy manner with the locally available foods.

iv) To encourage agencies, organizations and health institutions to conduct further nutrition surveys in this area to establish if the factors are consistent over time or if there have been any changes. This will guide the focusing of health and nutritional interventions.

v) Establishing economic empowerment programs for women in the community as what they earn when they are economically empowered will most likely be spent on their children. Economically empowering women in the community will increase the earning power and social status of the families. This will reduce malnutrition among children in the community.

vi)   RCH and children's ward staffs to make sure that when children come to the hospital either as an outpatient or inpatient their nutritional status are routinely checked, and nutritional counsel / education given to their mothers or guardians.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1   Introduction

Child malnutrition causes health treats worldwide especially in developing countries. The present study aimed at finding the level of malnutrition in Manyovu. The aims were divided into three areas of assessment; first: prevalence of malnutrition among under-fives, second: to assess the risk factors and third: to find the strategies for reduction and control of malnutrition amongst children of 6 to 59 months. This chapter discusses the findings of the present study.

5.2   Prevalence of Malnutrition Amongst Children Aged 6 to 59 Months

The analyses showed that the prevalence of underweight was 9.7%, stunting was 43.1%, and wasting 3.6%. Level of stunting in Manyovu (43.1%) was higher than that of national level 34% (Ash *et al*, 2017).   The observed prevalence of underweight and wasting were lower compared to those recorded for Kigoma Region, which were 19.4% and 6.0% (Ash *et al*, 2017). This could be because Kigoma region includes those of both Buhigwe where Manyovu is and Muyama District. Manyovu could only add little percentage to the whole region. The prevalence of both underweight and wasting were also lower when compared to that of Nzega district, which was 11.7% and 6.0% (John *et al* 2015). They were also lower compared to that of North Sudan which was at 32.7% and 21%. However the level of stunting observed in this study was slightly higher than that reported in North Sudan 42.5% (Sulaiman *et al* 2018).   The prevalence of stunning,

underweight, and wasting is this study was lower than that reported in a study done in South Ethiopia which was 47.6%, 29.6%, and 13.4% respectively (Asfaw *et al* 2015). This is not surprising as it only proves that people in rural areas are the most affected. All these studies were done in rural areas, and the findings only show the need to do better in rural areas.

The study in Nzega was done on prevalence of malnutrition amongst the children of the same age groups as in this study. We expected to see similar results as both studies were conducted in rural areas where food can be relatively easier to reach than in urban areas. This is however not surprising as different villages may not have similar resources. The time difference in these studies could also be a factor in the difference in findings as efforts of the Tanzanian government and other agencies to improve the nutrition of the communities is also yielding positive fruits.

The stunting in this study was, higher (43.1 %) than those of Kigoma region, Nzega district and North Sudan which are 37.9%, 26.1% and 42.5% respectively. The level of stunting in the in Manyovu was also found to be much higher than the national who was at 34%. This study suggests that Manyovu may contribute more to the overall status of stunting in Kigoma and even nationally. A study done in Burundi on the prevalence of malnutrition on the children of the same age groups found the prevalence of stunting to be at 57.7% (Akombi *et al,* 2017).

Prevalence of severe stunting reported was higher amongst female children of ages between 6-11 months at 24.2%. This could be because this is the age range when they start supplementary foods, given the fact that their mothers may not be well

aware of how or what foods to start their children on. It is also possible that these young ones are left under the care of not much older siblings or relations. This is contrary to the study done in North Sudan. The study reported higher prevalence of stunting amongst older boys than girls (Sulaiman *et al* 2018). Male children had higher prevalence of underweight compared to female children. This could be due to the fact that female children are always where food is being cooked while the boys are out a lot more coming in when it is meal time.

Manyovu shares a boarder with Burundi, this raises a question of whether it could be the same factors accounting for stunting in these areas. This is a question that needs to be answered. Therefore, further study needs to be conducted in this same area in order to find out for a fact if the cause of the level of stunting is due to lack of nutrients, or by enteric infections leading to intestinal inflammation and malabsorption of nutrients or human genetic polymorphisms that can alter host genes that affect nutrient absorption and metabolism.

5.3 Risk Factors for Malnutrition Among Children Aged 6 to 59 Months

The characteristics of the parents recorded and analyzed in this study were, age, level of education, occupation, and marital status.

