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THE PREVALENCE AND FACTORS ASSOCIATED WITH MALNUTRITION
AMONG CHILDREN AGED 6-59 MONTHS
IN BUSHENYI
DISTRICT

BY

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DECLARATION

I, **Byamugisha Sadic**, hereby declare that this dissertation is my original work and to the best of my knowledge, it has never been submitted for any award in any institution.

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DEDICATION

This work is dedicated to my sons Byamugisha Sharif, Shafik and Samir plus my wife Namudu Aisha and my dear mother Bahati Jane for their endurance, support and understanding throughout the time of this study.

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ABBREVIATIONS

AIDS	Acquired immunodeficiency Syndrome
BCG	Bacillus Calmette-Guerin vaccine against tuberculosis
DPT	Vaccine against Diphtheria, Pertussis and Tetanus
FAO	Food Agriculture Organization
GIS	Geographical Information System
HAZ	Height for age Z score
HIV	Human immunodeficiency Virus
MDGs	Millennium Development Goals
MDHS	Malawi Demographic and Health Survey
MoA	Ministry of agriculture
MoH	Ministry of Health
MOLG	Ministry of Local Government
NGO	Non-governmental Organization
NSHS	National Centre for Health Statistics
NUFU	Norwegian Programme for Development, Research and Education
SPSS	Statistical Package for Social Science
TA	Traditional Authority
UBOS	Uganda Bureau of Statistics
UDHS	Uganda Demographic Health Surveys
UNICEF	United Nations children's Fund
UNDP	United Nations Development Plan
USA	United States of America
WAZ	Weight for age Z score
WHO	World Health Organization
WHZ	Weight for height Z score
GAM	Global Acute Malnutrition
NCHS	National Centre for Health Statistics

ABSTRACT

Bushenyi has persistently registered highest levels of childhood malnutrition in the whole of Uganda despite being referred to as “*the food basket*” of the country. Malnutrition is a major public health problem of developmental concern with both health and socio-economic consequences. High prevalence is in developing countries which contribute up to 50% of the world’s under-five mortality.

This study determined the prevalence and factors associated with malnutrition among children aged 6-59 months in Bushenyi district.

This was a community house survey that was carried out to collect information on nutritional status of children and associated risk factors in Bushenyi district. This was a cross-sectional study that used both qualitative and quantitative methods of data collection. Multistage random sampling and stratified sampling were used to select study areas and households with children 6–59 months, respectively. Stunting, wasting and underweight levels were determined using anthropometric measurements of H/A, W/H and W/A respectively using the US NHCS Reference Standards. The study enrolled 274 study participants aged 6 -59 months identified by probability and non-probability sampling methods between July to December 2015. Data was analysed in SPSS using descriptive and linear regression analysis.

Results showed that 150 out of the 274 studied children had malnutrition with prevalence of (54.7%), mild malnutrition was 104 (69.3%), moderate malnutrition was 35 (23.3%), severe malnutrition was 11 (7.3 %). Stunting levels were high amongst girls at 62% as compared to the 38% of the boys who were stunted. Malnutrition was associated with some factors like family size of more than three people, parental/care takers education level of non formal with the analysis showing that an increase in mother’s education level decreased the rate of malnutrition among children.

This study concluded that there is high prevalence of malnutrition in Bushenyi district with high rates of stunting and underweight among boys than girls. This study showed that factors associated with malnutrition in Bushenyi district include family size, level of education, weaning of children, the socio-economic status in families and behavioural factors.

The study recommended community nutritional interventions to address the root causes of malnutrition within Bushenyi. Further research is therefore needed to confirm and/or obtain explanation regarding high prevalence of malnutrition.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Nutrition is a science of food and its relationship with the human body or the process that involves the intake, assimilation and utilization of proper amounts of nutrients to maintain health, wellbeing and productivity (Caulfield & Black, 2010). Nutrition affects growth and development of children especially those under five. Adequate nutrition is an essential prerequisite for maintaining health status. The critical role nutrition plays in health and development warrants greater commitment and investment in nutrition (WHO, 2015).

According to WHO (2015), malnutrition is defined as the disturbance arising from the deficiency or excess of one or more nutrients whereas under nutrition can be defined as lack of adequate energy, protein and micronutrients to meet basic requirements for body maintenance, growth and development, a condition that affects many people on a continuous basis. In this study, malnutrition was defined as lack of proper nutrition caused by not having enough to eat, not eating enough of the right things, or being unable to use the food that one does eat.

Malnutrition is a public health concern as it contributes to infant and child morbidity and mortality worldwide (WHO, 2015). This condition results from intake of too little or too much of one or more nutrients. Under nutrition is due to deficiency of nutrients and over nutrition is due to excess intake of nutrients (Caulfield, and Black, 2004).

Children often suffer from marginal deprivation or mild chronic deficiency of certain macro- and micronutrients resulting in growth retardation, loss of weight and proneness to infections (Cronk, 2013).

This study established the prevalence of under nutrition and factors associated with malnutrition among children under five in Bushenyi district. This chapter presents the background to the study, the research problem, and the purpose of the study, the objectives, and the research questions, justification of the study, scope of the study, the significance and conceptual framework.

1.1 Background to the Study

1.1.1 Historical background to the study

By the late 1980s roughly 60 percent of the world's population lived in countries that had more than 2600 Kcal available per person per day. At the same time 123 million people resided in countries where dietary energy supplies were grossly insufficient at less than 2000 kcal per person per day (Chen & Scrimshaw , 2013). The average per captor food supplies in the developing countries increased in the 1980s although at a slower rate than in the 1970s. In sub-Saharan Africa food supplies reached critical levels because of severe drought coupled with civil unrest in some countries. By 1990, approximately 18 million people were affected and in urgent need of emergency assistance (Gross & Monteiro, 2009)

In Asia and the Pacific Asia, striking improvements have occurred in the last 20 years, the proportion of the population affected by under nutrition declined from 40 percent to 19 percent. Nevertheless, the highest numbers of chronically undernourished people, 528 million, live in this region (Horton, Alderman , Rivera, 2008). The region with the largest proportion of the population affected by under nutrition, 33 percent, is Africa. The actual number of Africans affected by undernutrition has increased dramatically, rising from 101 million people in 1969-71 to 128 million in 1979-81 and reaching 168 million in 1988-90 (Gross & Monteiro, 2009)

Globally, an estimated 165 million children under-five years of age, were stunted (WHO, 2015), 35% decrease from an estimated 253 million in 1990 (Horton, Alderman & Rivera, 2008). An estimated 52 million children under-five years of age, were wasted (i.e., weight-for-height below $-2SD$) in 2001, an 11% decrease from an estimated 58 million in 1990(Ashworth, 1969). An estimated 43 million children under-five years of age, or 7%, were overweight (i.e., weight-for-height above $+2SD$) in 2001 — a 54% increase from an estimated 28 million in 1990 (WHO, 2015).

Increasing trends in child overweight have been noted in most world regions, not only developed countries, where prevalence is highest (15% in 2001) but also in developing countries. In Africa, the estimated prevalence of under-five overweight increased from 4% in 1990 to 7% in 2001(WHO, 2014).

Uganda has one of the highest levels of childhood stunting in sub-Saharan Africa. The 1988/89 Uganda Demographic and Health Survey (UDHS) revealed that almost half of the

children under five years of age (45%) were chronically malnourished (stunted). Subsequent national demographic and health surveys over the last two decades found the situation not appreciably improved as stunting levels among under-five children stagnated between 33-39% (UDHS, 2013).

Stunting levels are almost 20 times higher than what would be expected in a normal healthy population. Prevalence of micronutrient malnutrition in Uganda is also reported to be high among children, and women of reproductive age.

1.1.2 Theoretical background

According to the theory of poverty by Bradshaw (2006) about malnutrition, he demonstrates the sequence of cause and effect that ultimately lead to a particular problem or, turned around to a positive view, a particular ultimate result. He typically traces out several layers of causality as well as lateral relationships. According to this theory, if an economic crisis or conflict force some family members to leave the home in search of labour or as recruited fighters, the distribution of labour in the home is likely to change. This may negatively affect the child-caring practices and possibly child nutritional status. According to this theory income poverty (due to unemployment, low wages, or lack of education) can lead to household food insecurity, inadequate care, “unhealthy household environment, and lack of health services. People of low socio-economic status are most vulnerable to food insecurity since purchasing power serves as a main determinant of the ability-to-afford nutritional food sources. Households who cannot attain nutritious foods due to income poverty are most associated with the inadequate diet and disease that leads to malnutrition (Bradshaw, 2006).

Malnutrition at an early age can cause a spiralling effect that deepens the influence of poverty and traps individuals and societies in what is known as the “cycle of poverty”. The theory incorporates many factors that reinforce one another, from the social to economic to political contexts that consequently affect individual wellbeing. The spiral of disinvestment and decline is difficult to escape, and it has been shown that damage from under nutrition in early life is a contributing factor to this cycle and disadvantages individuals in their adult years (Bradshaw, 2006).

For instance, if a child experiences malnutrition or poor growth or retardation within the first two years of life, the associated health consequences may irreversibly jeopardize adult health (Amina, Uriyo, Msuya, Swai, Stray Pedersen, 2012). The period between birth and two years has been called the “window of opportunity” for nutrition intervention, since it is during this critical time when improved nutrition can help avoid obstructed labour and contracted pelvis.

Infant under nutrition has been associated with shorter adult stature, less school performance, lower adult income, and for women, a higher chance of giving birth to an underweight baby (Benzeval and Judge, 2010).

Under nutrition affects cognitive development and intellectual capacity, factors that contribute to poor educational performance. Nutrition-related health problems can contribute to days missed from school and reduced school attendance (Ahmed and Billah, 2012). Disruption in education is a factor that contributes to the spiralling “cycle of poverty”, as it leads to restricted income-earning potential which is associated with the inability of families to provide food to their children that lead to under-nutrition (Caulfield and Black, 2004).

