

**OUTCOMES OF SEVERELY MALNOURISHED CHILDREN AGED 6 – 59  
MONTHS ON OUTPATIENT MANAGEMENT PROGRAM IN KITUI  
COUNTY HOSPITAL**

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## DECLARATION

This Dissertation is my original work and has not been presented for a degree award in any other university.

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## **DEDICATION**

I wish to dedicate this work to my loving husband Collin Micheni, our lovely children Victor Mawira, Weddy Mwende and Brenda Nyawira for their unfailing support and encouragement.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>CMAM</b>	Community Management of Acute Malnutrition
<b>GOK</b>	Government of Kenya
<b>HAZ</b>	Height for age Z-score
<b>IMAM</b>	Integrated Management of Acute malnutrition
<b>KDHS</b>	Kenya Demographic and Health Survey
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>MDG</b>	Millennium Development Goal
<b>cm</b>	Centimeter
<b>MOH</b>	Ministry of Health
<b>MUAC</b>	Mid Upper Arm Circumference
<b>NCHS</b>	National Centre for Health statistics
<b>OTP</b>	Outpatient Therapeutic Program
<b>RUTF</b>	Ready to Use Therapeutic Food
<b>SAM</b>	Severe Acute Malnutrition
<b>UNICEF</b>	United Nations Children’s Fund
<b>WFP</b>	World Food Program
<b>WHO</b>	World Health Organization

## OPERATIONAL DEFINITIONS

**Malnutrition:** Malnutrition is both under nutrition and over nutrition, but in this study the term will refer solely to a deficiency of nutrients.

**Under-nutrition:** A state of nutritional inadequacy which, in children, manifests as underweight, stunting and wasting with or without edema.

**Severely malnourished** will be determined by WHO reference classification  $W/H < -3$  Z-score, MUAC  $< 11.5$ cm, A good appetite, No medical complications and No severe edema (do not have ++ or +++ edema)

**Mid upper arm circumference:** This is the circumference of the upper arm taken mid way between the olecranon process and the acromion using a special color coded tape. It is usually taken on the left side for purposes of standardization.

**Progress:** increase in weight, height and MUAC. Expected parameters weight ( $\geq 8$ g/kg/day),  $W/H -2$ Z-score and MUAC  $> 11.5$ cm.

**Outcome:** Something that follows after an action. Outcome in the study will be recovered (cured), defaulted, transferred to inpatient care due to complications and failure to respond.

**Recovered** is when children get target  $W/H -2$  Z-score, MUAC  $> 11.5$ cm and no edema for two consecutive visits. The patient has attained discharge criteria.

**Defaulter** is a patient that is absent for two consecutive weeks and confirmed that the patient is not dead by home visit.

**Transferred to inpatient** is when a patient develops complications, nutritional edema or loses appetite leading to admission to the wards.

**Non-respondent** is a patient that has not reached discharge criteria after staying under OTP intervention for 28days.

**Mean weight gain** is the difference between two weights taken on admission and on discharge was divided by the number of days and then by the mid-point of the two weights. The units of mean weight gain were grams per kilogram per day

## ABSTRACT

**Background:** Children suffering from severe acute malnutrition (SAM) have a 5–20 times greater risk of death than well-nourished children (UNICEF, 2012). Traditionally, children with SAM were rehabilitated within inpatient services. Advent of ready to use therapeutic food (RUTF) made it possible to treat majority of these children in their homes. Most studies have highlighted prevalence rates and case fatality rates without describing the outcomes of severely malnourished children on outpatient management.

**Objectives:** The broad objective was to assess the outcomes of severely malnourished children aged 6-59 months on outpatient therapeutic program at Kitui County Hospital. The specific objectives were to determine the outcome (recovery, default and non-response rates) and to establish the association between socio-demographic and socio-cultural factors and outcomes of severely malnourished children aged 6-59 months enrolled in outpatient therapeutic program (OTP).

**Methodology:** This study adopted a longitudinal prospective study design and 104 children with SAM were enrolled in the study consecutively. Data was collected by use of pre tested structured questionnaire. Information was obtained from caretakers regarding demographic, socio-economic and socio-cultural factors. Anthropometric measurements, physical examination and appetite test of the children under study was conducted in a private room within the OTP clinic. Descriptive analysis using means, frequency and proportions was computed. Chi-square test ( $p < 0.05$ ) and odds ratio with corresponding 95% confidence interval was used to determine the association between dependent and independent variables. Binary logistic regression analysis was performed to determine the significant factors associated with recovery from SAM. Paired t test (0.05) was also computed for continuous variables.

**Results:** The findings of the study revealed that the recovery rate was 73.3%, weight gain rate of 5.1g/kg/day and defaulter rate was 2.8%. Significant predictors of recovery were being a house wife {AOR=5.26; 95%CI=1.33-20.87; P=0.018}. Introduction of complementary food at the age of 6 months {AOR=8.86; 95%CI=2.20-35.68; P=0.002}. Children of Mothers/guardians who thought there was no differences in feeding between boys and girls {AOR=12.37; 95%CI=1.87-81.76; P=0.009}. Not suffered any sickness in the last one month {AOR=5.23; 95%CI=1.36-

20.10; P=0.016} and giving antibiotics (Amoxicillin) {OR=13.06; 95%CI=3.01-56.65; P=0.001}.

**Conclusion:** The findings of the study revealed that the overall recovery rate (73.3%) and rate of weight gain (5.1g/kg/day) were below acceptable standards; but, the defaulter rate (2.8%) was within the acceptable international standards. Special focus should be given on predictors of recovery rate like administering routine antibiotics, prompt and appropriate management of co-morbidities and advising mothers to initiate complementary feeding at the age of 6 month

**Recommendations:** Special focus should be given on predictors of recovery rate like administering routine antibiotics, prompt and appropriate management of co-morbidities and advising mothers to initiate complementary feeding at the age of 6 months. Moreover, Kitui County Hospital should establish a tracking system among all SAM children on OTP to monitor on RUTF consumption/ potential sharing, taking weight weekly and give RUTF according to body weight.



# CHAPTER ONE

## INTRODUCTION

### 1.1. Background of the Study

Severe Acute Malnutrition (SAM) is defined as weight-for-height ratio of less than  $-3$  standard deviations below the median reference population or weight-for-height ratio of below 70% or presence of nutritional edema (WHO/UNICEF/WFP, 2007). On the other hand WHO refers to malnutrition as both under nutrition and over nutrition, but in this study the term will refer solely to a deficiency of nutrition. Millennium Development Goal (MDG) four aims to reduce child mortality by two thirds between the years 1990 and 2015 (UN, 2005). To meet this target, efforts to prevent child deaths must be employed.

Out of the estimated 8.8million deaths in children less than five years in 2008 worldwide, 35% were attributable to under nutrition. Severe acute malnutrition (SAM) affects 20 million children globally and contributes to 1 million child deaths every year (Irena, 2011). Children suffering from SAM have a 5–20 times greater risk of death than well-nourished children (UNICEF, 2012). Malnutrition is common in developing world and associated with morbidity and mortality (Bejon *et al.*, 2008). It continues to be a major public health problem in developing countries. Indeed it is a most important risk factor for the burden of disease causing about 300, 000 deaths per year and is directly or indirectly responsible for more than half of all deaths in children. It was estimated that nearly 30% of infants, children, adolescents, adults and elderly in the developing countries are suffering from one or more of the forms of malnutrition. At least 49% of the 10 million deaths among children less than 5 years old each year in the developing world are associated with malnutrition. A study carried out in Ethiopia revealed that 47.6%, 30.9% and 16.7% of children were stunted, underweight and wasted respectively (Mengistu *et al.*, 2013).

In Kenya 35% of children less than five years are stunted, (7%) wasted, and (16%) underweight among children under-five years old a (KDHS, 2008/2009). Eastern province has the highest proportion of stunting (42%) and that the proportion of underweight children increased from (21%) in 2003 to (25%) (KDHS 2008-2009). Results by UNICEF indicated that infant and child mortality was highest in Eastern province where eighty six per one thousand live births die (Kenya National Bureau of Statistics (2009). In Kitui County the less than five years mortality rate is 86 per 1000 births, underweight prevalence

below 2 standard deviation (-2 SD) is 25.7% and stunting prevalence below -2 SD is 37.9% (Kenya National Bureau of Statistics 2009). Malnutrition in childhood is known to have important long-term effects on the work capacity and intellectual performance of adults. Health consequences of inadequate nutrition include delayed physical growth and motor development, impaired cognitive development, greater behavioral problems, deficient social skills and susceptibility to infections (Mengistu *et al.*, 2013).

## **1.2. Statement of the Problem**

Traditionally, the Kenyan Ministry of Health (MOH) had rehabilitated children with SAM within inpatient services, mainly through District and Provincial Hospitals, which treated all cases with therapeutic milk-based formulas (F75 and F100) administered by medical staff. These facilities were often overcrowded promoting cross-infections, extending the length of stay in hospital subsequently leading to high default rates and the mother's absence from her other children for long periods (MOH, 2009). This resulted in higher costs of care and a loss to the economy. Therapeutic innovations at global level led to evolution from total in-patient to community-based care with outpatient and inpatient treatment included: First, the development of ready-to-use therapeutic foods (RUTF), which are lipid-based and thus resistant to contamination; second, was a new classification distinguishing between severe cases with and without medical complications; and third was the use of simple, color-coded mid-upper arm circumference (MUAC) measuring tapes for diagnosis that allow community members to be trained to identify SAM for referral to treatment (UNICEF, 2012).

Increased coverage of programs addressing SAM was made possible about ten years ago when the advent of RUTF and an innovative community-based approach made it possible to treat majority of children in their homes. The Integrated Management of Acute Malnutrition (IMAM) was initiated in Kenya in 2009 (UNICEF, 2012).

Evaluation report on IMAM in Kenya reviewed that out of the total 111,336 discharged children over the period between 2010 and 2011, 81% recovered, 1.5% died, and 13% defaulted. The average length of stay was 59 days with a relapse rate at 3%. This data confirms the general success of outpatient care (UNICEF, 2012). Community management of SAM has major public health impact which resulted in a dramatic increase of the programme coverage and, consequently, of the number of children who were treated successfully – yielding a low case-fatality rate (WHO, 2007).

Although the prevalence of malnutrition in Kenya especially Eastern province including Kitui County is still high, the outcome data on outpatient therapeutic program of severe acute malnourished children is still unclear. This study, therefore, seeks to establish the outcomes of outpatient therapeutic program among the children aged 6 –59 months in Kitui County Hospital.

### **1.3. Justification of the Study**

Over the past decade there has been a global initiative to shift from facility-based treatment approaches to a decentralized community based approach. This shift is founded on evidence that in many poor countries, majority of children with SAM are never brought to health facilities and in these cases, only an approach with a strong community component can provide them with an appropriate care (WHO/ UNICEF/ WFP, 2007). The updated WHO guidelines recommend that children with SAM who do not have health complications that require hospitalization, receive special, high-energy food and antibiotics to treat infection. This allows them to recover at home with their families. Morbidity and mortality among children aged 6-59 months remains a major health challenge in Kenya. Most studies have highlighted prevalence rates and case fatality rates without describing the outpatient therapeutic program outcomes of severely malnourished children. The existing gap brought on board the data not only on the outcomes but also contribute to the intervention measures to reduce or to improve OTP management practices. The study has contributed data on outcomes of outpatient management of severely malnourished children attending Kitui County Hospital. The fact that prevalence of malnutrition in children aged 6 –59 months is high in the eastern region of Kenya; a study was conducted to establish the OTP outcomes in Kitui County Hospital as an effort to fill this gap.