5.3.1 Maternal and Paternal Age

The age of mothers was found not to correlate with the nutritional status of the children. The fathers in this study were older than the mothers; however, their ages similarly did not correlate with the nutritional status of the children. Ages of both mothers and fathers were found however to significantly positively correlate with

the number of children. The older the fathers and mothers are the more children they have. This is because they do not believe in any form of family planning as they believe that each child comes with his own "luck" in life. They believe that the more children they have the higher the chances of one doing well in life.

5.3.2 Maternal and Paternal Education

The more the parents were educated, the better their children's nutritional status. The findings of this study support the study previously done at Kilimanjaro Tanzania (Abubakar *et al*, 2012). And also supports a study done in South Ethiopia where it was also found parent's education had strong relationship with the nutritional status of the children (Asfaw *et al* 2015). The finding also supports the study done in Democratic Republic of Congo (Kandala *et al*, 2011) where it was also reported that mother's education positively correlated with the nutritional status of the children.

Similarly, there was a significant and positive correlation between fathers' education and nutritional status of the children. The children from parents who were primary school leavers or those who did not have formal education were more malnourished compared to those from families where both parents had secondary education and above. Several other studies support the findings of this study (Ansuya *et al* 2018, Jamro et al 2010 and Kikafunda *et al* 2020). Parents' education contributes in various ways to the nutritional status of children as their earning power is increased and they are better informed of the basics of food and nutrition helping them adopts better feeding practices. Based on their level of education, they

could be also more aware of the importance of personal and home hygiene and general cleanliness. All these impacts positively on the nutritional status of their children and the members of the household in general.

5.3.3 Maternal and Paternal Occupation

As stated in the results section, majority of the parents both mothers and fathers were farmers. No correlation was observed between both mothers' and fathers' occupation with the nutritional status of the children in this study. This supports a similar study carried out in Kenya (Abinya, 2012) where there was no correlation between maternal occupation and nutritional status of the children.

5.3.4 Marital status

It was observed that majority of the mothers registered in the study were married and few were single, divorced or widowed. There was no correlation found between marital status and the nutritional status of the children in this study. This may be because the percentage of single mothers, divorced and widows were low. This finding supports previous findings of the study done in Kenya (Abinya 2012), Bugando Tanzania (Ahmed.M *et al*, 2016) which found no relationship between marital status and nutritional status of the children,

5.3.5 Land and Livestock Ownership

Although higher percentage of respondents in this study owned a piece of land and livestock this did not impact positively on the nutritional status of the children as we expected. Parents' land and livestock ownership is a part of an indication of

how many resources are available to the family. These factors have however not been found to have the impact they are expected to have. This is also contrary to a study done in North Sudan where economic status of parents had a relationship with nutrition status of their children (Sulaiman *et al* 2018). In support to the findings of this study another study in Ghana found socioeconomic factors of the parents as risk factors to malnutrition in children (Anderson *et al.*2010). This only suggests that a major problem with the nutritional status of children who are seen in Heri Adventist Hospital from the surrounding communities is majorly that of lack of nutritional knowledge and practices.

5.3.6 Number of Foods Groups Consumed by Mothers and Children in The Last 24 Hours

The 24 hr recall indicates that the eating pattern of nearly the entire community is the same. Almost all the respondents in the study listed the same types of foods. The quantity of these classes and items consumed are possibly a factor that needs exploration. The children eat the same foods their mothers eat. It was observed that majority of children 88 (24.3%) consumed five food groups, and minority 1.1% of the children consumed two food groups. Though higher percentage of children consumed five food groups, there was no correlation with their nutritional status. This is not surprising as those who ate more number of food groups were only 11 (3.0%). This percentage could not have made any major difference.

In the meat/poultry/fish/seafood group almost only "dagaa", a kind of small fish they get from Mwanza was consumed in most homes. Most homes did not consume

any other form of animal protein. The small fish from Mwanza is more affordable than fish from Lake Tanganyika which are much more expensive. Most of the homes do not consume eggs as those whose chickens lay eggs sell them to make money while those who do not have poultry cannot afford eggs. Oils that are consumed by most households in the community are as food ingredients. No other forms of fats such as margarine, butter or cheese was consumed. Even though most people in the community are farmers they do not consume many food groups in their homes because much of their farm produce is sold to earn money for family use.