1.1.3 Conceptual background

Nutritional well-being is fundamental to attainment of the full social, economic, mental and physical potential of individuals, communities and populations (Fisher, 2013; Hoddinott and Yohannes, 2012). Adequate nutrition is essential in early childhood to ensure healthy growth, proper organ formation and function, a strong immune system, and neurological and cognitive development. Economic growth and human development require well-nourished populations who can learn new skills, think critically and contribute to their communities. Child malnutrition impacts cognitive function and contributes to poverty through impeding individuals’ ability to lead productive lives (Hoyland and Lawton, 2009). In addition, it is estimated that more than one-third of under-five deaths are attributable to under nutrition (Lipton, 2013).

Individuals who are malnourished as young children are stunted as adults, and the extent of stunting depends upon the duration, timing and severity of malnutrition (Haddad, Alderman, Appleton, and Yohannes, 2013). Poor nutritional status is linked to high morbidity and mortality. When children do not eat enough or adequate food to ensure sufficient energy and/or nutrients, their immune system defences are lowered, resulting in greater incidence, severity and duration of disease. Disease increases nutrient loss and suppresses appetite, so sick children tend not to eat as they should and the cycle continues (Caulfield & Black, 2004; Chen & Scrimshaw, 2013).

Basically health and sanitation category, child feeding practices and access to appropriate knowledge; socio-economic variables of access, demographic and environmental factors contribute to malnutrition. High prevalences further information, indicate that the main causes of stunting are poverty (wealth ranking), lack of information on child care, poor weaning

practices and compromised access to proper hygiene, sanitation and more specifically access to safe drinking (Kikafunda and Tumwine, 2014)

Nutrition has increasingly been recognized as a basic pillar for social and economic development. The reduction of infant and young child malnutrition is essential to the achievement of the Millennium Development Goals (MDGs); particularly those related to the eradication of extreme poverty and hunger (MDG 1) and child survival (MDG 4). Given the effect of early childhood nutrition on health and cognitive development, improving nutrition also impacts MDGs related to universal primary education, promotion of gender equality and empowerment of women, improvements of maternal health and combating HIV/AIDS (Lwanga, Kirunda, and Garimoi-Orach, 2010)

1.1.4 Contextual background

1.1.4.1 Global burden

Two billion people in the world suffer from various forms of malnutrition. Malnutrition is an underlying cause of death of 2.6 million children each year a third of child deaths globally (WHO, 2015). 1 in 4 of the world's children are stunted in developing countries this is as high as one in three in Uganda (FAO, 2013). This means their bodies fail to develop fully as a result of malnutrition. Under nutrition accounts for 11 per cent of the global burden of disease and is considered the number one risk to health worldwide (Gross and Monteiro, 2009).

1.1.4.2 African burden

In Africa poverty continues to hinder women to properly feed their children (Sherman, 2012). In countries such as Somalia, Chad and Southern Sudan where there is food insecurity, children under 5 years are at risk of malnourishment (FAO, 2013). According to (Ahmed B & Billah, 2012), nutritional teams in East Africa and around the world provide health education, promoting exclusive breast-feeding up to six months and educating mothers on what to feed their children, preventing children from ever becoming malnourished in the first place. Where there is food insecurity and children under 5 years, pregnant and breastfeeding women are at risk of having malnourished children (WHO, 2015). Supplementary feeding programme are run, providing families with a corn soya blend to supplement food supplies (Ahmed and Billah, 2012). Over 41% of people in sub Saharan Africa live on less than one dollar per day, 32% are under nourished (Ahmed, 2010)

1.1.4.3 Malnutrition burden in Uganda

Uganda is among the top 20 countries worldwide with a high burden of under nutrition (Kikafunda, Agaba and Bambona,2014). 12% of women of reproductive age are chronically energy deficient. Among children under five years, 33% are stunted, 14% are under weight and 5% are wasted (Kikafunda, Agaba and Bambona, 2014). Micronutrients deficiency is highly prevalent among children and women, with rates of vitamin A deficiency at 20% and 19% respectively, and anaemia at 50.4% and 24.2% respectively (WHO, 2015). Uganda is pursuing a multisectoral approach to improve nutrition status of under five children. . The core interventions for nutrition are:

- i. Growth monitoring
- ii. Routine supplementation with vitamin A, Iron, Zinc and de-worming to prevent micro-nutrient deficiency disease.
- iii. Food fortification with vitamin and minerals
- iv. Improve infants and young child feeding, breast feeding promotion
- v. Increase micronutrients supplementation during the biannually year child days.
- vi. Increase routine iron, folic acid and vitamin A supplementation to both Antenatal and post natal clinics
- vii. Strategies followed are: social marketing of maternal child health services, identification of areas with high mortality and low coverage, integration of services, involvement of the private sector in delivery of interventions, reaching out to the household level and community involvement, taking vital statistics. (MOH, 2013).

In Bushenyi district though there has been activities such as having a district nutritionist to improve on nutrition levels among children, nutrition levels in children below five years is still poor. According to Mehangye (2009) in her study about maternal health and nutritional status of children in Bushenyi district, underweight in children was 15%, stunting was at 32.8% and wasting was 2.1%. This shows high levels of poor nutrition in Bushenyi district.

1.2 Statement of the problem

Adequate nutrition is an essential prerequisite for maintaining a healthy status. The critical role nutrition plays in health and development warrants greater commitment to and investment in nutrition in Uganda. Moreover, such an investment is a necessary prerequisite for further progress on the Millennium Development Goals (MDGs), particularly the hunger and health MDGs. Young children (from birth through age 5) have specific nutritional needs, which must be met for them to reach their full physical, mental, and social potential. Because

they undergo periods of rapid growth, these children are particularly vulnerable to the detrimental effects of poor nutrition. Government agencies, health organizations, and nutritionists have been disseminating nutrition information for decades, however, in Uganda dietary intake surveys indicate that most families do not eat as advised (Adair , 2013)

Bushenyi district enjoys relatively good climate that favour variety of food crops to thrive. However in spite of favourable natural and human resource capacity, malnutrition remains an important health and welfare problem in the district especially among children below 5 years. The district has persistently registered highest levels of childhood malnutrition despite being referred to as one of “*the food basket districts*” of Uganda. For instance in Bushenyi district the 2012/2013 Uganda Demographic and Health Survey (UDHS) revealed that almost half of the children under five years of age were chronically malnourished (stunted). Subsequent national demographic and health surveys over the last five years in Bushenyi district found the situation not appreciably improved as stunting levels among under-five children stagnated between 33-39% (UDHS, 2013).

However limited researcher has been carried to establish the prevalence and factors associated with malnutrition of children aged 6-59 month in Bushenyi district. This study thus sought to bridge this information gap.

1.3 Purpose of the study

To establish the prevalence and factors associated with malnutrition of children aged 6-59 month in Bushenyi district.

1.4 Specific objectives

1. To determine the prevalence of malnutrition in children aged 6 to 59 months in Bushenyi district.
2. To describe patterns of malnutrition in children aged 6 to 59 months in Bushenyi district.
3. To determine the factors associated with severe malnutrition among undernourished children aged 6 to 59 months in Bushenyi district.
4. To determine the common co-morbidities in severe malnourished children aged 6 to 59 months in Bushenyi district.

1.5 Research questions

1. What is the prevalence of malnutrition in children aged 6 to 59 months in Bushenyi District?
2. What are the patterns of malnutrition in children aged 6 to 59 months in Bushenyi district?
3. What are the factors associated with severe malnutrition among undernourished children aged 6 to 59 months in Bushenyi district?
4. What are the common co-morbidities in severe malnourished children aged 6 to 59 months in Bushenyi District?

1.6 Scope of the study

1.6.1 Content Scope

The study was restricted to determining prevalence of malnutrition ,prevalence of severe malnutrition, factors associated with severe malnutrition and common co-morbidities in malnutrition, by carrying out anthropometric measurement as suitable method in community survey,

1.6.2 Geographical Scope

The study was carried out in Bushenyi district. The district is located in the south-western part of western Uganda. Bushenyi district enjoys relatively good climate that favour variety of food crops to thrive and often referred to as one “*the food basket districts*” of Uganda. Despite that half of the children under five years of age were chronically malnourished (stunted) (UDHS, 2013). This will therefore create a lot of avenues for the researcher to determine the prevalence of malnutrition and factors associated with malnutrition in children age aged 6-59 months in Bushenyi district.

1.7 Justification of the study

1.7.1 Academic Justification of the study

Information about individual and/ or household level factors impacting on the nutritional status of members in the household is broadly established and helpful in policy formulation. For instance, there is well established knowledge about the influence of socio-demographic, economic factors on dietary intakes and the nutritional status of the individuals (WHO, 2013). Nonetheless, it is still very important to continue identifying factors that influence the nutritional status of children because of variations in different environmental settings and rapid demographic transition. Interventions based on appropriate current information can be