### **1.4. Purpose of the Study**

The main purpose of this study was to establish the outcomes of outpatient management of severely malnourished children aged 6 –59 months in Kitui County Hospital. Findings of this study will therefore form the basis on which policy makers can institute measures to maintain best practices or review existing practices to further improve outcomes. Moreover, in part it is expected to serve as a baseline reference for those who may wish to undertake further research on the area.

## **1.5. Research Questions**

The study sought to answer the following research questions:

1. What is the outcomes (recovery, default, non-response and weight gain) rate among severely malnourished children aged 6-59 months enrolled in outpatient therapeutic program?
2. What are the socio-demographic, socio-economic, socio-cultural factors among the guardians with severely malnourished children aged 6-59 months enrolled in outpatient therapeutic program?
3. What are the factors associated with good outcomes of severely malnourished children aged 6-59 months

## **1.6. Objectives of the Study**

### **1.6.1 Broad objective**

To assess the outcome of severely malnourished children aged 6-59 months on outpatient therapeutic program at Kitui County Hospital

### **1.6.2. Specific objectives**

1. To determine outcomes (recovery, default, non-response, mean weight gain) rate among severely malnourished children aged 6-59 months enrolled in outpatient therapeutic program
2. To describe socio-demographic, socio-economic, socio-cultural factors among the guardians with severely malnourished children aged 6-59 months enrolled in outpatient therapeutic program
3. To establish factors associated with good outcomes of severely malnourished children aged 6-59 months enrolled in outpatient therapeutic program

### **1.7. Theoretical Framework**

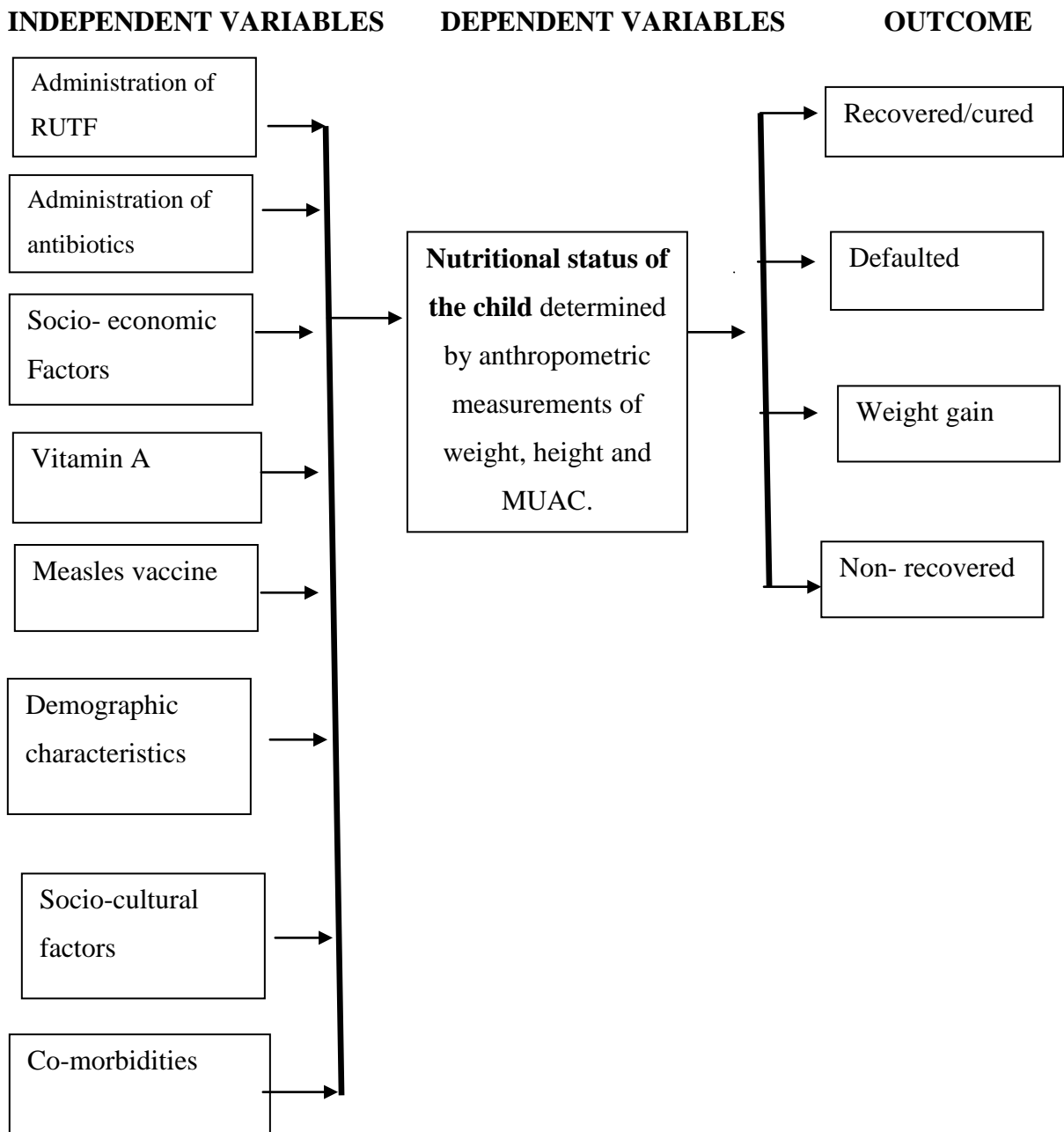
The study was based on transactional model of development by Arnold Sameroff (1975). Sameroff believed that interplay of nature and nurture is key in explaining the development of positive and negative outcomes for children.

The transactional model looks at development as a result of a complex interplay between the child and their natural personality and traits, as well as family experiences and economic, social and community resources. The influences are classified as proximal and distal influences.

*Proximal* influences are the factors that influence the child's growth and development closely such as interaction between parent and family.

*Distal* influences are those affecting the child *indirectly*. *They include factors like* family income and the type of community. Infants and young children spend more time with their parents and caregivers; this is why they are more dependent on their "proximal influences." Distal factors affect parents/caregivers ability to provide for their child. These include negative factors, such as family unemployment, which may result on additional risks to the development of a child.

### 1.8. Conceptual Framework



### 1.10. Benefits of the Study

During the study, mothers of children with SAM were educated on ideal diet and frequency of feeding their children. The Kitui County Hospital administration will be able to utilize the data obtained to formulate more hospital policies for the management of SAM children. The study has established a platform for future researchers to base their studies and moreover, the study results will be published, adding on to the existing body of knowledge.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1. Introduction

In this chapter, the researcher presented a review of literature related to outpatient management of severely malnourished children. The review was based on management method of severely malnourished children, progression of children on outpatient therapeutic program, the relationship between socio-demographic, socio-cultural and outcome of severely malnourished.

#### 2.2. Global Situation

Malnutrition affects all groups of people in the general population and the problem is particularly significant among infants and young children worldwide. This is so because young children have increased nutritional needs for growth and development (Torun, 2006). Children under the age of five years are the most vulnerable and majority of those who are affected with malnutrition are in the developing world (Ashworth *et al.*, 2004). Socio-cultural barriers are major hindrances in some communities, with female children usually being the most affected (Luchuo, 2013)

Over the past decade there has been a global initiative to shift from facility-based treatment approaches to a decentralized community based approach. This shift is founded on evidence that in many poor countries, the majority of children with severe acute malnutrition (SAM) are never brought to health facilities and in these cases, only an approach with a strong community component can provide them with an appropriate care (UNICEF, 2011). “It’s generally better for children and better for their families if they’re treated as outpatients because it can be easier for families who need to continue providing and caring for other children and it allows vulnerable, malnourished children to stay home and avoid the risk of getting hospital infections”(WHO, 2013).

Nearly half of all deaths in children under 5 are attributable to under nutrition. This translates into the unnecessary loss of about 3 million young lives a year. Globally the nutritional status of children has gradually improved though there has been a global decrease in under nutrition from 47% in 1980 to 33% in 2000 (De onis *et al.*, 2000). Despite this, malnutrition is still on the rise in East Africa (Johanna, 2010). For the past two decades malnutrition has been the leading cause of morbidity and mortality in

children below five years worldwide. 1 out of 3 (177 million) under five years children were found to be malnourished in 1990 (Torun, 1994) on the other hand 199 million children were still suffering from malnutrition (Zere, 2003). In 2004, 55% of child deaths worldwide resulted from under nutrition (Caulfield *et al.*, 2004). Malnutrition contributed to 2.2 million deaths of children under five years old in 2008 (Black *et al.*, 2008) and in 2009 more than one third of all the children's deaths worldwide were caused by under-nutrition as well (UNICEF, 2013).

Underweight prevalence continues to decline, in a slow pace and that worldwide, 99 million children under age of 5 years were underweight in 2013. If current trends continue, the MDG 1 target (halving the 1990 underweight prevalence by 2015 at the global level) will not be met. Africa has experienced the smallest relative decrease, with underweight prevalence of 17 per cent in 2013, down from 23 per cent in 1990 (Black *et al.* 2013)

In 2013 globally, 51 million children under 5 were wasted and 17 million were severely wasted. This translates into a prevalence of almost 8 per cent and just less than 3 per cent, respectively. In 2013, approximately two thirds of all wasted children lived in Asia and almost one third in Africa. Sub-Saharan Africa represents a 'serious' need for intervention with appropriate treatment programs (UNICEF, 2014).

### **2.3. Kenyan Situation.**

Comparison of the 2008-09 results with those from the 2003 Kenya Demographic and Health Survey (KDHS) points out that there has been almost no change in the proportion of children who are stunted, wasted, and underweight. According to KDHS findings, 35 percent of Kenyan children are stunted, while 14 percent are severely stunted. Seven percent of Kenyan children are wasted, with two percent severely wasted. Sixteen percent are underweight, while four percent are classified as severely underweight as shown in table 2.1 below (KDHS, 2008-09)



**Table 2.1:** Malnutrition indicators for under-fives (u5s)

	<b>1993 KDHS</b>	<b>1998 KDHS</b>	<b>2003 KDHS</b>	<b>2008-09 KDHS</b>	<b>2010 (Unicef)</b>
<b>U5 mortality rate*</b>	96	112	115	74	85
<b>Stunting (u5s)</b>	33%	33%	30.3%	35.3%	35%
<b>Wasting (u5s)</b>	6.1%	6%	5.6%	6.7%	7%
<b>Underweight (u5s)</b>	22%	22%	19.9%	16.1%	16%

\*per 1,000 live births

**Sources:** KDHS surveys for 1993, 1998, 2003, 2008-09; Republic of Kenya 2008; UNICEF 2010.

## **2.4. Factors that predispose children to malnutrition**

The factors that predispose children to malnutrition are complex and varied. They range from political instability, social, cultural practices and slow economic growth due to infectious diseases (De Onis *et al.*, 2000). A study carried out in Nigeria showed that mother's educational level, age, parity, types of family like for single parents, children's immunization status and age of child are among the key determinants of the nutritional status for less than five (Ojofeitimi, 2003).

### **2.4.1 Socio-economic factors**

Living standards, water and sanitation, parity, birth interval, sex of child, weaning practices and mothers level of education are a few of the important contributory factors which have been highlighted, however, dietary inadequacy is the basic cause of malnutrition in pre-school children (Raheela, 1994).

The level of income is by far the greatest single cause of variability in food intake although income is not the only measure of poverty. When the household income decreases, it is usually the women who try earning extra wages causing the mother to have less time for childcare (Lipton, 1998).

### **2.4.2. Cultural factors**

Some of the cultural factors that may affect nutrition include abrupt weaning due to pregnancy, the belief that food should not be given to a child who is suffering from measles or diarrhea. It is further argued that sharing food from the same bowl between different children can result in the younger children getting less than their body

requirements. In some traditional societies it is common for the youngest and weakest children to be at a further disadvantage in family food sharing (Maletnlema, 1978).