5.3.7 Breastfeeding Practices, Access to Clean Water and Health Centre

Some of direct causes of malnutrition are: unclean water, breastfeeding practices, and access to health center. In the current study 341 (94.2%) of the families had access to clean water, more than 342 (94.5%) exclusively breast fed their children, 349 (96.4%) had access to health center, 343 (94.8%) had easy access to school and 257 (71.0%) had electricity. However, these findings did not have any relationship with the nutritional status of the children. This supports a study done in North Sudan where they reported no relationship with nutritional status of the children. However this is contrary to a previous study done in DRC (Kandala *et al*, 2011) and India (Jamro *et al*., 2012). It was also contrary to the previous study done in Nzega district (Safari *et al,* 2015) where it was reported that breastfeeding practices and access to clean water was a big problem. Breastfeeding practices in these studies had a significant relationship with the nutritional status of the children. This could however explain the fact that the percentage of wasting and underweight is

significantly low in this area mostly because of good breastfeeding practices and access to clean water, even though stunting is at a significantly higher level.

The lack of correlation found between parents' occupation and number of food groups and the nutritional status of the children is possibly because of poor knowledge of nutrition and feeding practices. The reason for the lack of correlation between breastfeeding and nutritional status of the children is possibly because the children in the study were already consuming other food and were not only breastfeeding at the time, they were recruited in the present study.

5.4   Strategies for Reducing Malnutrition Among Children

This section presents strategies for mitigation of malnutrition in Manyovu as the focus group resolved.

5.4.1 Provision of Education on the Importance of Child Nutrition

Child nutrition is still a big problem all over the world. This study and many more around Africa have proven the need for continued child nutritional education to the parents mostly in rural areas, before these little ones are born. It is believe when that is done, we will be able to reduce and control child malnutrition. To accomplish this, this study suggests that Nutrition clinic should be started at the hospital to be run once a week. In this clinic mothers will be educated on the importance of making sure the child eats all the food groups at each meal. In a reproductive and child Health clinic emphasis is placed on maternal care, emergency obstetric care, and new born and postpartum care, diagnosis and

management of sexually transmitted diseases, including maternal and child transmission and family planning. A nutrition clinic on the other hand will more specifically monitor nutritional development of the child and address identified challenges therapeutically.

Mothers will be instructed on how to better feed the child. The instruction will include cooking demonstrations of different recipes with food materials locally available in the community. The study conducted in Bagamoyo indicated that verbal instructions to mothers/caregivers about providing a balanced diet are unlikely to be very effective in addressing malnutrition (Ali *et al* 2016). Another study done in Uganda found that children from families where mothers were not educated were more undernourished (Kikafunda *et al* 2020). If the mothers have the knowledge they need on child nutrition, they would be better placed to take good care of their children nutritionally.

5.4.2 Educate Community on Importance of Birth Control Spacing

Most people in this area believe in having as many children as possible not considering that having more children makes it harder to sustain the family considering their socio-economic status. A study done in Nzega reported that chronic malnutrition (stunting) was significantly associated with mother's number of antenatal care visits and family size (Safari *et al* 2015). Education on the importance of birth control, birth spacing/family planning will help reduce malnutrition in children. This can be achieved by using: Antenatal and post natal

clinics, Religious houses and denominations, Women's groups, Market women groups and Outreach programs.

5.4.3 Emphasis on Educating Female Child to a Minimum of Secondary Level in the Community

This study concurs with many other studies on education of female child. A study done in Bugando reported that low maternal education associated with severe malnutrition of children aged less than 2years (Ahmed *et al* 2016). This was also the same for a similar study done in Kilimanjaro. The study reported that concerns on child growth and maternal education were found to independently predict stunting (Abubakar *et al* 2012). Chronic malnutrition (stunting) was also reported to be significantly associated with maternal education (Safari *et al* 2015).

5.5   Study strengths

Data on all variables were collected only once for each respondent. The researcher was able to measure prevalence for all factors under investigation. The research assistants were very competent with their work. The study was relatively quick and easy to conduct as there was no follow up. All efforts were made to ensure that the measurements on the children were accurate as any shortfall on that would have made the study unreliable. The Hospital Administration and staffs were generally ready and available to render their assistance where needed. This study is the first of its type in Manyovu. Therefore, the data provided may constitute a database for future studies in this same area.

5.6   Study Limitations

There may be recall bias for some questions concerning feeding practices. The study does not help determine cause and effect.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents conclusion and recommendations on the prevalence of malnutrition, risk factors and strategies for reducing malnutrition among children ages 6 to 59 months in Manyovu.