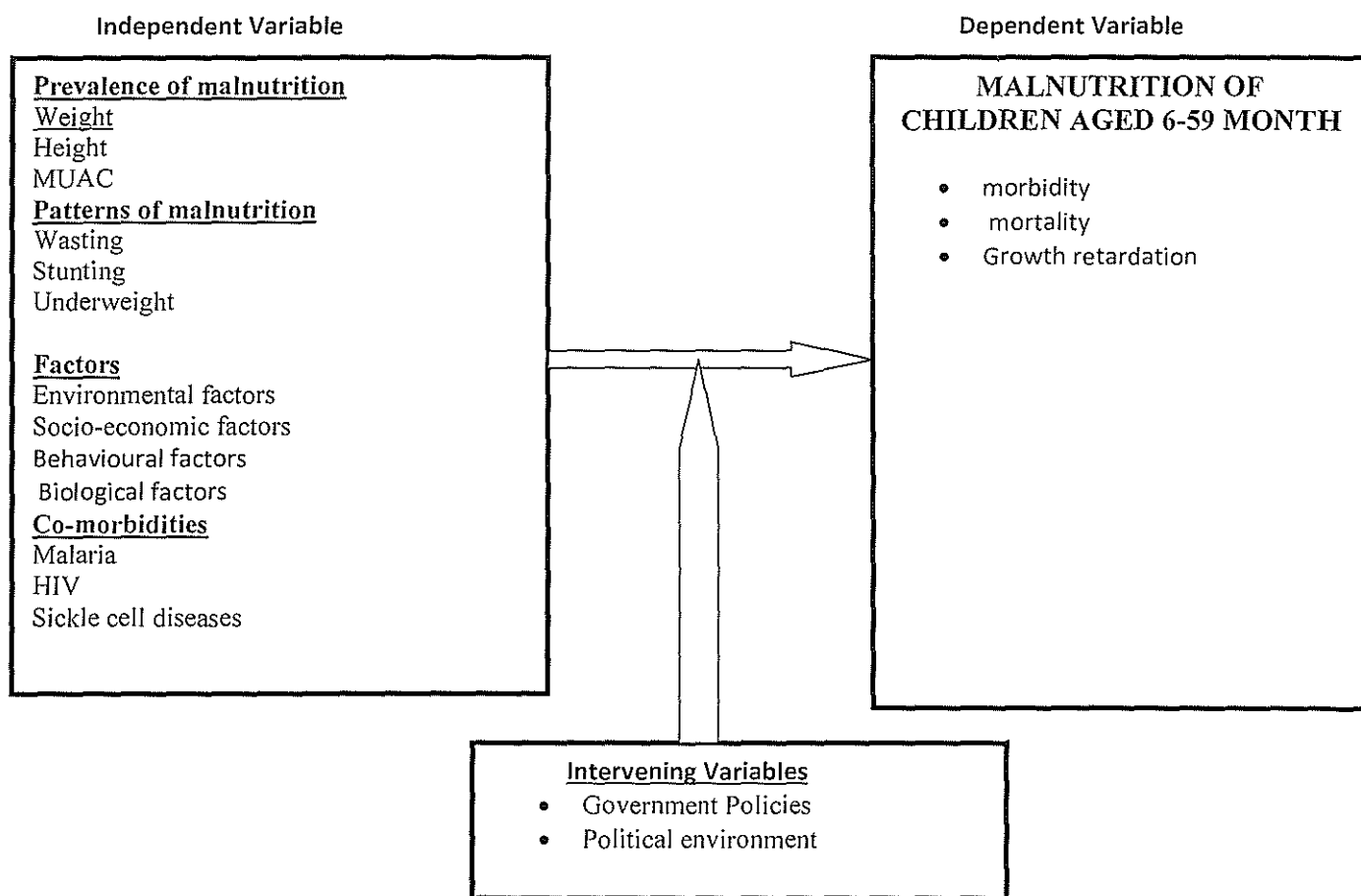
both effective and successful. Such information will in addition be a yardstick for evaluating interventions. While this is the case, little is known about the existing association between community level factors and the nutritional status of children under five years old. A study conducted in Brazil among children under five (Ashworth, 1969) pointed to infrastructure, health and educational services as important community factors determining the nutritional status of children. Cultural factors including language and religion have an influence on the type of habits that people exhibit, including food habits. Thus, community factors have an impact including individual and household factors. Therefore, assessing factors associated with malnutrition of children under five will help to identify the gaps in the accessibility and utilization of the available services to improve on the nutrition of children less than five years.

1.7.2 Community Justification of the study

The information obtained will be useful for the community and decision makers at the district and regional level in planning, implementing and evaluating various interventions related to research findings to reduce on poor nutritional status of children below five years.

As partial fulfilment for award of Master degree in public health.

Figure 1: 1.6 Conceptual frameworks



Source (WL Cheah, WM Wan Abdul Manan, Z Zabidi-Hussin, CT Chang, 2009)

1.5.4 Description of the conceptual Framework

Based on the exploratory factor the three main contributing factors of malnutrition identified include biological, Environmental and behavioural. Poor feeding practices, particularly during the transition from weaning to solid food significantly contribute to malnutrition in children under five years.

CHAPTER TWO:

LITERATURE REVIEW

2.0 Introduction

This chapter reviews the related literature. The researcher reviews the ideas and findings of other researchers, authors and other organizations that have commented on the nutrition and factors associated with nutritional status of children under five globally. The chapter reviews literature according to objectives:

2.1 Nutrition

Nutrition is science that studies the interaction that occurs between living organism and food (Mehangye, 2009). According to Lipton (2013), nutrition focuses on selecting food, eating recommended number of servings, planning a diet that reduces risks of diseases, protection against food borne disease, developing healthy eating habits. Good nutrition is essential for physical and mental development of a child, healthy pregnancies, resistance to infection, daily work performance, and prevention of deficiency diseases (Ashworth, Chopra, Sanders, Jackson, Karaolis, Schofield, 2004).

Factors promoting good nutrition are good agricultural practice such as modernized farming methods, variety of food crops, good storage, proper food distribution and transportation, sound economy, enough land, credit schemes, co-operative societies, food security, healthy environment with safe water, sanitation which comprise of vector control, good housing, adequate latrine coverage food safety and education to foster behavior change (Ashworth, 1969).

Benzeval & Judge (2010) stated that food contains nutrients which are substances in food required by the body for growth maintenance and reproduction, chemically there are six nutrients namely carbohydrates, lipids, protein, water, vitamins, and minerals.

Nutrients are essential which must be supplied in diet as the body cannot make them in sufficient quantities. Non-essential nutrients are those which can be made by the body in sufficient quantities (Miller, 2009). In addition major nutrients which are needed in large quantities are carbohydrates which provides energy, lipids provide storage form of energy, protein needed for growth, maintenance of body structure, and regulation of body processes, water is a macronutrient that act as lubricant, transport

medium, maintenance of regular body temperature, Vitamins and minerals are micronutrients because they are needed in small amounts. They help regulate production of energy from carbohydrate, lipid and protein. Examples of micronutrients are; Vitamins. There are fat soluble vitamins A, D, E and K and water soluble vitamins B and C. Minerals consist of major minerals which are needed in large amount such as Calcium, magnesium, sodium, potassium, sulphur, phosphorus and chloride. According to Lwanga et al (2010) Trace minerals such as Iodine, selenium, Iron, Zinc, copper, magnesium, fluoride, chloride and molybdenum are needed in small amounts.

2.2 Prevalence of malnutrition

Malnutrition starts early in infancy for children in Uganda. By extrapolation, at birth, about 11 percent of children are already stunted and about 16 percent are wasted. The substantial proportion of children born with low birth weight suggests that high fertility rates, short birth intervals, young maternal age and maternal malnutrition are likely factors that contribute significantly and adversely to child malnutrition from birth. The prevalence of wasting and underweight peaks when children are 9-13 months, and wasting significantly contributes to high prevalence of malnutrition (WHO, 2015)

Malnutrition in under-fives varies from country to country according to the socio-economic status. UNICEF global data base on child malnutrition 2001 report showed the prevalence of wasting (weight/length or height) which represents acute malnutrition to be 15% in South Asia, 7% in Middle East and North Africa, while 10% and 9% were observed in sub Saharan Africa and in developing countries respectively (Pelletier, Frongillo, Schroeder, & Habicht 2015).

The WHO goal aims at reducing the mortality in under-fives with malnutrition to less than 5% by 2010 and since 1970s there were management protocols which aimed at reducing mortality up to 1 - 5% (11)(WHO, 2015)

According to WHO Global Database on Child Growth and Malnutrition Worldwide, underweight prevalence was projected to decline from 26.5% in 1990 to 17.6% in 2015, a change of -34% (95% confidence interval [CI], -43% to -23%). In developed countries, the prevalence was estimated to decrease from 1.6% to 0.9%, a change of -41% (95% CI, -92% to 343%). In developing regions, the prevalence was forecasted to decline from 30.2% to 19.3%, a change of -36% (95% CI, -45% to -26%). In Africa, the prevalence of underweight was forecasted to increase from 24.0% to 26.8%, a change of 12% (95% CI, 8%-16%). In Asia, the prevalence was estimated to decrease from 35.1% to 18.5%, a change of -47%

(95% CI, -58% to -34%). Worldwide, the number of underweight children was projected to decline from 163.8 million in 1990 to 113.4 million in 2015, a change of -31% (95% CI, -40% to -20%). Numbers are projected to decrease in all sub regions except the sub regions of sub-Saharan, Eastern, Middle, and Western Africa, which are expected to experience substantial increases in the number of underweight children (WHO, 2015)

In a study conducted about Prevalence of malnutrition among children under five years old in Khartoum State, Sudan showed that socioeconomic factor, poor nutrition, and mothers' knowledge and feeding practices led to increase in the prevalence of malnutrition.

MUAC indicator showed that 20.9% of children were badly nourished and 79.1% of the children were well nourished. In addition, to poor economic situation, the study found that about 15.4% of children were underweight, 8.8% were moderate underweight and 6.6% were severe underweight. The prevalence of wasting was 21.1% (12.3% moderate and 8.8% severe) and the prevalence of stunting was 24.9% (15.1% moderate and 9.7% severe).

The World Health Organization standard showed that the prevalence of global malnutrition, moderate malnutrition and severe malnutrition was 12.8%, 8.0% and 13.6%, respectively. (WHO, 2015)

The National Centre for Health Statistics reference showed that the prevalence of global malnutrition, moderate malnutrition and severe malnutrition was 23.1%, 10.2% and 12.9%, respectively (Scrimshaw, Taylor & Gordon, 1968).

2.3 Patterns of malnutrition

Malnutrition can be classified in six different ways: Gomez, Water-low, WHO (Wasting), WHO (Stunting), Kanawati and Cole. This study will use the WHO (Wasting) and Water-low for classification of malnutrition in order to identify acute malnutrition which is routinely practiced in our setting and this classifies malnutrition in mild, moderate and severe forms(Appendix A). HIV/AIDS in developing world frequently presents with a combination of wasting and stunting, sometimes making the interpretation of the WHO criteria for malnutrition difficult.

Acute malnutrition is an indicator for current nutritional status showing weight changes due to low nutrients in take. This can be classified as oedematous or non-oedematous. Oedematous mal nutrition leads to Severe acute malnutrition which is defined by a very low weight for height (below -3z scores of the median WHO growth standards), by visible severe wasting, or by the presence of nutritional oedema (WHO, 2015).

Chronic malnutrition is an indicator of nutritional status over time when children are stunted and shorter than their colleagues of comparative age group (Leslie, Ciemins & Essama, 2013).