### **2.4.3. Information and education**

Malnutrition is worsened by a lack of nutritional information and knowledge, especially maternal nutrition education. This leads to unhealthy dietary habits, poor nutrition related practices and attitudes, perceptions and socio-cultural influences (NDoH, 2003). For families to be healthy with a good nutritional status, they need knowledge regarding growth, purchasing, processing, and preparation of food, in the right quantities and combinations (NDoH 2005a).

Female children are involved in household chores resulting in poor school attendance, which influence education leading to poor knowledge and caring practices for her family (UNICEF, 2009). Lack of nutritional knowledge can also lead to misconceptions about food and negative food traditions that are passed on from generation to generation (NDoH 2005b).

Better maternal knowledge leads to better childcare practices like breastfeeding for longer than six months and the delayed introduction of solids (Kalanda *et al.*, 2006). Uneducated mothers have trouble preparing infant formula correctly and the milk is too expensive to give sufficient amounts hence end up using diluted cow's milk (Berdanier, 1995).

Increased coverage of programs addressing SAM was made possible approximately ten years ago when the advent of RUTF and an innovative community-based approach made it possible to treat majority of children in their homes. The Integrated Management of Acute Malnutrition (IMAM) was initiated in Kenya in 2009 based on the CMAM model. The Government of Kenya (GoK) through the Kenya Vision 2030 aims at achieving good nutrition for optimum health of all Kenyans (UNICEF, 2012).

### **2.5. Outpatient Treatment of SAM**

According to the National Guidelines for Management of Acute Malnutrition, a child admitted into an outpatient therapeutic program (OTP) should have WFH  $< -3SD$ , and a MUAC  $< 11.5cm$ . The child should have a good appetite, without severe or moderate edema and no medical complications.

The community base model provides a framework for an integrated public-health response to acute malnutrition, treating most patients with SAM solely as outpatients and reserving

inpatient care for the few with SAM and complications. The model also aims to integrate treatment with various other interventions designed to reduce the incidence of malnutrition and improve public health and food security. Program design attempts to take into account the socioeconomic factors, particularly poverty, high workloads for women, and the exclusion from health and education services that contribute to the late presentation of cases of acute malnutrition (MOMS and MOPHS, 2009).

### **2.5.1. Case definition**

Severe acute malnutrition in this study was defined as weight for height 3 SD less than the mean of the WHO reference population, with good appetite, free from moderate or severe nutritional edema and / or left mid upper arm circumference of less than 11.5cm and free of medical complications.

### **2.5.2. Management**

Patients enrolled in OTP should be treated with routine drugs such as Vitamin A, Folic acid tabs, antibiotics (Amoxicillin), de-worming tabs and measles vaccine and the relevant quantity RUTF at home. Out-patients attend a health facility weekly for monitoring and to replenish RUTF supply. Nutrition rehabilitation in the community is effective when the patient receives a weekly supply of take home Ready to Use Therapeutic Food (RUTF). This is a specialized food developed specifically for the recovery of severe malnutrition at home. It is an energy-dense, mineral/vitamin-enriched product that is equivalent to F100 with added iron. It contains the required energy and micronutrients to meet the nutritional needs of the severely malnourished child. RUTF is an oil-based, ready-to-use product that has a low risk of contamination. It provides approximately 530Kcal per 100g. The ration given to a severely malnourished child is based on the intake requirement of between 150-200 kcal/kg/day. The amount of RUTF to be consumed per day is based on the weight of the child as shown in the table 3.1 (MOMS and MOPHS, 2009).

## **2.6. Outcomes of OTP Management**

In a prior study children, who had been treated for severe malnutrition aged 12-59 months who had reached the discharge criterion of 80% of weight-for-height, were followed for the next 12 months. During follow-up, 7.5% were lost without trace, 0.6% relapsed, and 2.3% died (Khanum, 1998)

Outcomes from 20,976 cases of SAM presenting to 21 community-based therapeutic care (CTC) programs implemented in Malawi, Ethiopia North & South Sudan in 2000 – 2005, indicated that community-based programs can attain excellent rates of recovery and coverage. These programs achieved recovery rates of 78.1% and mortality rates of 4.3%, default rates of 11.0%. Transfer to inpatient and non-recovery rates were 3.3% and 2.2% respectively. Coverage rates were approximately 73%. 74% of the severely malnourished children who presented were treated solely as outpatients (Collins *et al.*, 2005).

In 2005, Ashworth updated her review with an additional six studies of RUTF use. Five (83%) reported greater success rate than in those studies not using RUTF (Ashworth, 2006).

Therapeutic foods should be considered essential medicines and should be integrated into regular health care services. In Maradi most severely malnourished children were treated with RUTF on an outpatient basis, with a cure rate of nearly 90 percent which is far above the National cure rate (Tectonidis, 2006).

Children who were identified as severely malnourished by the WHO standards on OTP had shorter duration of treatment and a greater rate of recovery. Number of children identified with a WFH of 70% of the NCHS reference median and a WFH z score of less than 3 of the WHO standards (Isanaka *et al.*, 2009).

Out of the total of 111,336 discharged children over the period between 2010 and 2011, 81% recovered, 1.5% died, and 13% defaulted. The average length of stay was 59 days with a relapse rate at 3%. This data confirms the general success of outpatient care (UNICEF, 2012). Experience from the past two decades indicates that children with uncomplicated moderate or severe acute malnutrition can be managed successfully as outpatients, by use of appropriate treatment of infections and either lipid-based, ready-to-use therapeutic foods or appropriately formulated home diets, along with psychosocial care.

Gebremichael *et al.*, (2014) reported that 61.78% of the children who had been managed for SAM were recovered after they were treated under the OTP intervention. The defaulter rate was 13.85%, death rate 3.02% and Non-respondents 8.91%. In light of these,

complying with the appropriate management of OTP resulted to significantly faster recovery rate.

Plumpy' Nut/ RUTF administered in OTP had a positive effect to the recovery. A child, who consumed one more sachet of Plumpy'Nut, had the recovery rate from SAM increased by 4%. Presence of diarrhea, vomiting, failure to gain weight for at least 3 consecutive weeks, appetite loss with Plumpy'Nut, amoxicillin and de-worming drug intakes were significant to predict the recovery rate from SAM. The partial administration of routine medications and managing children with medical complications might also contribute to the delay of recovery from SAM. He continued to argue that the length of stay under the OTP has social, psychological and economic implications. Hence, globally it is set to be less than 4–6 weeks considering that at least 75% of the children at this point could get recovered from SAM (Gebremichael *et al.*, 2014)

Nalwa in her prospective cohort study found that the mean increase in weight-for-height Z score and MUAC were 0.86cm and 0.7cm respectively after 4 weeks of treatment and follow-up in OTP. Average weight gain was significantly higher in children who were reported to have consumed the entire RUTF ration. Majority of patients were discharged from the OTP and were thereafter managed as moderately malnourished (57.5%) after four weeks of follow up and treatment. The mortality, transfers to inpatient and default rates were 1.6%, 0.8% and 6.5% respectively (Nalwa, 2013).

## **2.7. Findings comparing in and outpatient management of SAM**

A trial study in Malawi reported better results in outpatients than in inpatients (recovery: 72% vs 49%). The second trial in Bangladesh reported the reverse (recovery: 67% vs 86%) but no food supplement was provide to outpatients. The recovery rates for outpatients ranged across studies from 69% to 96%. These rates were consistently higher than for those children with marasmus (range 33–81%) or marasmic kwashiorkor (range 45–71%), and mortality rates were consistently lower (Roberfroid, 2013)

A study carried out in Mbagathi district hospital established that for the 142 children who were discharged the overall recovery rate at discharge was 3% (n=4). However the recovery rate at day 21 of therapeutic feeding for the 20 children who were hospitalized for a minimum of 21 days was 20%(n=4). Median weight gain was also reported at

5.6g/kg/day (IQR 1.7-10.4). Forty four children(30%) experienced a weight gain of more than 10g/kg/day, 38(27%) gained 5-10g/kg/ day, 60(43%) gained less than 5g/kg/day categorized by WHO as good, moderate and poor weight gain respectively (Fondo, 2013).

A prior study conducted at Kenyatta National Hospital reported a case fatality rate of 38% in severely malnourished children. Even with appropriate guidelines for inpatient management and trained health personnel, patient management of severely malnourished children is still inadequate. The study established that the quality of care of children admitted in Kenyatta National Hospital was below the WHO guidelines (Nzioki, 2009).

## 2.8. Summary of the outcome in a table

Author	Study design	Title	Findings
Collins <i>et al.</i> 2005. Malawi, N.Ethiopia and South Sudan.	Longitudinal study design	Key issues in the success of community based management of severe malnutrition	Out of 20,976 cases of SAM; recovery rates were 78.1% and mortality rates of 4.3%. Transfer to inpatient and non-recovery rates were 3.3% and 2.2% respectively. Coverage rates were approximately 73%. 74% of these children were treated solely as outpatients
(Gebremichael <i>et al.</i> , 2014) Northern Ethiopia.	retrospective cohort study	Outpatient therapeutic feeding program outcomes and determinants in treatment of severe acute malnutrition in Tigray, Northern Ethiopia: A retrospective cohort study	61.78% of the children who had been managed for SAM recovered under the OTP intervention. Defaulter rate 13.85%, death rate 3.02% and Non-respondents were 8.91%.
Nalwa 2013. Kenya	prospective cohort study	Outcomes of severely malnourished children aged 6-60 months on outpatient management in Nairobi.	The mortality, transfer inpatient and default rates were 1.6%, 0.8% and 6.5% respectively.
Tectonidis 2006. Maradi	Descriptive cross sectional design	Perspective: crisis in Niger-outpatient care for severe acute malnutrition	Most children with SAM treated with RUTF on an outpatient basis, had a cure rate of nearly 90%
UNICEF 2012. Kenya	Longitudinal study design	Evaluation of Integrated management of acute malnutrition(IMAM): Kenya country case study	Out of the total of 111,336 discharged children, 81% recovered, 1.5% died, and 13% defaulted. This data confirms the general success of outpatient care.

## **2.9. Summarizing major findings**

Malnutrition affects all groups of people in the general population and the problem is particularly significant among infants and young children worldwide. Children under the age of five years are the most vulnerable and majority of them are in the developing world. The length of stay under the OTP has social, psychological, cultural and economic implications.

Over the past decade there has been a global initiative to shift from facility-based treatment approaches to a decentralized community based approach. This is because it can be easier for families who need to continue caring for other children. Moreover it allows vulnerable, malnourished children to stay at home and avoid the risk of getting hospital infections.

According to the National Guidelines for Management of Acute Malnutrition, a child admitted into an OTP should have WFH  $<-3SD$ , and a MUAC  $<11.5CM$ . The child should have a good appetite, without severe or moderate edema and no medical complications. Patients enrolled in OTP should be treated with routine drugs such as Vitamin A, Folic acid tabs, antibiotics (Amoxicillin), de-worming tabs and measles vaccine. In addition they are given relevant quantity of RUTF at home. These have a positive recovery rate from SAM. On the other hand co morbidities have a reduced recovery rate. The length of stay should be less than 4-6 weeks.

Patients with SAM under OTP intervention recover, transferred to inpatient, default while others do not respond. Patients with SAM without medical complications recover faster than those with medical complications.

## **CHAPTER THREE**

### **MATERIALS AND METHODS**

#### **3.1. Introduction**

This chapter presents procedures that were used to conduct the study, focusing on research design, study population, sample and sampling procedures, data collection tool and data analysis.

#### **3.2. Research Design**

The study design is a longitudinal prospective study.

#### **3.3. Study Variables**

##### **3.3.1 Dependent Variable**

Nutritional status of the child which was determined by anthropometric measurements.

Outcomes of OTP (recovered (cured), default and non-response and weight gain.