6.2 Conclusion

The study assessed prevalence of malnutrition among children of aged 6 to 59 months in Manyovu. The data was collected using a structured questionnaire from 362 respondents who met the inclusion criteria of the study. Consent was gotten from the mothers/ caregivers before the mother-child pairs were included. Child nutritional status was assessed based on anthropometric measurements. The potential contributing factors to malnutrition were also assessed. These included: socio-demographic/ economic characteristics, and exclusive breastfeeding. Data were statistically analyzed using statistical package for social science (IBM SPSS statistics 20-2016) software.

WHO Anthropometric calculator version 3.2.2 was used to convert raw anthropometric measurements (weight, height or length of the children) into anthropometric indices of weight-for-age Z-score (WAZ), weight-for-height Z-score (WHZ), and height-for-age Z-score (HAZ) and was compared with the WHO reference data. The researcher worked with two research assistants who were

competent. The results of this study confirm the existence of child malnutrition in Manyovu and the surrounding communities. The findings were as follows: underweight 9.7 %, stunting 43.1%, and 3.6% wasting.

The present study determined parental ages, levels of education, and earnings per month, access to clean water, number of food groups consumed and exclusive breastfeeding as risk factors for malnutrition among children aged 6 to 59 months in Manyovu. Strategies for reduction and control of malnutrition were identified by having an expert group meeting. These includes: education of young girls, economic empowerment of women and establishing of nutritional units in health care institutions.

6.3   Recommendations

Given the high prevalence rates of malnutrition in the Manyovu area the researcher recommends the following:

i)   Advocate the establishment of nutritional units in the hospitals in the area. This will serve the purpose of both providing interventional care for acutely malnourished children and also serve as nutritional educational units for mothers.

ii)   Encourage women economic empowerment programs in the area. This will help improve family incomes that will reflect directly on the welfare of the children. Encourage the community leaders to help in ensuring that the already existing minimum education level recommended by the Tanzania government is ensured by parents in the communities of Manyovu.

iii) Water, Sanitation, and Hygiene (WASH) interventions is said to have the highest effect in the reduction of stunting. Since the finding of this study shows high level of stunting (43.1%) in this area, we recommend the village leaders to help encourage this WASH program to be emphasized in this community. Further study is recommended to determine the causes of high prevalence rate of stunting in the community.

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APPENDICIES

Appendix I: Questionnaire

Prevalence of malnutrition, associated risk factors and strategies for reducing malnutrition among children under five years of age at Heri Adventist Hospital Buhigwe District, Kigoma –Tanzania

Date of data collection (dd_____ /mm_____ /yr_____)

SECTION A: SOCIO ECONOMIC STATUS

1.   Name of the respondent (initials) …………………………………………..

2.   Relationship with the child   ( ) mother   ( ) guardian

3.   Age or year of birth of the mother/guardian: ………………………………

4.   Marital status of Mother:

     ( ) Married. ( ) Single.   ( ) Divorced/separated. ( ) Widowed   ( ) Cohabiting.

5.   Age or year of birth of the father: …………………………………

6.   Maternal educational level:

      ( ) No formal education. ( ) Primary education.   ( ) Secondary education.

       ( ) Certificate/ Diploma level Higher Education.   ( ) university education.

7.   Maternal occupation:

      ( ) Cash crop farming. ( ) Subsistence farming. ( ) Formal employment

      ( ) Casual laborer.   ( ) Self employed.   ( ) House-wife. ( ) Student.

8.   Paternal Educational Level:

      ( ) No formal Education. ( ) Primary Education.   ( ) Secondary Education.

      ( ) Certificate/ Diploma level Higher Education.   ( ) University Education.

9. Paternal occupation:

    ( ) Cash crop farming.   ( ) Subsistence farming.   ( ) Formal Employment.

    ( ) Casual laborer.   ( ) Self Employed.   ( ) No Employment.   ( ) Student.

10. Does the house-hold own piece of land for farming?   ( ) Yes.   ( ) No.

11. What is the total acreage of the farm?

    What crops does the family farm…………………………………..

12. How many children are in the family? ………….

13. How much money does the family earn per month? ……………………..

14. What type of housing does the family have:

    ( ) Brick house with aluminum roof. ( ) Mud house with aluminum roof. ( )

    Mud house with grass roof.