2.4 Factors associated with malnutrition

In the third world countries, prevalence of under-nutrition is high due to high family size, low family income, poor education, poor environment and housing, having little access to health facilities and failure of treatment of acute and chronic disease (WHO, 2015).

There is also a strong association between severe malnutrition and some indicator of poverty, such as lack of adequate breast-feeding or failure to complete immunization (FAO, 2013). Children under the age of 5 years of age constitute a priority group because of their large numbers. They are also regarded as vulnerable or high risk group because of the problems arising out during their growth, development & survival. 50% of the deaths occur among children during the first 5 years of life in developing countries Malnutrition is regarded as the most widespread condition affecting the health status of under five children (UNICEF, 2013).

2.4.1 Environmental factors

According to (water and sanitation, 2008), the use of latrine for disposing off faeces keeps the environment free from germs thus reducing cases of diarrhoeal diseases and worm infestation. Water borne diseases are spread by drinking water contaminated with faeces. Risk factors being inadequate water supply, poor storage, and dirty homestead (Health promotion, 2008). Millennium development Goal 7 has objective “to half by 2015 number of people without sustainable access to safe water and basic sanitation. (Millennium Development Goal, 2007). This calls for implementation of safe provision of water and basic sanitation and research.

According to Svedberg (2013) research done in Zimbabwe pointed out that water and sanitation had nutritional impact on children. A study done by (Monterio *et al.*, 2001) in Brazil concluded that prevalence of malnutrition was high where water and sanitation facilities are inadequate in rural and slum areas. As stated in (UNICEF, 2013) damage of infrastructure, potable water had negative effect on under-fives nutrition status in Iraq caused by armed conflicts.

2.4.2 Breast feeding/Weaning practice

Breastfeeding is a process of feeding an infant or child directly from breast milk. Weaning and feeding is when children are feed on family food. Inadequate nutrient intake lead to malnutrition (Haddad et al., 2013). According to medicines (2008) no matter what quantity of food children take to satisfy hunger, they will still be malnourished so long as right amount of nutrients are lacking in the diet (Nagawe et al., 2003) carried out study in Zambia and discovered more under nutrition in rural areas where breast feeding practice and frequency of feeding were inadequate.

According to Gross & Monteiro (2009) duration of breast feeding, weaning procedure are important factors in curbing malnutrition in children under five years. Manila (2007) did research in Japan and identified factors responsible for malnutrition as restricted food intake. Study done in Adamawa state in Nigeria by Madusolumuou and Akogun (2004) attributed childhood malnutrition to poor weaning and feeding children on cereals which contains mainly calories.

According to focus group discussion exclusive breast feeding for six month and stopping and no breast feeding from time of birth for artificial feed promoted by PMTCT for HIV positive mothers causes malnutrition among under-fives (Wamani, Tylleskar, Astrom, Tumwine & Peterson, 2014)

Fisher (2013) stated that exclusive breast feeding should take at least six month because during this period breast milk has sufficient nutrients and has anti-infective factors. Cross sectional studies done by (Dinesh *et al.*, 2014) in Angwari in India discovered that delayed initiation of breastfeeding as part of cultural taboo deprive child of colostrum. In addition improper weaning is a risk factor for under nutrition among under five, infants should start other food at about six months which is the proper weaning time because by this age children cannot get enough nutrients from breast milk and babies gastrointestinal tract can digest family food (Felicity and Ann 2003). Chen & Scrimshaw (2013) observed balanced diet as a necessity for weaning if malnutrition is to be minimized.

Malnutrition remains an important health and welfare problem in Bushenyi district especially among children below 5 years. The district has persistently registered highest levels of childhood malnutrition despite being referred to as one of “the food basket districts” of Uganda. For instance in Bushenyi district the 2012/2013 Uganda Demographic and Health

Survey (UDHS) revealed that almost half of the children under five years of age were chronically malnourished (stunted) (UDHS, 2013).

According to Bushenyi district the 2012/2013 Uganda Demographic and Health Survey (UDHS); the prevalence of malnutrition is as follows; underweight at 16%; stunting at 38%, wasting at 6% and the total undernourishment is at 19 % (UDHS, 2013).

2.4.3 Parental/ Care giver Education level

It should be noted that the African traditional role division has largely laid the responsibility of childcare on women. This begins at conception and continues until infancy, teenage and adulthood. Therefore, women are key players in the growth and development of children. However, it is not until recently that the role of mothers' education in enhancing the quality of care and nutritional status of children is being emphasized in empirical research (Birungi, 2013).

Educated mothers may have better paid jobs thus be able to earn higher income and take better care of their children, be resident in urban areas where there are functioning social infrastructures, possess commendable culture of hygiene needed to protect children from diseases, be more likely to participate in child health enhancing programs like immunization and child care talks, and be able to benefit maximally from nutrition- and health-related radio and television programs (Gross & Monteiro, 2009).

Underscoring the role of mothers' education, Ryan *et al* (1984) analyzed the determinants of individual diets and nutritional status in six semi-arid villages of Southern India using weight-for-age classification suggested by Gomez *et al* (1955). They found that educational level of mothers and non-involvement of the mothers in the rural labour market significantly reduced the nutritional status of children. Jitta *et al.*, (2012) found that the employment status of mothers, the number of living children, the level of education of the mother and non-involvement of the mothers in the rural labour market significantly reduced the incidence of stunting, wasting and underweight among children in Sri Lanka.

Hunger and malnutrition remain among the most devastating problems currently facing the majority of the world's poor (WHO, 2015). Conventionally, the nutritional status of under-five children is one of the acceptable indicators of households' well-being (Fisher, 2013). However, child malnutrition has worsened significantly over the past few decades in many developing countries especially in households of uneducated mothers (FAO, 2013).

2.5 Malnutrition with co-morbidities

In a severely malnourished child who has diarrhea, mortality is high ranging from 67.3% - 71% and the cause of death is commonly due to dehydration and electrolytes imbalances. Death is also associated with septicemia, pneumonia, malaria and hypothermia (WHO, 2015)

A study conducted in Nigeria showed that 9% of children hospitalized for severe malnutrition were HIV infected (Benzeval & Judge, 2010). Malnutrition is multi-factorial and HIV can induce or aggravate it. In sub-Saharan Africa, mortality is higher in HIV infected children and ranges from 25% to 38% with severe malnutrition than in non-infected children (Schofield and Ashworth, 1996). During re-nutrition, mortality was still found to be higher in HIV positive than HIV negative children in Malawi (WHO, 2015).

Bacteremia in these children is so common. Organisms commonly isolated in malnourished children in blood, urine and stool cultures are non-typhoid *Salmonella* (13%), *S. pneumonia* (10%), and *E. coli* (8%). *E. coli* accounts for 58% of the urinary isolates, but stool culture most of time has no growth of pathogens (Henry, Nordrehaug, Stefan, Tumwine & Tylleskär, 2012).

An 18 country study in sub-Saharan Africa showed that children whose mothers are infected with HIV have a higher chance of being stunted (28%), wasted (26%) or underweight (26%) compared to children of the similar demographic and socioeconomic backgrounds with children of non-HIV mothers (Gross & Monteiro, 2009). In Uganda 440 children die of diarrhoea every week (UDHS, 2013). Diarrhoea results into stunting in children.

CHAPTER THREE

STUDY METHODOLOGY

3.1 Introduction

A community survey was carried out to collect information on nutritional status of children to determine the prevalence of malnutrition and establish factors associated with malnutrition in children aged 6-59 months.

3.2 Study Design

The study design was cross-sectional study which used quantitative method of data collection.

3.3 Study Location

The study was conducted in Bushenyi District, South Western Uganda. The district has projected population of 251,400 people of which 51,537 (20.5%) are under five years of age children (Bushenyi DHO'S office, 2015). It has total area of 3942.3 km²

Bushenyi District is bordered by Rubirizi District to the northwest, Buhweju District to the Northeast, Sheema District to the east, Mitoma District to the south and Rukungiri District to the west. The District is endowed with natural resources. The economy of the district depends mainly on agriculture. Agriculture is a source of food for the population, subsistence income for most families and provides direct employment to 86.7% of the district population, as well as supplying raw materials to industries. The majority of the people are involved in subsistence agriculture with some engaged in commercial production of crops including, matoke, cassava, coffee. (Joyce Kikafunda and Edgar Agaba, 2014)

There are nine sub-counties in the district namely: Bumbaire, Ibare, Kyabugimbi, Kyeizoba, Ruhumuro, Bitoma, Kakanju, Kyamuhunga and Nyabubare.

3.4 Target population

All children of 6 to 59 months of age in Bushenyi district qualified for the study. The focus was based on the youngest in the family which had more than one child aged between 6- 59 months. The projected population of under five children was 47,595 out of which 12,110 were males 35,485 were females (Bushenyi DHO'S office, 2015).

3.5 Study Samples

The study population included children aged 6-59 months of age with their care takers/parents who had lived in the randomly selected villages for at least six months.

3.6 Sampling procedure

Both probability and non-probability sampling methods were employed to identify study site and participants. To identify village of study, simple random sampling was used to identify the sub county, parish and village of study. The first family that was enrolled in the study was done using convenience sampling method. The subsequent families that followed were identified using snow ball sampling technique; the VHTs and the mothers interviewed were asked to suggest names of the nearby mothers with children under five in their village.

3.6.1 Stage 1

From nine sub counties of, Bunbaire, Ibaare, Kyabugimbi, Kyeizoba, Ruhumuro, Bitooma, Kakanju, Kyamuhunga and, Nyabubare. Two sub counties were selected by simple random sampling using balloting that is Kyeizoba and Ruhumuro.

3.6.2 Stage 2

One parish was randomly selected by balloting from each sub county that is Nyeibingo from Ruhumuro and Buyanja from Kyeizooba.

3.6.3. Stage 3

One village was randomly selected by balloting from each parish, Kayanga A from Nyeibingo parish and Katerero 2 from Buyanja parish.

3.6.4 Stage 4

Clusters of households formed by mapping each villages. Absenteeism, non response was taken as refusal to participate in the study. A household with more than one child the youngest participated in the study since is more likely to get malnutrition compared to the rest.