##### **3.3.2 Independent Variables**

Administration of RUTF, antibiotics (amoxicillin), vitamin A, measles vaccine, Socio-demographic characteristics, socio-economic status, cultural beliefs, co-morbidities and mother's level of knowledge/ education.

#### **3.4. Study Area**

The study was carried out in Kitui County Hospital which was started as a dispensary in the late 1800s by colonial government officials. It was moved to the current township dispensary in 1924. Laying of foundation stone was by then vice president Daniel Arap Moi in October 1967 and hospital opened by the first President Mzee Jomo Kenyatta on 4<sup>th</sup> February, 1968 – 30 beds.

It has a catchment population of 75,000 and serves as the main referral hospital in the Southern part of Kitui County, an area with a population of 600,000.

It has a bed capacity of 200 beds and 44 cots and an outpatient department with an OTP. The OTP is manned by 2 nutritionists and occasionally trains students on clinical experience from various universities and KMTCs on nutrition. Patients enrolled to OTP are detected from MCH through routine screening, referred from in-patient and by



community health workers (CHWs). The nutritionists are responsible for monitoring weight, nutritional counseling, issuing RUTF and nutritional follow-up.

### **3.5. Study Population**

The study population in this study included children aged 6 – 59 months enrolled in outpatient therapeutic program of Kitui County hospital.

#### **3.5.1. Inclusion criteria**

- All children aged 6 – 59 months with SAM enrolled in outpatient therapeutic program
- Those children aged 6 – 59 months with SAM whose parents/ guardian gave written consent to be interviewed.

#### **3.5.2. Exclusion criteria**

- All children aged 6-59 months with SAM with poor appetite and medical complications
- All children aged 6 – 59 months with SAM whose caregivers who declined to give consent.

### **3.6. Sample size determination**

According to the health records at Kitui County Hospital, approximately 140 children aged 6-59 months are usually enrolled in the OTP on a monthly basis. Therefore, this was used as the target population from which the study sample was drawn. The researcher adopted a formula (Israel, 1992) which was used to calculate sample size of children aged 6-59 months enrolled in OTP who participated in the study. The sample size was determined as follows

$$n = \frac{N}{1 + N(e)^2}$$

Where n = the sample size

N= the population

e = error term

1 is a constant

$$\begin{aligned}
\text{Therefore } n &= \frac{140}{1 + 140 (0.05)^2} \\
&= \frac{140}{1 + 140 \times 0.0025} \\
&= \frac{140}{1 + 0.35} \\
&= \frac{140}{1.35} \\
&= 103.703 \\
n &= 104 \text{ children}
\end{aligned}$$

Therefore 104 children were recruited from the Kitui County Hospital outpatient therapeutic program (OTP) based on WHO admission criteria to participate in the study.

### **3.7. Sampling Procedure**

Children with SAM were recruited to the study consecutively as they came to out-patient therapeutic program until the sample size was reached. SAM was determined by WHO reference classification  $W/H < -3$  Z-score,  $MUAC < 11.5\text{cm}$ , a good appetite, no medical complications and no severe edema (do not have moderate or severe edema).

For children who met the inclusion criteria, their parents/caretakers were given a written informed consent and then were enrolled in the study. After the parents/caretakers agreed to be part of the research, having duly filled and signed the consent form, they were interviewed with the questionnaire and physical assessment (anthropometric measurement and physical examination) was done for their children. More over the appetite test was conducted. The interviews, physical assessment and appetite test were taken in a private room of the Hospital.

### **3.8. Data Collection Tools**

#### **3.8.1. Questionnaire**

Data was collected by using pre-tested semi-structured questionnaire (Appendix 11). The structured questionnaire was also translated into Swahili (Appendix 11). The questionnaire was then translated back from Swahili to English to confirm same meaning. The questionnaires were administered with the help of one nutritionist and two 4<sup>th</sup> year nutrition students who were working in the hospital. They were trained on the general approach of the questionnaire and diagnosis of SAM.

Information was obtained from caretakers regarding demographic, socio-economic and socio-cultural factors. Anthropometric measurements, physical examination and appetite test of the children under study was conducted in a private room within the OTP clinic.

#### **3.8.2. Physical assessment**

Physical examination was conducted in a private room by a trained nutritionist on visible severe wasting, bilateral pitting edema of lower limbs, pallor of the mucus membranes and gums and superficial infections (involve subcutaneous tissue of the skin). Moreover, observations of temperature and respirations were done at the onset then weekly for 4 weeks.

#### **3.8.3. Anthropometric measurements**

The anthropometric was collected using the procedure stipulated by the WHO (1995) for taking anthropometric measurements. Adherence to this procedure was ensured. The protocol used was as follows:

**Weight:** Salter scale with calibrations of 100g-unit was used. This was adjusted to zero before weighing every child. The children's clothes were removed before the weight was taken. The weight was measured on admission which served as baseline reference and weekly during follow up until 4<sup>th</sup> week (exit). Two readings by the researcher were taken for each child and the average was recorded on the questionnaire.

#### **Height/Length**

The measuring board was used to measure standing height for children older than 2 years or above 87cm and recumbent length for infants and children unable to stand on admission only. This board measures to the nearest 0.1 cm and has maximum capacity of 130 cm.

The height/length was measured twice and the two values were averaged. Two readings were taken and average was computed.

#### **Left Mid Upper Arm Circumference**

UNICEF issued color coded M.U.A.C tapes were used to measure the left mid upper arm circumference on admission, then weekly until 4<sup>th</sup> week. This is the circumference of the left arm mid-way between the acromion and the olecranon process with the M.U.A.C tape fitting snugly. The M.U.A.C was measured twice and values averaged.

#### **W.H.O Z score tables**

W.H.O gender specific weight for height, weight for age and height for age Z score tables were used to grade malnutrition after anthropometric measurements were taken. Diagnosis of SAM was based on weight/height or length, MUAC, presence of edema as explained earlier and appetite test.

#### **3.8.4. Appetite test**

Appetite test was used as per WHO guidelines (see Appendix VI).

#### **3.8.5 Checklist for Follow up Outpatient Therapeutic Care**

MOMS and MOPHS IMAM Guidelines (2009) were adopted as a checklist to record the Follow up of Outpatient Therapeutic Care on a weekly basis (Appendix V).

### **3.9. Data Quality Control**

The questionnaires were cross-checked at the end of the four visits for completeness.

The nutritionists working in OTP clinic ensured weighing machines are calibrated for validity and standardization of reporting. Research assistants were trained on data collection procedures and tools of the study before the actual study commenced, whereby they were exposed to the objectives of the study. Moreover, quality assurance was maintained through monitoring of data collection activities on daily basis by the senior nutritionist and weekly by principal investigator (PI).

To ensure validity and reliability, pre-testing of the questionnaire was done at Mbagathi District Hospital. Six questionnaires were administered which comprised of 5% of the study's sample size. The aim of this pre-testing was to check the extent to which questions were understood by the interviewee and to identify areas for modifications and corrections before actual data collection commenced. Two questions were not well understood hence they were modified. There was an omission on respondent's relationship with the child.

Three questions were changed from open ended questions to closed ended questions to capture the actual view of the respondent.

### **3.10. Data Management and Analysis**

All questionnaires were stored in locked cabinets throughout the study and accessed only by authorized persons so as to ensure confidentiality and to avoid data loss. After data collection, a double entry of the same data was done for accuracy purposes. The data is stored under passwords. Data was cleaned, entered into a computer using MS Excel then exported to SPSS for analysis. Coding and verification of the data was done for easy manipulation, analysis and presentation. Data is presented using tables and graphs showing frequency distribution for independent and dependant variables.

Descriptive analysis using means, frequency and proportions was computed. For categorical variables Chi-square test ( $p < 0.05$ ) and odds ratio with corresponding 95% confidence interval was used to determine the association between dependent and independent variables. Binary logistic regression analysis was performed to determine the significant factors associated with recovery from SAM. Paired t test (0.05) was also computed for continuous variables.

### **3.11. Ethical considerations**

The study was conducted following approval by Joint Kenyatta National Hospital/University of Nairobi (KNH/UON), Ethics and Research Committee. The consent was obtained from the guardian/ caregiver. The serial numbers were used instead of participants' names on the questionnaires to ensure confidentiality. The participants were recruited voluntarily and those who wished to withdraw in the course of the study did so at will. The serial numbers were used instead of participants' names on the questionnaires to ensure confidentiality. The questionnaires were kept in a locked cabinet where access was limited to the researcher and research assistants.

Moreover, study participants who developed complications were referred to inpatient.

### **3.12. Dissemination plan**

The findings of the study will be presented to the University of Nairobi, School of Nursing. It will also be published in a peer reviewed journal and presented in conferences and workshops of relevant stakeholders in this area. Moreover, in part, this study can serve as a baseline for those who may wish to make further research on the area.

### **3.13. Study limitation**

During malnutrition low hemoglobin and serum albumin concentrations are common but due to financial constraints the study did not make provision for taking blood samples for biochemical information, therefore only anthropometric measurement were used.

Food intake was obtained from mother/guardian using 24 hour dietary recall method (recall bias may occur). Quantity of therapeutic feed consumed was also obtained from the mother/guardian (recall bias may occur).

## CHAPTER FOUR

### RESEARCH FINDINGS

#### 4.0 Introduction

This chapter demonstrates results and analysis of the study findings. It is organized as follows; descriptive information of the study variables, anthropometric measurement differences between baseline and 28 days or discharge and then factors significantly associated with recovery rate. The results are presented in tables and graphs form.

#### 4.1 Characteristics of the children

In the present study comprising of 104 children aged 6-56 months, 44(42.3%) were males and 60(57.7%) were female children. With regards to age distribution it was observed that highest percentage were found in 6-12 months 36(34.6%) followed by 13-18 months 29(27.9%). The mean age of the children was 18 months. About a quarter 28(26.9%) of the children were first born however, in the remaining birth order there was almost equal distribution ranging from 13.5% to 21.2% (Table 4.1).

**Table 4. 1: Characteristics of the children**

Socio-demographic characteristics	n=104	%
<b>Mean of age in months (<math>\pm</math>SD) = 18.07(<math>\pm</math>18.4)</b>		
<b>Age in months</b>		
6-12 months	36	34.6
13-18 months	29	27.9
19-24 months	23	22.1
25-56 months	16	15.4
<b>Sex</b>		
Male	44	42.3
Female	60	57.7
<b>Birth order</b>		
First	28	26.9
Second	22	21.2
Third	21	20.2
Fourth	14	13.5
Fifth and above	19	18.3

#### 4.2 Socio-demographic attributes of mothers/guardians to the child

The distribution of socio-demographic characteristics among mothers/guardians participated in this study is shown in Table 4.2. The findings show the mean age of the respondents was 31.5 years with a SD of 9.8 years. About half of respondents 50(48.0%) were within the age group of 25-35 years, 27(26.0%) among 18-24 years and 27(26%) among 36 years and above. Almost all of the guardians were females 103(99.0%). Majority 64(61.5%) of the respondents attended primary school while only 6(5.8%) attended college. More than half 58(55.8%) of the mothers/guardians were married and most 100(96.2%) were Christian followers.