15. Does the family have easy access to clean water ( ) yes. ( ) No.

16. Does the family have easy access to any health center? ( ) Yes. ( ) No.

17. Does the family have electricity in the house? ( ) Yes. ( ) No.

18. Any School near by the house? ( ) Yes. ( ) No.   `

19. Does your house-hold own any of the following Livestock Yes/No Number?

    i)   Cows   ( ) Yes. How Many? (   )   ( ) No

    ii)   Goats   ( ) Yes. How Many? (   )   ( ) No

    iii)   Sheep   ( ) Yes. How Many? (   )   ( ) No

    iv)   Poultry   ( ) Yes. How Many? (   )   ( ) No

    v)   Donkeys ( ) Yes.   How Many? (   )   ( ) No

SECTION B: CHILD INFORMATION

20. Sex of the child :( ) Male   ( ) Female

21. Age in months: ……………

22. Weight (kgs) : ……………

23. Height (cm): ……………..

24. Mid-upper arm circumference (cm): ………

25. Is/was the child on exclusive breast feeding for the first six (6) months?( )

    Yes ( ) No

26. Is/was the child breast feeding very well?   ( ) YES   ( )   NO

27. Has the child started eating other foods?   ( ) YES   ( ) NO

28. At what age (in months) was the child introduced to weaning foods?

    …………..

29. Does the child eat very well? ( ) YES   ( ) NO

30. How many meals a day does the child eat? ....

31. Does the child eat between meals? ( ) YES   ( ) NO

32. Who prepares food for the child?

    ( ) mother.   ( ) father.   ( ) sister. ( ) brother.   ( ) grandmother. ( ) aunty.   ( )

    House help.

33. Who feeds the child?

    ( ) mother.   ( ) father.   ( ) sister.   ( ) brother.   ( ) grandmother.   ( ) aunty.   ( )

    House help.

34. What kind of food does the child eat in the morning?

    ( ) Millet porridge. ( ) corn porridge. ( ) Tea Mandazi   ( ) Tea chapatti   ( )

    other specify……………………………………

35. What kind of food does the child eat lunch time? ( ) rice, beans.

    ( ) rice, beans, vegetables   ( ) Ugali, beans.   ( ) Ugali, beans, vegetables.

( ) rice, meat/fish. ( ) rice, meat/fish, vegetables. ( ) Ugali, meat/fish.

( ) Ugali, meat/fish vegetables . ( )cooked banana, meat/fish/beans. ( ) cooked banana, meat/fish/beans, vegetables. ( ) sweet potatoes, beans, meat/fish.

( ) sweet potatoes, beans, meat/vegetables ( ) other specify…………………

36. What kind of food does the child eat for evening?

( ) Millet porridge. ( ) Millet porridge with milk ( ) corn porridge . ( ) corn porridge with milk. ( ) plain tea mandanzi. ( ) Milk and Mandazi ( ) Tea/milk chapatti ( ) rice, meat/fish, vegetables. ( ) Ugali, meat/fish. ( ) Ugali, meat/fish vegetables. ( ) Ugali beans. Ugali beans and vegetables ( ) cooked banana, meat/fish/beans. ( ) cooked banana, meat/fish/beans, vegetables. ( ) sweet potatoes, beans, meat/fish. ( ) sweet potatoes, beans, meat/vegetables ( ) other specify……………………………………

37. Do you have any problems that you think is preventing you from providing adequately for your child? ( ) Yes. ( ) No

Please mention………………………………………………

SECTION C: DIETARY ASSESMENT

C-1: 24 hrs recall

List the foods eaten by the mother in the last 24 hrs.

MEALS	TIME	FOOD EATEN
Breakfast		
Mid morning		
Lunch		
Mid afternoon		
Dinner		

List the foods eaten by the child in the last 24 hrs.

MEALS	TIME	FOOD EATEN
Breakfast		
Mid morning		
Lunch		
Mid afternoon		
Dinner		

C-2: FOOD FREQUENCY

The Child's Diet at home

Meals	Foods	Food Category	Frequency
BREAKFAST			
LUNCH			
DINNER			

Expected time of Commencing the Study: 1st of June 2018

Expected time of completing the Study   : 30th of November 2018

Signatures:

Student………………………… Date…………………………………………………

Comments of the supervisor

Supervisor……………………………Date………………………………………………

Appendix 2: The Nutrition Status (WAZ, HAZ and WHZ) of Children Per Age

Age groups	N	Weight-for-Age (%)					
		% < 3SD	(95% CI)	% < -2SD	(95% CI)	Mean	SD
Total:	362	1.9	(0.4%,3.5%)	9.7	(6.5%,12.9%)	-0.66	1.1
(6-11)	73	4.1	(0%, 9.3%)	15.1	(6.2%, 24%)	-0.61	1.3
(12-23)	85	1.2	(0%, 4.1%)	8.2	(1.8%,14.7%)	-0.35	1.3
(24-35)	88	1.1	(0%, 3.9%)	6.8	(1%, 12.7%)	-0.68	1
(36-47)	71	1.4	(0%, 4.9%)	8.5	(1.3%,15.6%)	-0.8	0.9
(48-60)	45	2.2	(0%, 7.6%)	11.1	(0.8%,21.4%)	-1.05	0.8
		Length/height-for-age (%)					
		% < -3SD	(95% CI)	% < -2SD	(95% CI)	Mean	SD
Total:	362	16	(12.1%,19.9%)	43.1	(37.9%,48.3%)	-1.74	1.38
(6-11)	73	20.5	(10.6%,30.5%)	43.8	(31.8%,55.9%)	-1.56	1.7
(12-23)	85	16.5	(8%, 24.9%)	45.9	(34.7%,57.1%)	-1.73	1.38
(24-35)	88	18.2	(9.6%,26.8%)	54.5	(43.6%,65.5%)	-1.9	1.44
(36-47)	71	9.9	(2.2%,17.5%)	29.6	(18.3%,40.9%)	-1.66	1.05
(48-60)	45	13.3	(2.3%, 24.4%)	35.6	(20.5%,50.7%)	-1.85	1.09
		Weight-for-Length/Height (%)					
		% < -3SD	(95% CI)	% < -2SD	(95% CI)	Mean	SD
Total:	362	1.7	(0.2%, 3.1%)	3.6	(1.5%, 5.6%)	0.41	1.36
(6-11)	73	1.4	(0%, 4.7%)	5.5	(0%, 11.4%)	0.41	1.47
(12-23)	85	2.4	(0%, 6.2%)	3.5	(0%, 8%)	0.65	1.68
(24-35)	88	1.1	(0%, 3.9%)	1.1	(0%, 3.9%)	0.47	1.19
(36-47)	71	2.8	(0%, 7.4%)	4.2	(0%, 9.6%)	0.22	1.18
(48-60)	45	0	(0%, 1.1%)	4.4	(0%, 11.6%)	0.12	1

Appendix 3: The Nutrition Status (WAZ, HAZ and WHZ) of Children Per Age Per Gender

Age groups	N. Male	Weight-for-Age (%)				N. Female	Weight-for-Age (%)		
		% < -3SD	(95% CI)	% < -2SD	(95% CI)		% < -3SD	(95% CI)	% < -2SD
Total:	182	2.2	(0%, 4.6%)	10.4	(5.7%, 15.2%)	180	1.7	(0%, 3.8%)	8.9
(6-11)	40	5	(0%, 13%)	20	(6.4%, 33.6%)	33	3	(0%, 10.4%)	9.1
(12-23)	38	2.6	(0%, 9%)	5.3	(0%, 13.7%)	47	0	(0%, 1.1%)	10.6
(24-35)	45	0	(0%, 1.1%)	4.4	(0%, 11.6%)	43	2.3	(0%, 8%)	9.3
(36-47)	35	2.9	(0%, 9.8%)	11.4	(0%, 23.4%)	36	0	(0%, 1.4%)	5.6
(48-60)	24	0	(0%, 2.1%)	12.5	(0%, 27.8%)	21	4.8	(0%, 16.3%)	9.5

Length/Height-for-Age (%)

Age groups	N. Male	% <-3SD	(95% CI)	% < -2SD	(95% CI)	N. Female	% < -3SD	(95% CI)	% < -2SD
Total:	182	13.2	(8%, 18.4%)	44	(36.5%, 51.4%)	180	18.9	(12.9%, 24.9%)	42.2
(6-11)	40	17.5	(4.5%, 30.5%)	47.5	(30.8%, 64.2%)	33	24.2	(8.1%, 40.4%)	39.4
(12-23)	38	10.5	(0%, 21.6%)	44.7	(27.6%, 61.9%)	47	21.3	(8.5%, 34%)	46.8
(24-35)	45	13.3	(2.3%, 24.4%)	55.6	(39.9%, 71.2%)	43	23.3	(9.5%, 37%)	53.5
(36-47)	35	8.6	(0%, 19.3%)	31.4	(14.6%, 48.2%)	36	11.1	(0%, 22.8%)	27.8
(48-60)	24	16.7	(0%, 33.7%)	33.3	(12.4%, 54.3%)	21	9.5	(0%, 24.5%)	38.1