3.7 Sample Size determination

The sample size used in this study was determined using

$$n = \frac{Z^2 pq}{e^2} \quad \text{Kothari C.R (2002)}$$

e^2 Minimum sample size required

$Z = 1.96$ Parameter standard for a normal distribution curve at

$= 0.05$ and at 95% confidence interval

$P = 0.68$ prevalence of malnutrition. Uganda (UDHS, 2006)

$Q = 1 - p$ (Complement of the estimated prevalence of malnutrition (p) and

e = Allowable error at 5% - (Level of significance 0.05)

$$\frac{1.96 \times (0.68 \times 1 - 0.68)}{(0.05)^2}$$

$$n = \frac{0.835932116}{0.0025}$$

$$0.0025$$

$$n = 334$$

The number of under five children assessed for malnutrition were 274 because thirty households had no under fives, twenty had no people around by the time of the study and others refused to consent.

3.8 Data collection methods

Anthropometric data collection methods were used to measure weight, height and mid upper arm circumference of participants; age was obtained from the child's health card and birth certificates those without were compared with those of the same age and also from the caretakers.

Household survey using structured questionnaire were used for interview by research assistants. Both closed ended and open ended questions were utilized for data collection. The questionnaires included items for socio demographic characteristics, and history of previous illness. Data was collected on daily basis from morning to evening including weekends. On daily basis the researcher counterchecked the accuracy and completeness of the filled

questionnaire and all completed questionnaires were given numbers after completing the work. Tools to use for nutrition assessment which included:

Weighing scale: UNICEF spring hanging salter scale weight up to 25 kg. Measurement to nearest 0.1kg.

Age: Child health card and birth certificate were used to get children's age for those without them, the age were obtained from the caregiver.

Length / Height measurements

Participants of up to the age of 24 months, length were measured using a length board in the recumbent position by two examiners. For those above 24 months and who are able to walk, heights were measured while standing using a height meter. Weight for height/length and Z score of less than -1 indicated mild -2 indicated moderate and -3 indicated severe wasting.

Mid upper arm circumference; Measurements were done at midpoint between acromion and olecranon process by using a tape measure on the left arm. The readings were recorded to the nearest 0.1cm. Children with MUAC of 12.5-13.5cm were mild, 11.5 to 12.5cm were moderate and less than 11.5cm were considered severe malnourished.

3.9 Data processing and analysis

Data was entered into EPI Data Version 16 to check for outliers. This ensured coding and filtering. Completed data set was exported to Statistical Product for Social Science (SPSS version IBM ® 17). Anthropometric indices were run using SPSS syntax based on the WHO anthropometric macros adopted and edited to measure WHZ, WHA, and HA. Editing was done using ENA codes.

Regression techniques based on binary regression was used to develop the model of association between severe malnutrition and history of previous sickness. ANOVA one way was used to compare means of numerical variables and categorical – nominal relationship and p value was used to infer significance.

Correlation based on spearman's rank correlation was used to measure association between nominal – ordinal relationship to determine correlation coefficient and p values.

3.10 Field work arrangement

Base line survey was done by visiting study sites to get malnutrition information in a district health office prior to commencements of the research. Formation of research team which consisted of principle investigator, and research assistants was done.

The number of households in the village was obtained from the VHT who did village mapping, using mapping the first household to start with was randomly selected. The VHT introduced the researcher to the care givers in the household the researcher explained the importance of the study and consent the care giver of children to participate in the study.

In case of having the mother and father at home the mothers were being preferred since mothers are more close to children. In families with many children under five the youngest were being studied because they are at high risk of being malnourished.

3.12 Quality control

3.12.1 Reliability

To establish reliability, the instruments were pre-tested in KIUTH areas using inter- observer reliability, involving 10% of the sample size (27 questionnaires) to complete them. The findings from each observer was graded as reliable (1) or non-reliable (0). Cronbach alpha was used to calculate reliability index of the study instrument (α) given by:

$$\alpha = \frac{N \cdot \check{c}}{v + (N - 1) \cdot \check{c}}$$

Equation 1: Cronbach Alpha Formula for Reliability Test

Where α = reliability index (0.70 and above will be accepted)

\check{c} = the average inter-item covariance among the items

N = Number of items

V= the average variance

Calculation of inter item variance and average variance was done in Microsoft excel © 2013, using the formula functions in excel.

α of 70.7% was obtained

3.12.2 Validity

Validity is the extent to which research results can be accurately interpreted and generalized to other population basing on the samples interviewed. It's the extent to which research instruments measure what they are intended to measure.(Oso Y & Onen D, 2009). To establish validity, the instruments was given the supervisor to establish the relevance of each item in the instruments to the objectives and rate each item on the instrument as very relevant (4), quite relevant (3), some relevant (2) and not relevant (1). Validity was calculated using Content Validity Index (C.V.I). $C.V.I = \frac{n_{3/4}}{N}$, C.V.I = items rated 3 and 4 by both evaluators against the total number of items given by:

$$C.V.I = \frac{n_{3/4}}{N},$$

Equation 2: Content Validity Index for Validity Test

Since 2 out of ten questions were corrected. The instrument yielded a CVI of 80%

3.13 Inclusion and Exclusion criteria

3.13.1 Inclusion criteria

- I. All children under five years were eligible for the study (6-59 months).
- II. All established households in rural and urban area in the study area.
- III. Households with at least one under five children were included in the study.

3.13.2 Exclusion criteria

- I. Children who were visiting and not residents in Bushenyi district as explained by the care taker at home.

3.14 Ethical consideration and Approval

In order to make sure that the study upholds ethical criteria, the researcher fulfilled the following ethical issues:

3.14.1 Institutional Consent:

Ethical approval for the study was obtained from the Research and Ethics Committee of Kampala International University. Permission was also obtained from the office of the L.C III at the sub-county under study then preceded to the respective parishes in order for the

researcher to start data collection from the villages. Permission was obtained from the L.C I chairpersons who introduced the researcher to the villages.

3.14.2. Privacy and Confidentiality

The participants were interviewed in a private place, respecting the respondents and their information without sharing any personal information. While the confidentiality issues was addressed by keeping the data collected from the respondents confidential, the data were anonymous and their information given were used for only research. Information about respondent were collected during the study and put away and no-one but the researchers were able to see it.

3.14.3. Informed Consent

To get signed letter of informed consent from the respondents, the researcher and research assistants introduced themselves to the participants and all the procedures involved in the study and explained to the participants the purpose of the study, the information about the criteria for selecting who to participate in the study, procedures to be followed and any risks and benefits which may be involved. The participants were also informed that their participation was voluntary, and they were free to terminate their participation at their own will at any point in time and they were guided on whom to contact in case of any inquiry, the respondents who understood and consented.

3.14.4. Justice

All respondent were treated equally without giving a particular group priority. Simple random sampling was used to select the research site; all of the respondents were given equal chances of being selected for the study.

3.14.5. Respect for Human Rights

In the course of the study, the respondents were treated with utmost respect and honour. The respondents have the right to make the decisions and their decisions were respected as it is entitled to them.

3.14.6 Benefits and Risks

The anticipated benefit of this study is that it would help in bringing the current prevalence of malnutrition and the possible contributing factors in Bushenyi district.

The risk may be emotional stress for some respondent following the interview.

Overall the benefits from this study outweighed the risk.

3.15 Limitations and Delimitations

The limitation of this study was that the majority of the respondent had not gone to school and could not read. This posed a challenge as they could not easily understand the purpose of the study thus participate easily.

This was overcome by giving them explanations in order for them to consent.

3.16 Dissemination of the Study Findings

Weeks after making the final reports and after assessment, the findings from the study will be shared with office of the District Health Officer – Bushenyi local government and the participating villages.

A publication will also be made out of this work.

CHAPTER FOUR

PRESENTATION AND INTERPRETATION OF RESULTS

4.0 General Introduction

In this chapter, the researcher has presented the findings and results of the study based on the specific objectives of the study that was carried out in villages of Katerero 2 and Kayanga A in Bushenyi district and illustrated in terms of tables.

4.1 General characteristics of the study

4.1.0 Demographic characteristics of surveyed children

The study consisted of 274 children below five years of age which was surveyed in two villages. Most of the children were residing in Kayanga A village in Nyeibingo Parish 165 (60.2%) while 109 (39.8%) were from Katerero 2 in Buyanja parish.

As shown in the table 1 below, 111(40.5%) of the study participants were boys and 163(59.5%) were females with an overall boy to girl ration of 0.7. Majority of the surveyed children were aged 6-17 months and 165(60.2%) had both parents, 90(32.8%) had single parents and the rest were leaving with their relatives 19(6.9%).

Table 1: Demographic characteristics of surveyed children

	Boys		Girls		Total		Ratio
AGE (months)	no.	%	no.	%	no.	%	Boy: girl
6-17	39	35.1	55	33.7	94	34.3	0.7
18-29	20	18.0	65	39.9	85	31.0	0.2
30-41	25	22.5	16	9.8	41	15.0	1.6
42-53	18	16.2	23	14.1	41	15.0	0.8
54-59	9	8.1	4	2.5	13	4.7	2.3
Total	111	40.5	163	59.5	274	100.0	0.7

Majority of the care givers were females 242 (88.3%), Catholics were the predominant religion 138 (50.3%) and majority of them were married 126 (46.0%) and had non formal level of education 162 (59.1%). Most of them had the level of income more than 50000 ug sh monthly 148 (54.0%) and their families were more than three persons. As shown in table 2 below.

Table 2: Mothers and care givers

Variable	Subcategory	Counts (N)	Percentage (%)
sex	Male	32	11.7
	Female	242	88.3
Religion	Catholic	138	50.3
	Protestant	98	35.8
	Muslims	32	11.7
	Others	6	2.2
Marital status	Single	28	10.2
	Married	126	46.0
	Divorced	30	10.9
	Widowed	90	32.8
Level of education	Non-formal	162	59.1
	Primary	60	21.9
	Secondary	38	13.9
	Collage/university	14	5.1
Employment status	Peasant farmer	192	70.1
	employed	82	29.9
Family income level	<50000	126	46.0
	≥50000	148	54.0
Residency	Katerero 2	79	28.8
	Kayanga A	195	71.2

Objective 1:

4.1.2 Prevalence of Malnutrition

From July 2015 to December 2015, a total of 274 children aged between six to fifty nine months were all included in the study and screened for under-nutrition.