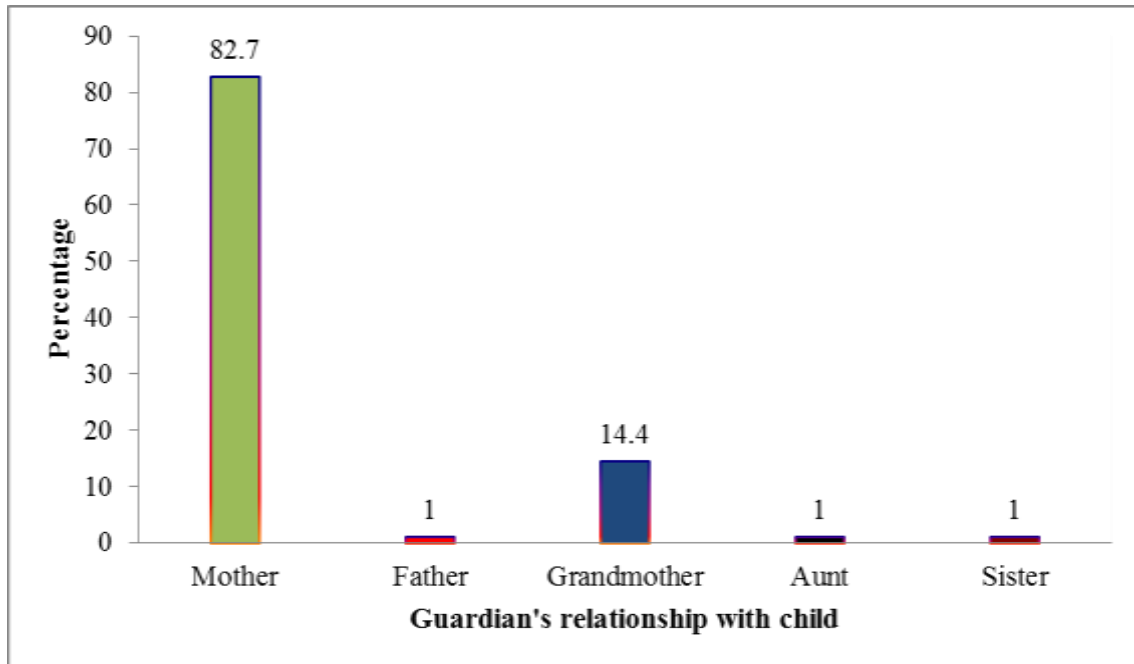
**Table 4. 2: Socio-demographic attributes of mothers/guardians to the child**

<b>Socio-demographic characteristics</b>	<b>n=104</b>	<b>%</b>
<b>Mean of age in years (<math>\pm</math>SD) = 31.5(<math>\pm</math>9.8)</b>		
<b>Guardian's age in years</b>		
18-24 years	27	26
25-35 years	50	48
36 years and above	27	26
<b>Guardian's gender</b>		
Male	1	1
Female	103	99
<b>Guardian's level of education</b>		
Never attended school	10	9.6
Primary	64	61.5
Secondary	24	23.1
College	6	5.8
<b>Guardian's religion</b>		
Christian	100	96.2
Muslim	2	1.9
Traditionalist	1	1
None	1	1
<b>Guardian's marital status</b>		
Single	30	28.8
Married	58	55.8
Widowed	9	8.7
Divorced	7	6.7



### 4.2.1 Guardian's relationship with the child

Figure 4.1 shows the guardian's relationship with the child and majority 86(82.7%) were mothers to the children who participated in the study.



**Figure 4. 1: Guardian's relationship with the child**

### 4.3 Socio-economic characteristics of mothers/guardians

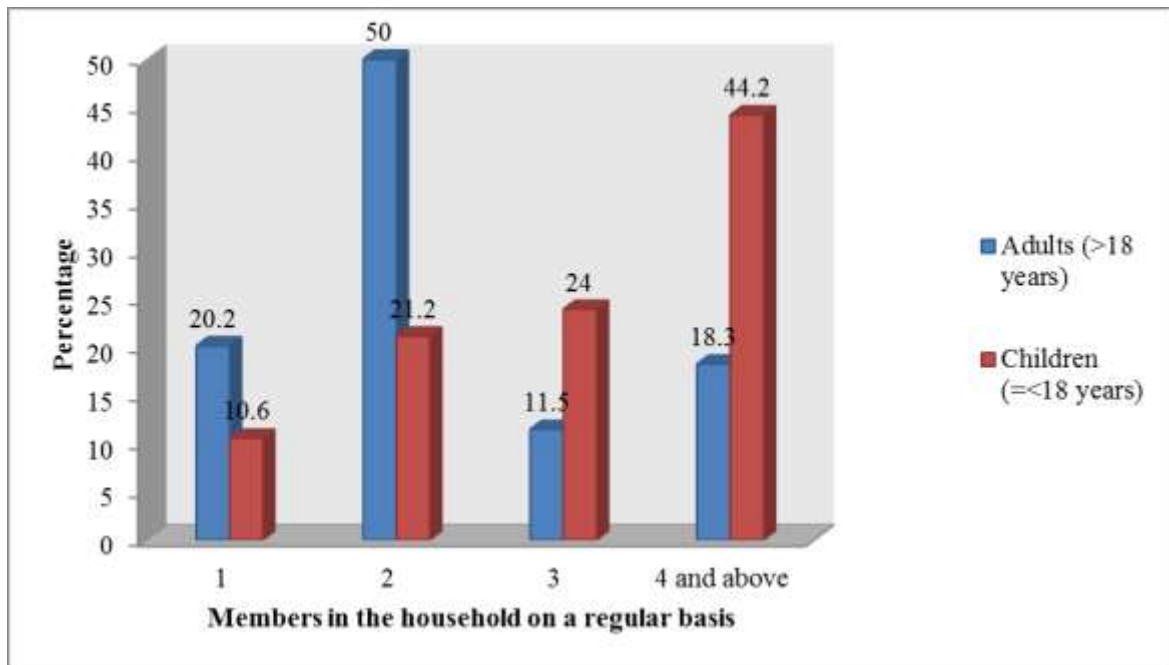
Table 4.3 summarizes the socio-economic characteristics of mothers/guardians to the child. Almost half 50(48.1%) of the guardians were housewives, 23(22.1%) were casual laborers and 31(29.8%) permanently employed. The monthly income of the household was inquired and about two thirds 62(59.6%) had a monthly income of <3000 shilling. About half 53(51.0%) of respondents were living in a semi-permanent houses (bricks) followed by 40(38.5%) who were living in a temporary house constructed by mud thatched with grass. The main source of water was river/stream. 73(70.2%) while piped water was only 7(6.7%).

**Table 4. 3: Socio-economic characteristics of mothers/guardians**

<b>Socio-economic characteristics</b>	<b>n=104</b>	<b>%</b>
<b>Guardian's occupation</b>		
Casual labourer	23	22.1
Employed	31	29.8
House wife	50	48.1
<b>Spouse's occupation</b>		
Casual labourer	16	27.6
Permanent employment	42	72.4
Not applicable	46	
<b>Income</b>		
<3000	62	59.6
3000-5000	28	26.9
5000-10000	8	7.7
>10000	6	5.8
<b>Type of house</b>		
Permanent(stone)	11	10.6
Semi-permanent (bricks)	53	51
Temporary (mud thatched with grass)	40	38.5
<b>Source of water</b>		
Piped water	7	6.7
Borehole	24	23.1
River/stream	73	70.2

**4.4 Members in the house on a regular basis**

Figure 4.2 depicts the number of adults and children members in the house on a regular basis. About half 46(44.2%) of the households had 4 children and above and half 52(50.0%) had 2 adult members.



**Figure 4. 2: Members in the house on a regular basis**

#### 4.5 Socio-cultural factors

The socio-cultural factors related to child feeding practices are shown in Table 4.4. Majority 71(68.3%) of the respondents indicated that the age of the child to introduce complementary foods was 6 months. The highest number of the respondents 40(39.2%) reported that a child should be fed 4 times per day. Most of the respondents 96(93.2%) reported there was no difference between boys and girls feeding practices. The main reasons reported was boys eat more than girls 5(62.5%) and boys require more energy than boys 3(37.5%).

About two thirds 68(65.4%) of the children were sharing food with the rest of the family from the same plate. More than half 60(57.7%) of the children were still breastfeeding at the time of data collection. The highest percentage of the mothers/guardians 42(40.4%) indicated that they feed their child 4 times per day.

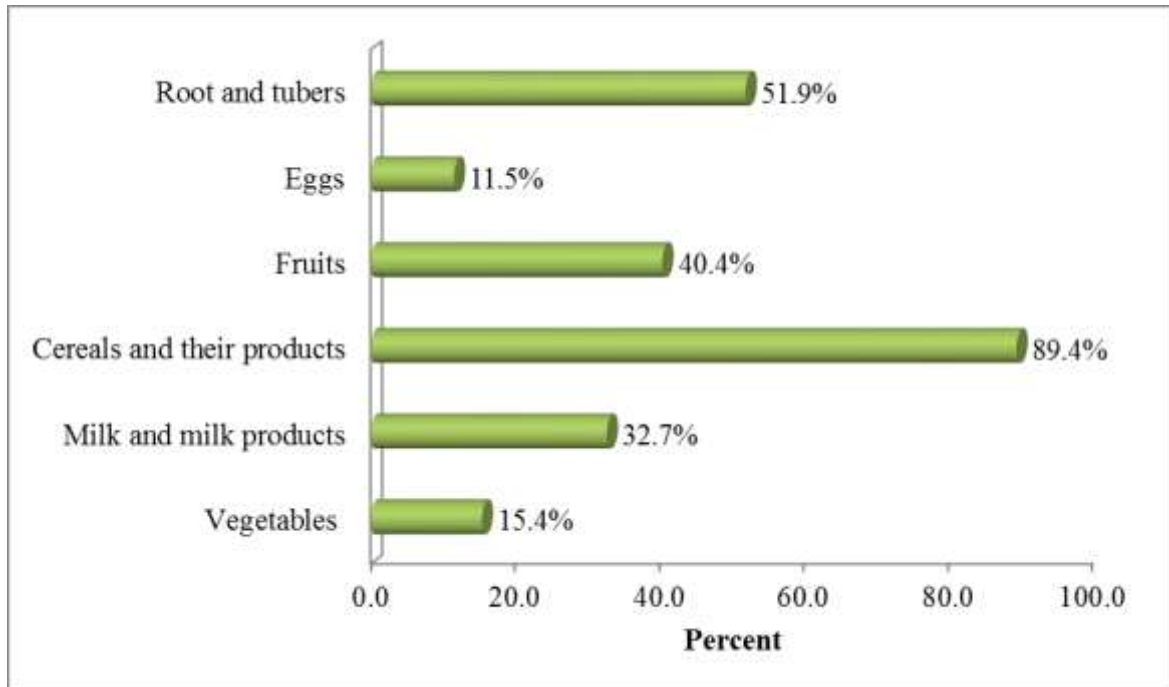
**Table 4. 4: Socio-cultural characteristics of the children.**

<b>Socio-cultural factors</b>	<b>n=104</b>	<b>%</b>
<b>Age of the child at introduction of complementary foods</b>		
2-4 month	18	17.3
5 month	15	14.4
6 month	71	68.3
<b>Frequency of complementary feeding per day</b>		
2	6	5.9
3	36	35.3
4	40	39.2
5	14	13.7
6	6	5.9
Missing	2	
<b>Differences between girls and boys feeding practices</b>		
Yes	8	7.7
No	96	92.3
<b>Reasons for specific difference between girls and boys feeding practices</b>		
Boys eat more than girls	5	62.5
Boys require more energy than boys	3	37.5
Not applicable	96	
<b>Sharing of food from the same plate</b>		
Yes	68	65.4
No	36	34.6
<b>Whether the child is still breastfeeding</b>		
Yes	60	57.7
No	44	42.3
<b>Whether the child is started on complementary food</b>		
Yes	101	97.1
No	3	2.9
<b>Frequency of feeding to the child per day</b>		
3 times	40	38.5
4 times	42	40.4
5 times	14	13.5
6 times	8	7.7
<b>Frequency of feeding to the child in the previous day</b>		
3 times	43	41.3
4 times	41	39.4
5 times	20	19.2

#### 4.6 Kind of complementary foods given to the child

Figure 4.3 demonstrates the complementary foods given to the child. Majority (89.4%) of the respondents indicated that cereals and their products were the common foods followed by roots/tubers 51(51.9%) whereas eggs were the least food given (11.5%).