Weight-for-Length/Height (%)

Age groups	N. Male	% < -3SD	(95% CI)	% < -2SD	(95% CI)	N. Female	% < -3SD	(95% CI)	% < -2SD
Total:	182	2.2	(0%, 4.6%)	4.9	(1.5%, 8.4%)	180	1.1	(0%, 2.9%)	2.2
(6-11)	40	2.5	(0%, 8.6%)	10	(0%, 20.5%)	33	0	(0%, 1.5%)	0
(12-23)	38	2.6	(0%, 9%)	5.3	(0%, 13.7%)	47	2.1	(0%, 7.3%)	2.1
(24-35)	45	0	(0%,1.1%)	0	(0%, 1.1%)	43	2.3	(0%, 8%)	2.3
(36-47)	35	5.7	(0%,14.8%)	5.7	(0%, 14.8%)	36	0	(0%, 1.4%)	2.8
(48-60)	24	0	(0%, 2.1%)	4.2	(0%, 14.2%)	21	0	(0%, 2.4%)	4.8

Appendix 4:   Clearance Letter

THE OPEN UNIVERSITY OF TANZANIA

DIRECTORATE OF POSTGRADUATE STUDIES

P.O. Box 23409
Dar es Salaam, Tanzania
http://www.openuniversity.ac.tz

Tel: 255-22-2668992/2668445
ext.2101
Fax: 255-22-2668759
E-mail: dpgs@out.ac.tz

Our Ref: PG201705552

Date: 25ᵗʰ May,2018

Director,
Heri Adventist Hospital,
Buhingwe,
Kigoma.

RE: RESEARCH CLEARANCE

The Open University of Tanzania was established by an act of Parliament No. 17 of 1992, which became operational on the 1st March 1993 by public notice No. 55 in the official Gazette. The act was however replaced by the Open University of Tanzania charter of 2005, which became operational on 1st January 2007. In line with the later, the Open University mission is to generate and apply knowledge through research.

To facilitate and to simplify research process therefore, the act empowers the Vice Chancellor of the Open University of Tanzania to issue research clearance, on behalf of the Government of Tanzania and Tanzania Commission for Science and Technology, to both its staff and students who are doing research in Tanzania. With this brief background, the purpose of this letter is to introduce to you **Ms.Yvonne Tshiya-Ine Reg No: PG201705552** pursuing Master of Science in Human Nutrition, **(MSc HUMAN NUTRITION)**.We here by grant this clearance to conduct a research titled *"Prevalence of Malnutrition, associated risk factors and strategies for reducing malnutrition among children under five years of age at Heri Adventist Hospital Buhingwe District Kigoma-Tanzania"*. He will collect his data at Buhingwe District in Kigoma Region from 28ᵗʰ May 2018 to 29ᵗʰ June 2018.

In case you need any further information, kindly do not hesitate to contact the Deputy Vice Chancellor (Academic) of the Open University of Tanzania, P.O. Box 23409, Dar es Salaam. Tel: 022-2-2668820.We lastly thanks you in advance for your assumed cooperation and facilitation of this research academic activity.

Yours sincerely,

Prof. Hossea Rwegoshora
For: VICE CHANCELLOR
THE OPEN UNIVERSITY OF TANZANIA

Appendix 5: Approval Letter from Heri Adventist Hospital

HERI ADVENIST HOSPITAL
AN INSTITUTION OF THE SEVENTH-DAY ADVENTIST
CHURCH
OFFICE OF THE MEDICAL DIRECTOR

P O BOX 1056
KIGOMA
TANZANIA
heriadventisthospital@gmail.com
+255 768944412
+255 6227690%

Ref : 2018/03/71

1st June 2018

Ms Tshiya, Rotimi-Ine Yvonne
Heri Nursing School
Nyamasovu, Mnanila
Kigoma

RE: REQUEST TO COLLECT DATA

The administrative / Ethics committee of Heri Adventist Hospital is delighted to grant you the requested permission to collect data for your research.

The institution wishes you well in this endeavor and hopes your studies with benefit the children in the communities we serve

Thank

Your sincerely

Dr Henry R Ine

Medical Director,

Heri Adventist Hospital