For all children surveyed 150 (54.7%) were undernourished. Among children who were screened 11 (4.5%) had severe malnutrition, of these 9(81.8%) were marasmic, 2(18.2%) had kwashiorkor and no one had marasmic kwashiorkor.

Among 150 undernourished children 104 (72.0%) had mild malnutrition, 35(23.3%) had moderate and 11(7.3%) had severe malnutrition.

Objective 2

Majority of boys generally were more affected than girls, 84(56.0%) and 66(44.0%) respectively. Only girls had oedematous malnutrition. See table below.

Table 3: Patterns of malnutrition

Based on severity	n	Boys N (%)	Girls N (%)
Overall			
Normal	124	27 (21.8)	97(78.2)
Mild	104	60(57.7)	44(42.3)
Moderate	35	19(54.3)	16(45.7)
Severe	11	5(45.5)	6(54.5)
Under weight W/A			
Normal	134	59(44.1)	75(55.9)
Mild	70	22(31.4)	48(68.6)
Moderate	59	16(27.1)	43(72.9)
severe	11	5(45.5)	6(54.5)
Wasting W/H			
Normal	130	33(25.4)	97(74.6)
Mild	96	60(62.5)	36(37.5)
Moderate	37	13(35.1)	24(64.9)
Severe	11	5(45.5)	6(54.5)
Stunting H/A			
Normal	104	11(10.6)	93(89.4)
Mild	68	45(66.1)	23(33.8)
Moderate	91	50(54.9)	41(45.1)
Severe	11	5(45.5)	6(54.5)
MUAC			
Normal	124	57(46.0)	67(54)
Moderate	119	41(34.5)	78(65.5)
Severe	11	5(45.5)	6(54.5)
Children less than 12 months	20	8(40)	12(60)
Based on presence of edema in malnourished children			
Malnutrition with no edema,	148	132(89.2)	16(10.8)
Malnutrition with edema	2	0(0)	2(100)

Objective 3 :

Factors associated with malnutrition

Table 4: Socio-demographic characteristics of 150 under nutrition children

Characteristics	Number (N=150)	Percentage (100%)
Child age (Month)		
6 - 17	96	64.0
18 –29	54	36.0
≥ 30		
Child Sex		
Male	84	56.0
Female	66	44.0
Residency		
Katerero 2	79	52.7
Kayanga A	71	48.3
Vaccination of child		
Complete	149	99.3
Incomplete	1	0.7
Age of weaning(month)		
< 6	97	64.7
≥ 6	53	35.3
Family size		
<3	42	28
≥3	108	72
Family income		
<50000	64	42.7
≥50000	86	57.3
Caretaker education		
Non formal	138	92.0
Primary	10	6.7
Secondary	2	1.3
College/university		
Parent's Occupation		
Peasant	122	81.3
Employed	11	7.3
Business	17	11.3

In univariate logistic regression analysis, age group 6 -17 and 18-29 months were both statistically significantly associated with severe malnutrition ($p = <0.001$) and remained statistically significant in multivariate logistic regression ($p = < 0.001$ and 0.001 respectively) compared to children aged more than two years. Other significant associated factors were getting family size of more than 3 people involving mother, father and 1 child ($OR=4.1$; 95%

CI= 1.7 – 16.4; $p = < 0.001$), weaning of children before 6 months (OR=2.4; 95% CI = 1.7 – 6.8; $p = < 0.001$) and children whose parents/care givers education was non formal (OR= 4.9; 95% CI = 3.3 – 6.6; $p = < 0.001$). When these factors were subjected to multivariate logistic regression analysis, they all remained significantly associated with malnutrition (OR= 3.9, 95% CI= 1.5 – 10.6, $p = 0.007$; OR=2.1, 95% CI= 1.1 – 4.5, $p = 0.042$; OR= 3.4, 95% CI= 1.9 – 5.9, $p = < 0.001$ respectively). In univariate analysis other significant factors were care takers education and occupations were all associated with malnutrition. Katerero 2 had more malnourished children compare to Kayanga A village.

Table 5: Showing results of bivariate analysis

Characteristic	Not Malnourished, n (%)	Malnourished , n (%)	Unadjusted OR [95% CI]*	p-value
Sex				0.0169
Male	10 (10.6)	84 (89.4)	4.8 [0.71-10.79]	
Female	87 (56.9)	66 (43.1)	1.0	
Age categories				0.0434
6-17	25 (20.7)	96 (79.3)	1.0	
18-29	60 (52.6)	54 (47.4)	6.5 [1.16-35.74]	
≥30	12	0	-	
Age at weaning				0.0190
<6 months	80 (45.2)	97 (54.8)	2.2 [0.64-7.80]	
≥6 months	17 (24.3)	53 (75.7)	1.0	
Child meals per day				0.0460
<5 times	37 (25.2)	105 (74.8)	2.3 [0.71-6.40]	
≥5 times	60 (57.1)	45 (42.9)	1.0	
Family size				0.0018
<3	55 (46.2)	64 (53.8)	1.0	
≥3	42 (32.8)	86(57.3)	1.3 [0.14-1.60]	
Parents education level				0.0364
Formal	19 (61.3)	12(38.7)	1.0	
Non formal	78 (36.1)	138(63.9)	0.6 [0.17-2.21]	
Parents employment status				0.8636
Employed	67 (70.5)	28(29.5)	1.0	
Unemployed	30 (19.7)	122 (80.3)	1.1 [0.33-3.68]	
Monthly income level				0.209
≥ 50000	88 (38.6)	140(61.4)	1	
<50000	9 (7.8)	107(92.2)	1.3(0.9 -1.9)	

Majority of the boys had malnutrition 84(89.4%) with the age category of 6-17 month dominating. Weaning age, number of meals given to the child per day, Family size and Parents/ care takers education level were found statistically significant in contributing to malnutrition.

Objective 4.

Table 6: Distribution of co – morbidities among children with severe malnutrition in Bushenyi .

Previous illness reported in the last two weeks	Variable categories	Number of malnourished children (N)	Frequency of malnourished children (%)
History of cough	Yes	4	(36.26%)
	No	7	(63.74%)
History of weight gain	Yes	0	(0%)
	No	11	(100%)
History of body swelling	Yes	2	(7.69%)
	No	9	(91.9%)
History of diarrhoea	Yes	1	(04.5%)
	No	10	(95.5%)
Other illnesses (TB,SCD	Yes	0	(0.0%)
	No	11	(100%)
HIV test	Positive	1	(04.5%)
	Negative	10	(100%)
Malaria test	positive	2	(7.69%)
	Negative	9	(91.9%)

As shown above, children with previous history of cough (pneumonia 4(36.36%) and those tested malaria positive 2(7.69%) were significantly most likely to have severe malnutrition the other remaining illness were not shown to be statically significantly associated with the occurrence of severe malnutrition.

At multivariate level of analysis the factors that come up significant included Non formal level of education of care takers, weaning of children before 6 months and family size of people more than three. Number of meals per day was not statistically significant may be because of variations in the meals given to children in different the house holds. See table below:

Table 7: Multivariate analysis of the factors affecting malnutrition levels

MODEL	N	Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		Beta			Lower Bound	Upper Bound
1(Constant)	11		12.732	.001	1.322	3.642
Sex of surveyed children		1.071	2.682	.004	.027	.154
Care givers education level		.211	1.645	.001	.229	.342
Age of weaning		.1010	2.329	.005	.127	.202
Family size		1.806	2.218	.000	.136	.381
Meals per day		.395	4.277	.022	.220	.551

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.0 General Introductions

In this chapter the researcher has presented the discussions, conclusions and recommendations of the study based on the findings and objectives of the study.

5.1 Prevalence of under-nutrition

In this study the overall prevalence of malnutrition was 150 (54.7%). Among children who were screened 11(4.5%) had severe malnutrition, of these 9(81.8%) were marasmic, 2(18.2%) had kwashiorkor and no one had marasmic kwashiorkor.

Among 150 undernourished children the prevalence of mild malnutrition was 104 (69.4%), 35(23.3%) moderate malnutrition and 11(7.3%) severe malnutrition. Among 11 children with severe malnutrition, majority had marasmus which is similar to the study done in Kenya. In this population, the prevalence of kwashiorkor was not high and this may be explained by the fact that beans are a common type of foods found in this area which is rich in proteins.

The similar study done in Botswana where the overall prevalence was found to be 59.8% the age group was 1 to 3 years compared to the age group of this study. The slight difference could be due to age difference of enrolled patients. Also a study conducted in south western region of Botswana by Kafunda and Tumwine (2010) revealed that malnutrition prevalence was high in the area.

5.2 Patterns of malnutrition

As noted in this study, the prevalence of stunting (<-2 z-score), among children in Bushenyi was (57.5%) underweight and wasting taking (139)56.3% and (113)45.7% respectively. These findings have a general indication that; there is a very high level of stunting in Bushenyi, well above the national average of 39% recorded by the (Uganda Demographic and Health Survey Uganda Bureau of Statistics, 2012), and comparably higher than those found in Kabale, 44.3% obtained for Kabarole District by Jitta et al, in the early 1990s (Jitta, Migadde, & Mudusu, 2012) in their secondary analysis of the Uganda Demographic and Health Survey data (Bachou, 2010) and more recent data of 46.3% found in pre-school children in the suburbs of Kampala City, Central Uganda (Kikafunda & Tumwine, 2010).

This study revealed that stunting among boys was 80 (56.3%), and girls 62(43.7%) indicating that stunting among boys was higher than that among girls. This findings is similar to the

outcomes of one of the meta analysis of socio-demographics variables from 16 studies across Africa which consistently showed that the prevalence of acute malnutrition was higher in boys than girls. The corresponding odds ratios (OR) for the prevalence of stunting among males compared to females were statistically significant in 11 of the 16 studies. In the pooled analysis the prevalence of stunting amongst males (40%) remained significantly greater than for females 36% ($p < 0.001$), OR 1.16 and 95% confidence interval (CI) 1.12 – 1.20.