**N.B:** The percentages are taken to total responses as respondents had multiple responds.



**Figure 4. 3: Kind of foods given to the child**

#### 4.7 Food intake among children in the previous 24 hours

The mothers/guardians were requested to indicate the types of foods they fed their children in the previous 24 hours. The findings are in Table 4.5. Forty six (44.2%) had taken porridge at the first meal and about a quarter 30(28.8%) ugali plus vegetables, 24(23.1%) ugali and soup and 20(19.2%) had consumed ugali and soup. However, 39(37.5%) of the children didn't have the fourth meal.

**Table 4. 5: Food intake among children in the previous 24 hours**

<b>Variables</b>	<b>n=104</b>	<b>%</b>
<b>Type of foods given at first meal in the previous 24 hours</b>		
Porridge	46	44.2
Milk	10	9.6
Milk and porridge	11	10.6
Ugali	9	8.7
Ugali, milk and kales	7	6.7
Rice and soup	6	5.8
Ugali plus vegetables	13	12.5
Pumbkin	2	1.9
<b>Type of foods given at second meal in the previous 24 hours</b>		
Mashed bananas	15	14.4
Mashed potatoes	7	6.7
Milk	16	15.4
Porridge	19	18.3
Ugali plus soup	30	28.8
Beans	7	6.7
Rice plus soup	5	4.8
Pumkin	1	1
Other fruits	4	3.8
<b>Type of foods given at third meal in the previous 24 hours</b>		
Mashed bananas	13	12.5
Mashed potatoes	4	3.8
Milk	14	13.5
Porridge	17	16.3
Rice	11	10.6
Ugali plus vegetables or other soups	24	23.1
Others	12	11.5
None	9	8.7
<b>Type of foods given at fourth meal in the previous 24 hours</b>		
Ugali plus vegetables or other soups	20	19.2
Porridge	16	15.4
Milk	8	7.7
Beans	3	2.9
Ripe banana	6	5.8
Rice	4	3.8
Others	8	7.7
None	39	37.5

#### 4.8: Medical related factors

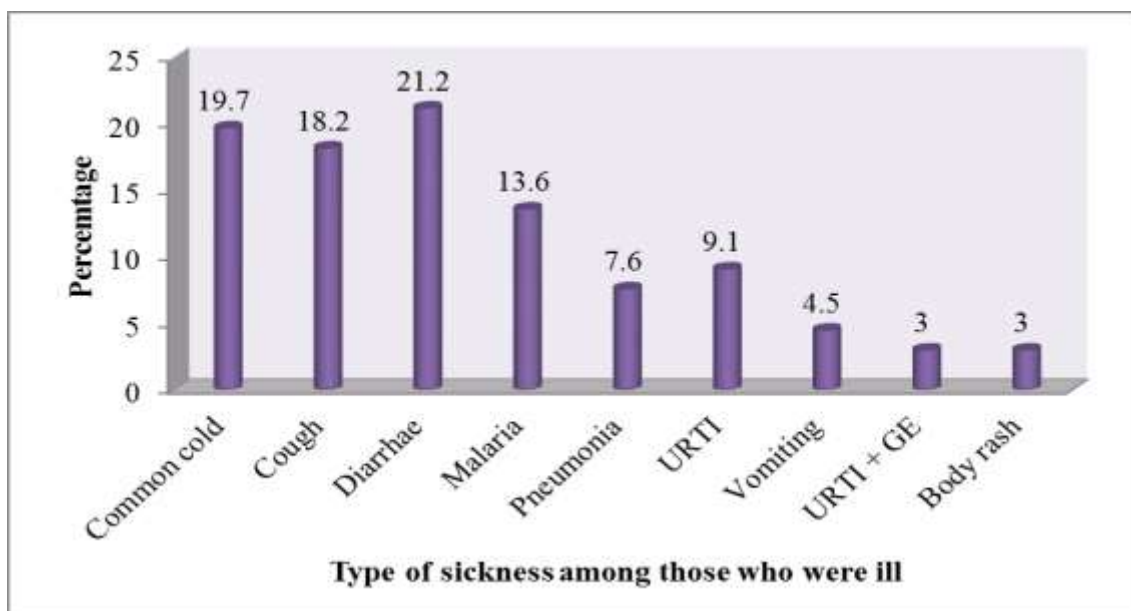
Table 4.6 shows medical related factors among the children. The mothers/guardians were asked about sickness of their children in the last one month and nearly two thirds of the children 66(63.5%) were sick. About half 53(52.5%) of the children were not given antibiotics. The table further reveals that most of the children 96(92.3%) and 92(88.5%) were supplemented with vitamin A and vaccinated against measles respectively.

**Table 4. 6: Medical related factors**

Variables	n=104	%
Illness in the last one month		
Yes	66	63.5
No	38	36.5
Vitamin A supplementation		
Yes	96	92.3
No	8	7.7
Vaccination for measles		
Yes	92	88.5
No	12	11.5
Whether antibiotic (amoxicillin) was given		
Yes	48	47.5
No	53	52.5

##### 4.8.1 Type of sickness among those who were ill

Among children who were sick in the previous one month, the main illnesses the mother thought the children had were diarrhea (21.2%), common cold (19.7%), cough (18.2%) and malaria (13.6%) as indicated in Figure 4.4.



**Figure 4. 4: Type of sickness among those who were ill**

#### **4.9 Outcomes**

The outcomes of severely malnourished children aged 6–56 months on outpatient management are presented in Table 4.7. Of the 104 children enrolled into the study 74(73.3%) recovered, 27(26.7%) didn't recover while 3(2.9%) defaulted. Children with WHZ  $-2SD$  and above were classified as recovered while WHZ below  $-2SD$  were considered as not recovered. Among those who had been followed throughout the study (101), 3(3.0%) failed to respond.

Out of the 101 children who were followed throughout the study, only 7(6.0%) had attained full nutritional recovery (WHZ =  $-1SD$ ). Moreover, more than half 55(54.5%) of the children had WHZ of  $-2SD$  by day 28 of admission or at discharge. The overall mean weight gain was 5.12 grams. About half of the children 49(48.5%) and 47(46.5%) had gained mean weight of 5 to 10g/kg/day and  $< 5$  g/kg/day respectively. However, there were only 5(5.0%) who gained mean weight of  $>10$  g/kg/day.



**Table 4. 7: Outcomes**

<b>Variables</b>	<b>N</b>	<b>%</b>
<b>Recovery</b>		
Yes	74	73.3
No	27	26.7
<b>Default</b>		
Yes	3	2.9
No	101	97.1
<b>Duration taken to recovery in days</b>		
21 days	21	28.4
28 days	53	71.6
Not applicable	27	
<b>Failure to respond</b>		
Yes	3	3.0
No	98	97.0
<b>Overall mean weight gain in grams</b>	<b>5.12(<math>\pm</math>2.5)</b>	
<b>Mean weight gain</b>		
> 10 g/kg/day	5	5.0
5 to 10g/kg/day	49	48.5
< 5 g/kg/day	47	46.5
<b>WHZ on day 28 or at discharge</b>		
-1SD	7	6.9
Between -1SD and -2SD	11	10.8
-2SD	56	55.4
Between -2SD and -3SD	13	12.9
-3SD	14	13.9

**4.10 Medical conditions among the children during the four visits**

As indicated in Table 4.8; oedema 10(9.9%), diarrhoea 19(18.8%), vomiting 24(23.8%) and fever 17(16.8%) reduced from considerable percentages at admission to zero or 1-2 percent in the fourth visit. The other medical conditions remained similar during different visits.

**Table 4. 8: Medical conditions among the children in the four visits**

<b>Variable</b>	<b>Admission, n(%)</b>	<b>Second visit, n(%)</b>	<b>Third visit, n(%)</b>	<b>Fourth visit, n(%)</b>
<b>Oedema</b>				
Mild	10(9.9%)	6(5.9%)	1(1.0%)	0(0.0%)
Nil	91(90.1%)	95(94.1%)	98(99.0%)	97(100.0%)
<b>Diarrhoea</b>				
Yes	19(18.8%)	5(5.0%)	1(1.0%)	0(0.0%)
No	82(81.2)	96(95.0%)	98(99.0%)	98(100.0%)
<b>Vomiting</b>				
Yes	24(23.8%)	6(5.9%)	3(3.0%)	1(1.0%)
No	77(76.2%)	95(94.1%)	96(97.0%)	97(99.0%)
<b>Fever</b>				
Yes	17(16.8%)	7(6.9%)	1(1.0%)	2(2.0%)
No	84(83.2%)	94(93.1%)	98(99.0%)	96(98.0%)
<b>Ability to drink/feed</b>				
Yes	100(99.0%)	100(99.0%)	99(99.0%)	98(100.0%)
No	1(1.0%)	1(1.0%)	1(1.0%)	0(0.0%)
<b>Appetite test</b>				
Good	101(100.0%)	98(97.0%)	95(95.0%)	96(98.0%)
Poor	0(0.0%)	3(3.0%)	5(5.0%)	2(2.0%)
<b>Anaemia</b>				
Yes	3(3.0%)	3(3.0%)	3(3.0%)	2(2.0%)
No	98(97.0%)	98(97.0%)	97(97.0%)	96(98.0%)
<b>Superficial infections</b>				
Yes	8(7.9%)	6(5.9%)	6(6.0%)	6(6.1%)
No	93(92.1%)	95(94.1%)	94(94.0%)	92(93.9%)
<b>No of sachets of RUTF given</b>				
14	19(18.8%)	16(15.8%)	13(13.3%)	11(11.3%)
18	29(28.7%)	28(27.7%)	23(23.5%)	23(23.7%)
21	34(33.3%)	35(34.7%)	40(40.8%)	39(40.1%)
25	13(12.9%)	13(12.9%)	13(13.3%)	15(15.5%)
28	6(6.0%)	8(7.9%)	9(9.2%)	9(9.3%)

#### 4.11 Trend and comparison of mean weight and MUAC between first and consecutive visits

##### 4.11.1 Trend of mean weight and MUAC between first and consecutive visits

Figure 4.5 shows the mean trend of weight and MUAC among children enrolled in the outpatient management program for 4 weeks duration. The figure shows that the mean weight has increased from 6.8kg in the 1<sup>st</sup> visit to 7.0kg in the 2<sup>nd</sup> visit, to 7.2kg in the 3<sup>rd</sup> visit and to 7.5kg in the 4<sup>th</sup> visit. Likewise, the mean MUAC has increased from 11.1cm at admission to 11.3cm in the 2<sup>nd</sup> visit, to 11.6cm in the 3<sup>rd</sup> visit and to 11.9cm at 4<sup>th</sup> visit or discharge.