One of the study shown by UNICEF showed that the prevalence of stunting in south western Uganda where Bushenyi is located was approximately 42% ranking the third highest in the country following western (44%) and Karamonjong region (45%) (Birunji, 2013; Karamagi, 2010).

The findings seem like an accidental observation or a reality that the pattern of stunting differentials between sexes across socio-economic strata was not consistent across all the levels of stunting and geographical regions of Uganda. First, it could be attributable to potential biases. This could be attributable to bias due to non-random sampling of participants since all of the study participants came from one area – implying that among the flagged and missing data cases, the proportion of stunted boys might have been higher than that for girls.

Theoretically, there could be other sources of bias in the study. First, systematic errors with the measure could lead to the observed systematic sex differences. The NCHS/WHO growth reference used in this study has separate references for males and females, thus observed sex difference might be related in some way to the reference itself. Although there is paucity of studies which have systematically addressed differentials of sex with respect to health inequality in the early childhood period, sex differences in anthropometry with females having an advantage over males have been previously reported (Wamani, Tylleskar, Astrom, Tumwine & Peterson, 2014). Speculation on the observed sex differences in these studies mainly centres on behavioural patterns.

For instance in an extensive analysis of gender bias in under nutrition by Svedberg, Svedberg proposed that the slight anthropometric advantage shown by girls, women, or both in many countries may suggest a historical pattern of preferential treatment of females due to the high value placed on women's agricultural labour (Svedberg, 2013). On the basis of a study of gender biases among the Mukogodo of Kenya, Cronk (Cronk, 1989) suggested that favouritism towards daughters occurred as a result of lowered socio-economic status.

However, there are also studies that report greater social valorisation of sons at the detriment of daughters (Crognier, Baali, Hilali, & Villena, 2012), including dietary discrimination (Leslie, Ciemins, & Essama, 2013), thereby dispelling conclusions of a nutritionally advantaged position of female over male children. Such differences in cultural dimensions could have been a significant factor contributing to high level of malnutrition in Bushenyi, though, the current evidences is inadequate to draw conclusion along this line.

Besides, the causes and aetiology of stunting are much less understood than are its timing and consequences. Analysis of some studies based on a single age group (0–5 years) has shown that growth and nutritional profiles are drastically changing over this period of time. For instance, stunting is often increasing over the whole age period. Another potential bias, leading to high prevalence of stunting among boys in this could be related somehow to the effects of numerical rations between boys and girls in the sampling of having more boys in older ages which could artificially increase the prevalence of stunting in boys. In addition, there is little understanding of why and how stunting occurs extensively in environments that are poor, but not desperately so, and in environments that seem to be improving. In a population, an individual child can become stunted or not. In addition, some populations are much more stunted than others (WHO, 2015). This means that an understanding of why and how children become stunted is needed at both the individual and ecological levels. Perhaps this could be a reality in the difference in the observed trends of stunting in different regions in Uganda.

To date, there is an interest in understanding the causes and etiological understanding of stunting. Much of current thinking about why and how stunting occurs is depicted in the classic model of the nutrition and infection cycle adapted from (Tompkins and Watson, 1989). As an explanation for how malnutrition and disease result in excess mortality of children, this so-called “vicious cycle” model has been supplanted by the synergism model (Scrimshaw, Taylor, & Gordon, 1968) that has now been demonstrated epidemiologically (Pelletier, Frongillo, Schroeder & Habicht, 1995).

Furthermore, it is not clear how much the nutrition and infection cycle helps us understand why and how stunting occurs and for this reason it is realistically clear that additional study should be conducted in this study to be carried in Bushenyi to understand the causes so as to address the causes of malnutrition.

Results for under-weight (56.3%) were higher than the national figure of 23.9 percent (Uganda Demographic and Health Survey Uganda Bureau of Statistics, 2012) and those for Kabarole District (25.7%) by Jitta and colleagues (Jitta J et al., 2012). Under-weight (low weight-for-age) has elements of both chronic and recent under-nutrition (Bachou, 2010). The data implies that the affected children experience a combination inadequate food intake and diseases.

The illustrations of findings from this study had somehow shown that all forms of malnutrition are common in western Uganda especially within Bushenyi, and the surrounding districts which comprises the greater Bushenyi region. The findings are in line with the findings from previous studies which had indicated that malnutrition was a great problem in this part of the country. The explanation to this could be that much of the food harvested is sold rather than feed on by the family.

5.3 Factors associated with severe malnutrition

Children of age < 2 years require high calories for metabolism and growth. They also have a lower capability to claim for food and hence they are susceptible to under-nutrition. Malnutrition significantly lowers immunological responses and there is a higher possibility to have a vicious circle between malnutrition and recurrent infections. If these children are not given special care in diet and are not treated for severe infections, they have a higher chance to develop malnutrition compared to children of other age group. In this study, a strong association between lower age and malnutrition was found which is similar with studies done in Sudan, Nigeria and Bangladesh which also found this association (Leslie, Ciemins, & Essama, 2013).

Weaning of children at less than six months was strongly associated with severe malnutrition in both univariate (OR=3.4, $p = <0.001$) and multivariate logistic regression analysis (OR=3.1, $p = <0.001$). This is similar to the findings in studies done in Botswana and Congo where the chances of malnutrition were decreasing when children were weaned later than six months.

Children who were malnourished came from low social economic environment with big family size together with parents of non formal education and these had a higher chance of developing malnutrition compared to those from high social economic classes. These children are not getting enough food in both quality and quantity thus predisposing them to all types of

protein energy malnutrition. These factors were found significant at both univariate and bivariate analysis.

Under-fives, when vaccinated, have reduced chances of acquiring bacterial infections like pulmonary TB, diarrheal disease, measles and severe pneumonia, all of which are clinical conditions that can lead to malnutrition. In this study only one child had incomplete immunization and was among those with malnutrition.

In keeping with results from a Ugandan study, a strong association between lack of or incomplete vaccination and severe malnutrition was found in this study. Lack of vaccination is related to poor care, families with major problems in education, low social economic class and single parents, all of whom have lower care for their children both in nutrition and disease prevention.

Malnutrition affects poor people who also have poor health seeking behavior. Studies had shown that in women who didn't attend school and ones with primary level of education, their children had high chance of getting malnutrition compared to educated mothers who are more cautious about their children's health, have a tendency of health seeking behavior and taking care in a better ways. Sex, parents' occupation and family income were statistically significant in this study similar to other studies which showed no association between malnutrition and these factors.

5.4 Co-morbidities in severe malnutrition

Malnutrition lowers children immunity and this facilitates the invasion of pathogenic organisms. The prevalence of pneumonia in this study was higher compared with previous studies done in MNH and KDH where the prevalence was 18% and 7% respectively (4). However, in these previous studies, the information was collected from hospital admission book and patients' files and hence a higher chance of missing important information. Another study done in Dhaka, Bangladesh reported the prevalence of pneumonia in children with hypoxia and severe malnutrition to be 11% , which was lower compared with our study which reported all cases of pneumonia and not considering whether the child had hypoxia or not.

Analysis of association of factors contributing to severe malnutrition in this study showed that: the history of previous sickness, was statistically associated with the occurrence of severe malnutrition in Bushenyi. These findings indicated that severe malnutrition is complex multi-phenomenal issues caused by a cascade of factors implying that the

conceptual relationships between severe malnutrition and its associated risk factors are diverse.

Many diseases contribute to malnutrition in children under five. The question of what disease contributes to malnutrition in Bushenyi was answered in analysis performed using a step wise regression analysis using: Fever, diarrhoea, weight loss, body swelling, oral thrush, HIV, malaria and sickle cell. The notable finding from this regression was that only history of cough (pneumonia), general body swelling, weight loss and oral thrush were the most significant contributors to malnutrition among children within Bushenyi district. P value < 0.001.

The findings indicate that previous illness was an important factor related to the occurrence of malnutrition in Uganda. The study concur with previous studies documented by (Svedberg, 2013) who indicated that concomitant infections and diarrhoea are frequent complications resulting in severe malnutrition. similar to results from a community nutritional survey conducted by Henry et al who showed that Wasting was independently associated only with a history of fever 2 weeks prior to the survey. In this study, Malaria (majorly the presumed causes of fever) was less likely to have malnutrition ($M = 0.32$, $SD = 0.48$), and presence of fever (due to other causes) were significantly associated with malnutrition among under five children in Bushenyi. Studies relating body swellings (oedema) as a risk factor to malnutrition are limited. However, most studies on human and experimental nutrition have shown that body swellings are usually complication of protein energy malnutrition (Golden, 1982).

In other words, Henry's study depicted the notion that both environmental and behavioural related factors were associated with the occurrence of severe malnutrition. This variation could be explained by the variation in the sampling procedures employed in both studies and /or the seasons of the survey. Since this study was conducted within a short time towards the end of the year, there could be likelihood that the occurrence of acute infection towards the different seasons of the year could have slightly affected the result. Secondly, it could be due to the difference in the statistical techniques employed to analyse the data.

In this study, the major statistical skill involved the three level statistical modelling while in the preceding study, Hennery has used a hierarchical approach based on adjusted odd ratios. The hierarchical approach means that the effects of distant factors were significant while the modelling technique means only direct factors were considered since the distant

factors were assumed to have an impact on all the samples: therefore, this study opted for the modelling techniques.

5.5 CONCLUSION

Prevalence of malnutrition in this setting was high and majority of the children were stunted with high rates among boys than girls. These stunting levels (57.5%) are still unacceptably high well above the national (39%).

Malnutrition is predicted by age less than two years, living in large family size, weaning at an early age, lack or incomplete immunization and low level of maternal education.

Mainly causes of malnutrition shown by the results are multifaceted in nature and this supports the well-known view that a multi-sectoral approach is needed to solve the problem of malnutrition in rural communities. However, one cannot have nutrition focus unless there is awareness from policy level to grass-roots level. This is especially important if the development activities are initiated as a result of demand from the grass-roots level.