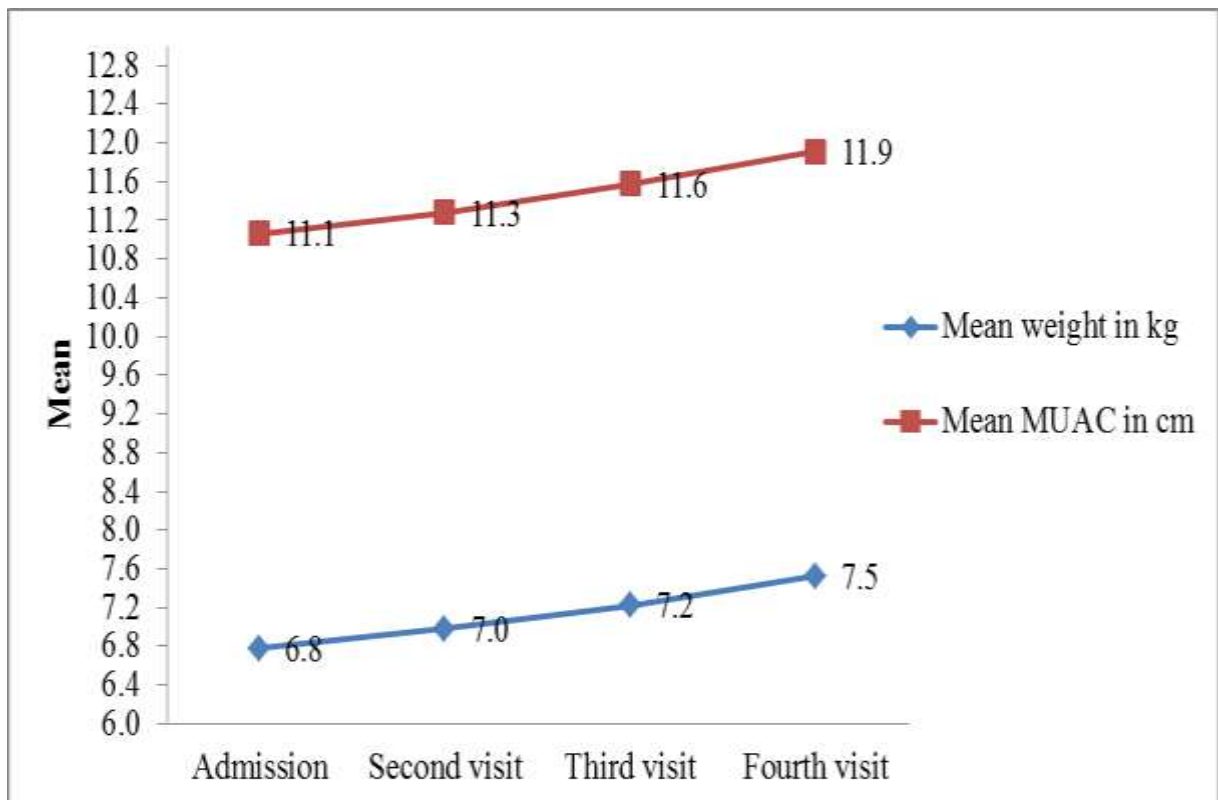


Figure 4. 5: Mean weight and MUAC between admission and 4<sup>th</sup> visit or discharge

#### 4.11.2 Comparison of mean weight and MUAC between first and consecutive visits

*Paired samples t test* was computed to determine the mean differences of weight and MUAC between the visits (Table 4.9). There was significant differences between the mean weights of 1<sup>st</sup> visit and 2<sup>nd</sup> visit (P=0.000), 1<sup>st</sup> visit and 3<sup>rd</sup> visit (P=0.000) as well as 1<sup>st</sup> visit and 4<sup>th</sup> visit (P=0.000). Likewise, the mean MUAC was significant between 1<sup>st</sup> visit and 3<sup>rd</sup> visit (P=0.000) as well as between 1<sup>st</sup> visit and 4<sup>th</sup> visit (P=0.000). However, the mean MUAC between 1<sup>st</sup> visit and 2<sup>nd</sup> visit was not significant (P=0.143).

**Table 4. 9: Comparison of mean weight and MUAC between first and consecutive visits**

<b>Variables</b>	<b>Paired t test between 1<sup>st</sup> and 2nd visit</b>	<b>Mean difference (95% CI)</b>	<b>Paired t test between 1<sup>st</sup> and 3rd visit</b>	<b>Mean difference (95% CI)</b>	<b>Paired t test between 1<sup>st</sup> and 4th visit</b>	<b>Mean difference (95% CI)</b>
<b>Mean weight in kg</b>	0.000	0.20(0.16-0.25)	0.000	0.43(0.38-0.40)	0.000	0.70(0.65-0.80)
<b>Mean MUAC in cm</b>	0.143	0.21(-0.07-0.50)	0.000	0.51(0.30-0.72)	0.000	0.80(0.54-1.12)

#### 4.12 Association between socio-demographic characteristics and recovery rate

Table 4.11 shows the relationship between socio-demographic characteristics among mothers/guardians and children with recovery rate. Children of mothers/guardians with secondary school education and above had significant increase in recovery rate 26(86.7%) {OR=8.13; 95%CI=1.51-43.78; P=0.015} compared to those who never attended school 4(44.4%).

However, there was no significant association ( $P < 0.05$ ) observed between recovery rate of the child and other mothers/guardians socio-demographic characteristics.

**Table 4. 10: Association between socio-demographic characteristics and recovery**

Socio-demographic attributes	Recovery		OR(95%CI)	P value
	Yes, n(%)	No, n(%)		
<b>Child's age in months</b>				
6 to 12	23(65.7%)	12(34.3%)	1.00	
13-18	24(85.7%)	4(14.3%)	3.13(0.88-11.12)	0.078
19-24	16(69.6%)	7(30.4%)	1.19(0.39-3.69)	0.760
25-56	11(73.3%)	4(26.7%)	1.44(0.38-5.48)	0.598
<b>Child's gender</b>				
Male	30(68.2%)	14(31.8%)	1.00	
Female	44(77.2%)	13(22.8%)	1.58(0.65-3.83)	0.312
<b>Birth order of the child</b>				
First	18(66.7%)	9(33.3%)	1.00	
Second	17(77.3%)	5(22.7%)	1.70(0.47-6.11)	0.416
Third	15(75.0%)	5(25.0%)	1.50(0.41-5.45)	0.538
Fourth	10(71.4%)	4(28.6%)	1.25(0.31-5.11)	0.756
Fifth and above	14(77.8%)	4(22.2%)	1.75(0.45-6.88)	0.423
<b>Guardian's age in years</b>				
18-24 years	19(73.1%)	7(26.9%)	1.00	
25-35 years	36(73.5%)	13(26.5%)	1.02(0.35-2.99)	0.971
36 years and above	19(73.1%)	7(26.9%)	1.00(0.29-3.41)	1.000
<b>Guardian's level of education</b>				
Never attended school	4(44.4%)	5(55.6%)	1.00	
Primary	44(71.0%)	18(29.0%)	3.06(0.74-12.70)	0.124
Secondary and above	26(86.7%)	4(13.3%)	<b>8.13(1.51-43.78)</b>	<b>0.015</b>
<b>Guardian's marital status</b>				
Single	23(76.7%)	7(23.3%)	1.00	
Married	40(71.4%)	16(28.6%)	0.76(0.27-2.12)	0.601
Widowed/divorced	11(73.3%)	4(26.7%)	0.84(0.20-3.47)	0.806

OR= Odds Ratio, CI= Confidence Interval

### 4.13 Association between socio-economic characteristics and recovery

Bivariate analysis of association between recovery rate and socio economic characteristics is summarized in Table 4.11.

Children whose mothers/guardians were house wives had significantly higher of recovery outcome 42(84.0%) {OR=3.64; 95%CI=1.17-11.34; P=0.026} when compared to children whose mothers/guardians were casual laborers 13(59.1%). There was a difference in the proportion of recovery outcome among those who were using different source of water (piped, borehole and river/stream).

However, this difference was not significant. In addition, there was no significant association ( $P < 0.05$ ) observed between recovery rate of the child and the other socio-economic characteristics.

**Table 4. 11: Association between socio-economic characteristics and recovery outcome**

Socio-demographic attributes	Recovery		OR(95%CI)	P value
	Yes, n(%)	No, n(%)		
<b>Guardian's occupation</b>				
Casual labourer	13(59.1%)	9(40.9%)	1.00	
Employed	19(65.5%)	10(34.5%)	1.34(0.42-4.13)	0.639
House wife	42(84.0%)	8(16.0%)	<b>3.64(1.17-11.34)</b>	<b>0.026</b>
<b>Spouse's occupation</b>				
Casual labourer	11(68.8%)	5(31.2%)	1.00	
Employed	30(75.0%)	10(25.0%)	1.36(0.38-4.89)	0.634
<b>Income</b>				
<3000	47(78.3%)	13(21.7%)	1.00	
3000-5000	19(70.4%)	8(29.6%)	0.66(0.24-1.84)	0.424
>5000	8(57.1%)	6(42.9%)	0.37(0.11-1.25)	0.110
<b>Type of house</b>				
Permanent(stone)	5(50.0%)	5(50.0%)	1.00	
Semi-permanent (bricks)	39(73.6%)	14(26.4%)	2.79(0.70-11.09)	0.146
Temporary (mud thatched with grass)	30(78.9%)	8(21.1%)	3.75(0.87-16.22)	0.077
<b>Source of water</b>				
Piped water	5(71.4%)	2(28.6%)	1.00	
Borehole	21(87.5%)	3(12.5%)	2.80(0.37-21.49)	0.322
River/stream	48(68.6%)	22(31.4%)	0.87(0.16-4.85)	0.876

OR= Odds Ratio, CI= Confidence Interval

#### 4.14 Association of socio-cultural factors with recovery rate

Table 4.12 shows the relationship between socio-cultural factors and recovery of children aged 6-56 months with SAM enrolled on outpatient management program.

Children introduced to complementary feeds at the age of 6 months had significantly increased recovery rate 57(80.3%) {OR=4.65; 95%CI=1.44-15.00; P=0.010} when compared to those introduced at 2-4 months 7(46.7%).

Mothers/guardians who indicated that there was no difference between boys and girls feeding practices had significantly greater recovery rate 71(76.3%) {OR=5.38; 95%CI=1.19-24.33; P=0.029} than those who reported otherwise 3(37.5%).

**Table 4. 12: Association of socio-cultural factors with recovery**

Socio-cultural factors	Recovery		OR(95%CI)	P value
	Yes, n(%)	No, n(%)		
<b>Number of adult members in the household in a regular basis</b>				
1	15(75.0%)	5(25.0%)	1.00	
2	39(75.0%)	13(25.0%)	1.00(0.30-3.29)	1.000
3	7(63.6%)	4(36.4%)	0.58(0.12-2.87)	0.507
4 and above	13(72.2%)	5(27.8%)	0.87(0.20-3.68)	0.846
<b>Number of children in the household in a regular basis</b>				
1	8(72.7%)	3(27.3%)	1.00	
2	16(76.2%)	5(23.8%)	1.20(0.23-6.34)	0.830
3	16(66.7%)	8(33.3%)	0.75(0.16-3.62)	0.720
4 and above	34(75.6%)	11(24.4%)	1.16(0.26-5.15)	0.846
<b>Age of the child to introduce complementary foods</b>				
2-4 month	7(46.7%)	8(53.3%)	1.00	
5 month	10(66.7%)	5(33.3%)	2.29(0.52-10.01)	0.273
6 month	57(80.3%)	14(19.7%)	<b>4.65(1.44-15.00)</b>	<b>0.010</b>
<b>Frequency of complementary feeding per day</b>				
3	28(66.7%)	14(33.3%)	1.00	
4	27(73.0%)	10(27.0%)	1.35(0.51-3.56)	0.544
5	17(85.0%)	3(15.0%)	2.83(0.71-11.32)	0.141
<b>Differences between girls and boys feeding</b>				
Yes	3(37.5%)	5(62.5%)	1.00	
No	71(76.3%)	22(23.7%)	<b>5.38(1.19-24.33)</b>	<b>0.029</b>
<b>Sharing of food from the same plate</b>				
Yes	48(72.7%)	18(27.3%)	1.00	
No	26(74.3%)	9(25.7%)	1.08(0.43-2.75)	0.866

<b>Whether the child is still breastfeeding</b>				
Yes	45(76.3%)	14(23.7%)	1.00	
No	29(69.0%)	13(31.0%)	0.69(0.29-1.69)	0.420
<b>Frequency of feeding to the child per day</b>				
3 times	29(72.5%)	11(27.5%)	1.00	
4 times	29(72.5%)	11(27.5%)	1.00(0.38-2.67)	1.000
5 or 6 times	16(76.2%)	5(23.85)	1.21(0.36-4.11)	0.756
<b>Frequency of feeding to the child in the previous day</b>				
3 times	32(74.4%)	11(25.6%)	1.00	
4 times	30(76.9%)	9(23.1%)	1.15(0.42-3.15)	0.792
5 times	12(63.2%)	7(36.8%)	0.59(0.19-1.87)	0.370

OR= Odds Ratio, CI= Confidence Interval

#### 4.15 Association between medical related factors and recovery

Children who did not experience sickness in the previous one month had significantly increased chance of recovery rate {OR=3.54; 95%CI=1.21-10.36; P=0.021} when compared to those children who were sick. There was also a significantly increased recovery rate among children who were given antibiotics (amoxicillin) {OR=**6.10**; 95%CI=**2.08-17.89**; P<**0.001**} than those who were not given (Table 4.13).