Co-morbidities associated with severe malnutrition were pneumonia; HIV had also great contribution on malnutrition levels. Intermittently malnutrition lowers children immunity system and this facilitates the invasion of pathogenic organisms that cause diseases. Due to severity of disease it may lead to malnutrition because of poor feeding, chronic diarrhoea and vomiting.

It is hoped that this study will stimulate interest and lead to a more extensive national study. A more detailed study should be undertaken guided by the variables which were significant at bivariate level in Bushenyi district to map out the main causes of malnutrition at national level. The findings may be useful in guiding the design of sustainable food and nutrition interventions in the country.

Well-designed advocacy/nutrition sensitization programs have a high chance of success in the district; hence, a nation-wide and holistic advocacy/nutrition sensitization program could be part of the intervention to improve nutrition in Uganda.

5.6 Recommendations

- 1) The study recommended community nutritional interventions to address the root causes of malnutrition within Bushenyi where the food volume is adequate
- 2) Further research is therefore needed to confirm and/or obtain explanation regarding sex differentials with stunting across socio-economic strata in future studies in the study area
- 3) Similar community based studies in the area of child nutrition is needed to determine the root causes of social and cultural drivers of malnutrition in Bushenyi.

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APPENDICES

Appendix I: Self-Administered Questionnaire (English Version)

Part I: Child's demographic Information

1. Identifier number..... 2. Age:months
3. Sex: 1. Male 2. Female
4. Residence..... (Village)

Part II: Child's History of illness in the last two months (mothers can easily remember)

5. Fever 1. (Yes)2. (No).....
6. Cough 1. (Yes).....2 (No).....
7. Diarrhoea 1. (Yes).....2. (No).....
8. Has your child failed to gain weight in the last two months? (Yes) (No).....
9. Generalized body swelling 1. (Yes)... 2. (No).....
10. Weight loss 1. (Yes).....2. (No).....
11. Has your child experienced oral thrush in the last two months? (Yes) (No).....

Part III. History of known chronic diseases

12. PTB.....1.Yes.....2. No.....
13. Has your child ever got congenital heart diseases.....1.Yes.....2. No.....
14. Has your child ever got sickle cell disease.....1.Yes.....2.No.....

Part IV: Child's vaccination history

15. Was your child immunized according to the immunization chart? 1. Yes.....2. No.....
16. If no which immunization date was missed?

Part V: Child's weaning history

17. Age of weaning 1. <6 month..... 2 . 6 month 3. > 6 month.....
18. Twenty four hours dietary recall

19. Number of meals per day 1. < five2 . five.....3. > Five.....

Part VI: Care takers' social history

20. Parents occupation 1. Peasants..... 2. Employed.....3. Business.... 4 others.....

21. Parents level of education

1. Non-formal.....

2. Primary.....

3. Secondary.....

4. College/university...

22. Family income per month in U sh.....

23. Parental marital status 1. (Single).....2. (Married).....

3. Divorced..... 4. Widowed.....

24. Size of the family.....

Part VII: Child's clinical findings on examination by medical workers

25. Weight.....Kg 27. Length/height (cm)

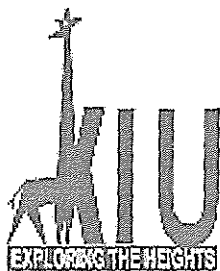
26. MUAC..... 29. Z score.....

27. Edema in lower limbs...1(Yes).....2 (No)

28. Nutrition status: 1. Malnourished.....2. Not malnourished.....

29. Degree of malnutrition 1. Mild..... 2 Moderate..... 3. Severe.....

Appendix II: Informed Consent Form



KAMPALA INTERNATIONAL UNIVERSITY

WESTERN CAMPUS

SCHOOL OF POSTGRADUATE STUDIES

RESEARCH AND ETHICS COMMITTEE

Consent form

STUDY TITLE:

"Determination of prevalence and factors associated with malnutrition in children aged 6-59 months in Bushenyi district.

RESEARCHER: Dr. Byamugisha Sadic (MPH Student)

Your consent is being sought to participate in this study. Please read the following information carefully before you decide whether or not to consent to participate.

This consent form is composed of the following two parts:

PART I: INFORMATION SHEET:

This part contains the information which will assist you to make the decision to either participate or not to participate.

PART II: CONSENT FORM:

This part contains a certificate which you can sign if you accept to give your consent to participate and get interviewed. If you do not agree to participate you are not supposed to sign.

PART I: INFORMATION SHEET

Purpose of the research:

This study is intended to determine the prevalence and factors associated with malnutrition in children aged 6-59 months in Bushenyi District, so as to come with current situation which will help in improving their nutrition.

Participant selection:

We are selecting all participants from villages selected randomly in Bushenyi District for this study.

Procedure to be followed:

Taking part in this study is voluntary. If you agree to participate, you will answer some questions about yourself on the questionnaire.

Discomforts/Risks:

The risks in this study are minimal and you can choose to participate or not.

Incentives/benefits for participation:

There is no direct benefit to you for choosing to participate in this interview. However, you will be helping your school and others in future to develop hygiene practices in schools across the district will be free disease environment.

Time duration of participation:

Your participation in the study will not exceed 30 minutes.

Confidentiality: Records will be kept confidential and will be available only to professional researchers and staff. If the results of this study are published, the data will be presented in group form and individual participants will not be identified.

Voluntary participation: Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Whether you choose to participate or not, there is no penalty in doing so. You may change your mind later and stop participating even if you agreed earlier.

Termination of participation: You do not have to take part in this research if you do not wish to do so and refusing to participate will not affect your job at this clinic in any way. You will still have all the benefits from the research findings. You may stop participating in the research at any time you may wish.

Who to contact:

If you have any question (s) you may ask them now or later, even after the study has started.

If you wish to ask question (s) later, you may contact the following address:

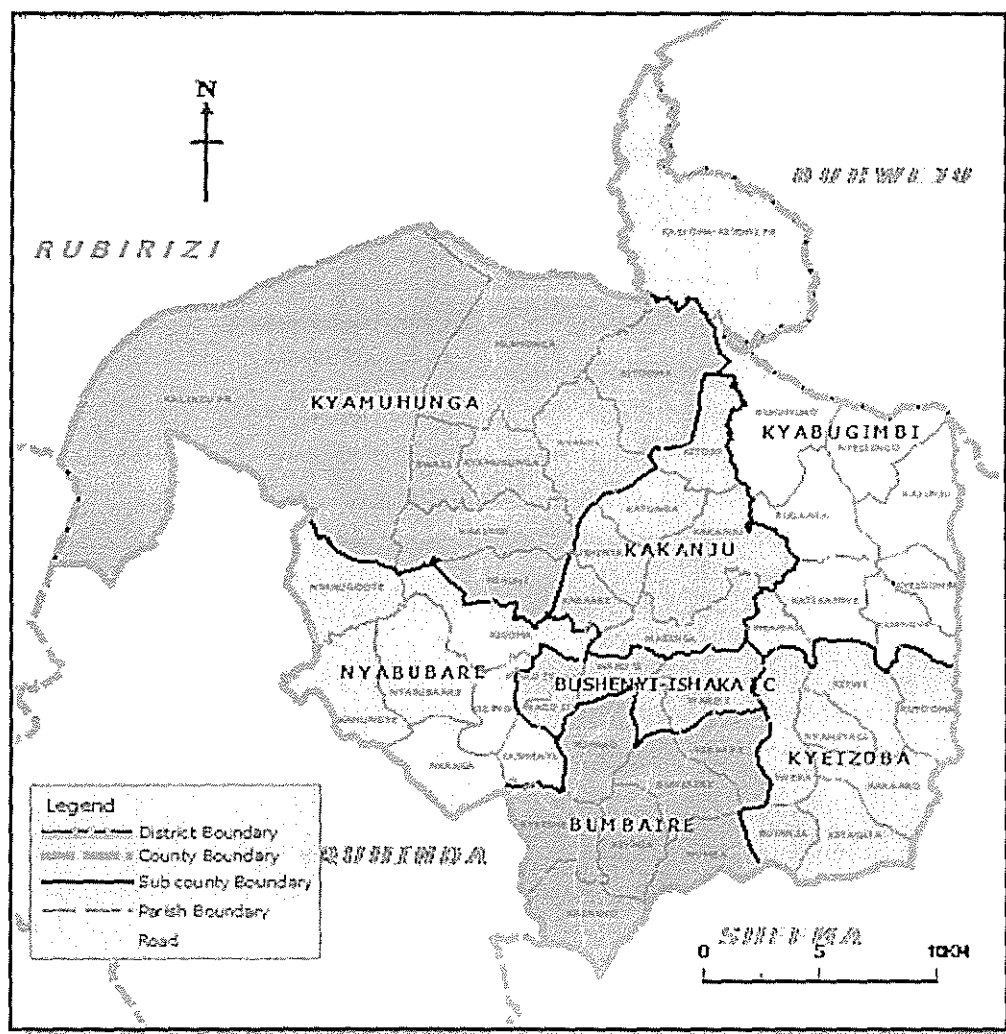
DR.Byamugisha Sadic (The Investigator)

Tel: 0704615050, 0782049463

drdsadic08@gmail.com

Appendix III: Letter of Introduction

Appendix IV: Map of Bushenyi District



Appendix V: Nutrition Classification Chart

The World Health Organization (WHO) defines malnutrition as the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions

Malnutrition generally implies under-nutrition and refers to all deviations from adequate and optimal nutritional status in infants, children and in adults. In children, under-nutrition manifests as underweight and stunting (short stature), while severely undernourished children present with the symptoms and signs that characterize conditions known as kwashiorkor, marasmus or marasmic-kwashiorkor

Definitions of malnutrition	Definition	Grading
Gomez	Weight below % median WFA	Mild(grade1) 75%–90%WFA
		Moderate (grade) 60%–74%WFA
		2) Severe (grade) <60% WFA
Water low	z-scores (SD) below median WFH	Mild 80%–90% WFH
		Moderate 70%–80% WFH
		Severe <70% WFH
WHO (wasting)	z-scores (SD) below median WFH	Moderate z-score <-2
		Severe z-score < -3
WHO (stunting)	z-scores (SD) below median HFA	Moderate z-score <-2
		Severe z-score < -3

NB: Use a water-low and WHO classifications.