However, there was no significant association (P<0.05) observed in the recovery rate of the child with vitamin A supplementation and vaccination for measles (Table 4.13)

**Table 4. 13: Association between medical related factors and recovery**

Medical related factors	Recovery		OR(95%CI)	P value
	Yes, n(%)	No, n(%)		
<b>Illness in the last one month</b>				
Yes	41(65.1%)	22(34.9%)	1.00	
No	33(86.8%)	5(13.2%)	<b>3.54(1.21-10.36)</b>	<b>0.021</b>
<b>Vitamin A supplementation</b>				
Yes	69(74.2%)	24(25.8%)	1.73(0.38-7.77)	0.478
No	5(62.5%)	3(37.5%)	1.00	
<b>Vaccination for measles</b>				
Yes	66(73.3%)	24(26.7%)	1.03(0.25-4.21)	0.966
No	8(72.7%)	3(27.3%)	1.00	
<b>Whether antibiotic given</b>				
Yes	43(89.6%)	5(10.4%)	<b>6.10(2.08-17.89)</b>	<b>0.000</b>
No	31(58.5%)	22(41.5%)	1.00	

OR= Odds Ratio, CI= Confidence Interval



#### **4.16 Multivariate analysis of factors associated with good recovery among children aged 6-59 months with SAM**

Binary regression analysis was performed in order to identify factors that were significantly associated with good recovery rate (Table 4.14). Five (6) factors that associated with recovery at  $p < 0.05$  during bivariate analysis were subjected all together in a multiple regression analysis. These include: (1) guardian's level of education, (2) guardian's occupation, (3) age of the child at introduction complementary foods, (4) differences between girls and boys feeding practices, (5) illness in the last one month and, (6) administration of antibiotic. Upon fitting these factors using binary logistic regression and by specifying '*backward LR*' method with removal at  $P < 0.05$ , the following factors remained significant guardian's occupation, age of the child at introduction complementary foods, differences between girls and boys feeding practices, illness in the last one month and administration of an antibiotic. (Table 4.14).

Children whose mothers/guardians were house wives had 5 fold more likely to be recovered from SAM on outpatient management program {AOR=5.26; 95%CI=1.33-20.87; P=0.018} as opposed to children whose mothers/guardians were casual laborers. Children introduced to complementary feeds at the age of 6 months had about 9 times {AOR=8.86; 95%CI=2.20-35.68; P=0.002} more likely chance of recovery than to those introduced within two to four months. Children of Mothers/guardians who indicated that there was no difference between boys and girls feeding practices had 12 fold more likely chance to have children recovered from SAM on outpatient management program {AOR=12.37; 95%CI=1.87-81.76; P=0.009} as opposed to those who reported otherwise. Children who did not experience sickness in the last one month had 5 times more chance of recovery {AOR=5.23; 95%CI=1.36-20.10; P=0.016} when compared to children who were sick. Children given antibiotics (amoxicillin) were 13 times more likely to be recovered from SAM {OR=13.06; 95%CI=3.01-56.65; P=0.001} than to those who were not given.

**Table 4. 14: Multivariate analysis of factors associated with good recovery among children aged 6-59 months with SAM**

Factors	AOR(95%CI)	P value
<b>Full model</b>		
<b>Guardian's level of education</b>		
Never attended school	1.00	
Primary	2.96(0.58-15.16)	0.194
Secondary and above	8.10(1.16-56.38)	0.035
<b>Guardian's occupation</b>		
Casual labourer	1.00	
Employed	1.10(0.27-4.43)	0.893
House wife	4.33(1.06-17.67)	0.041
<b>Age of the child to introduce complementary foods</b>		
2-4 month	1.00	
5 month	7.61(1.22-47.32)	0.030
6 month	10.05(2.29-44.24)	0.002
<b>Whether antibiotic was given</b>		
Yes	11.30(2.52-50.72)	0.002
No	1.00	
<b>Differences between girls and boys feeding</b>		
Yes	1.00	
No	14.05(2.18-90.81)	0.005
<b>Illness in the last one month</b>		
Yes	1.00	
No	4.98(1.21-20.41)	0.026
<b>Reduced</b>		
<b>Guardian's occupation</b>		
Casual labourer	<b>1.00</b>	
Employed	1.18(0.32-4.39)	0.805
House wife	<b>5.26(1.33-20.87)</b>	<b>0.018</b>
<b>Age of the child to introduce complementary foods</b>		
2-4 month	1.00	
5 month	<b>7.00(1.18-41.35)</b>	<b>0.032</b>
6 month	<b>8.86(2.20-35.68)</b>	<b>0.002</b>
<b>Whether antibiotic was given</b>		
Yes	<b>13.06(3.01-3.01)</b>	<b>0.001</b>
No	<b>1.00</b>	
<b>Differences between girls and boys feeding</b>		
Yes	<b>1.00</b>	
No	<b>12.37(1.87-81.76)</b>	<b>0.009</b>
<b>Illness in the last one month</b>		
Yes	<b>1.00</b>	
No	<b>5.23(1.36-20.10)</b>	<b>0.016</b>

AOR= Adjusted odds Ratio, CI= Confidence Interval

## CHAPTER FIVE

### DISCUSSION

#### 5.1. Introduction

This chapter discusses the results from quantitative data based on research findings. These are recovery, weight gain and defaulter rates. The significant predictors of recovery from SAM include mother/guardian being a housewife as opposed to being a casual laborer and the child having received complementary feeds at age 6 months as opposed to receiving feeds early at 2-4 months. Another significant predictor of recovery from SAM is mothers/guardians who thought there were no differences in feeding between boys and girls. The last significant predictor of recovery from SAM is child having had an illness in the previous month as opposed to having had no illness and having received an antibiotic as opposed to having not received an antibiotic.

#### 5.2. Outcomes

The findings of this study revealed a 74(73.3%) recovery rate and 27(26.7%) non recovery rate. The recovery rate was slightly lower than the international standards which set the lower threshold at 75%. This finding is lower than findings from studies carried out in Southern Ethiopia which shows 87% recovery rate (Teferi *et al.* 2010) and Bedawacho-Ethiopia with a recovery rate of 85% (Chane, 2014) and in Southern Malawi where the recovery rate was 89% (Dent, 2009). It is also lower than for the Kenya county case study among 47 counties which was 81 % (UNICEF, 2012).

Low recovery rate may be explained by low frequency of feeding per day and/ or sharing of the RUTF with other members of the household. Findings of a study in S. Ethiopia revealed that sharing of RUTF with other family members, mostly children, was justified by social norms favoring sharing of food, a shortage of food in the household, the good taste of RUTF and its perceived good treatment properties (Tadesse, 2015). Other studies have reported that sharing of RUTF among children was one of the main reasons for delayed recovery of SAM children (Collins and Sadler, 2002; Manary *et al.*, 2004; Collins *et al.* 2006; Eklund and Tsinuel, 2008). According to Gebremichael *et al.*, (2014) regular monitoring of these children may control for potential sharing of the therapeutic diet with other siblings at home, which is a likely predictor of poor recovery of children treated at home. The study also found that children with previous history of other comorbidities before enrolling to the OTP had a poor recovery rate. The children who had not reached

the target weight of  $<-2$  SD after the four weeks were to continue with the management under OTP.

In addition, genetic variations among SAM children may play a big role in the recovery rate. Results from several ethnic groups (Bagandan, Peruvian, Chilean, South African Coloured) show that previously malnourished children do not attain, at least for several years, the weight, height, and bone age of children of the same ethnic background but of a higher social class (Messina, 1999; Perdigón *et al.*, 1986). Considering that children from a higher social class may be nutritionally above average and may also be genetically different.

However, the recovery rate was much higher than in a study done in Nairobi which reported 58% (Nalwa, 2012), in Tigray Northern Ethiopia which reported a cure rate of 61.78% (Yebyo *et al.* 2013) and slightly higher in a similar study conducted in Mekelle Hospital (69.4%) and Ayder referral hospital (69.8%) (Gebremichael *et al.*, 2014). These discrepancies could be as a result of differences in adherence to optimal management of children under OTP across regions. On the other hand mothers/guardians may give/or fail to give the child the required amounts of feeds in the recommended frequency consistently. Additionally, mothers/guardians may fail to give a variety of foods to meet the nutritional needs of the growing child. Children aged one to five years should be fed five times in a day (MOH, 2013).

The overall defaulter rate 3(2.8%) is well within the minimum international standard ( $<15\%$ ). This figure is lower as compared to similar studies conducted on RUTF based therapeutic feeding programs in Maradi-Niger (Chaiken *et al.* 2006), Darfur-Sudan (Defaulty 2006), Bedawacho-Ethiopia (Taylor, 2002) and Arbegoba-Ethiopia (Collins 2002), 13.5% Woldia Hospital Ethiopia and Tigray North Ethiopia (Yebyo *et al.*, 2013). The low default rate may signify that the mothers/guardians in the study area are aware about the consequences of defaulting from the program. Malnutrition is worsened by a lack of maternal nutritional information and knowledge (NDoH, 2003), which leads to unhealthy dietary habits, poor nutrition related practices and attitudes. The low default rate could also be attributed to shortage of food among the community/households which may compel them to attend the outpatient program for RUTF. The level of income is by far the greatest single cause of variability in food intake although income is not the only measure of poverty (Lipton and de-Kadt, 1998). This could be linked to low socio-economic status of the mother/guardians as majority (59.6%) had  $<3000$  shilling monthly income and were

living in semi-permanent (53%) or temporary houses (40%). A study carried out in S. Ethiopia pointed out that in times of severe food insecurity, community Health workers (CHWs) stated that a child with SAM could be lent to 5–10 women and be admitted in different health posts using different names to secure supply of RUTF (Tadesse, 2015). During the period of the study there was consistent availability of RUTF in the facility and this could have contributed to low defaulter rate.

The mean weight gain of 5.12g/kg/day in this study was substantially less than the predicted rate based on the international standards which recommends weight gain of greater than or equal to 8 g/kg/day. Yet, it is well within the standards of the National Guideline for Integrated Management of Acute Malnutrition which recommend mean weight gain of 5-10g/kg/day (MOH, 2009). The mean weight gain was lower than 10.1g/kg/day reported by (Chane, 2014), 10g/kg/day reported by Hossain *et.al.* (2009), 17.4g/kg/day in Mekelle Hospital and 10.7g/kg/day in Ayder referral in Ethiopia (Gebremichael *et al.* 2014). The caregivers might not give and encourage the child to consume the right amount of the food. Sickness could also have contributed to low weight gain since nearly two thirds of the children (63.5%) were reported to have suffered a co-morbidity during follow up. Co-morbidities cause poor appetite, poor nutrient intake and poor absorption which may result to poor weight gain. The weights may not be taken on all visits and yet the RUTF should be given according to the body weight.

However, the weight gain was much higher compared to a similar study conducted in Nairobi which was 3.79/kg/day (Nalwa 2012). In India only (11.5%) children achieved weight gain of more than 5 gm/kg/day, while (89.5%) children had weight gain of less than 5gm/kg/day (Patel *et al.* (2010) .It was comparable to a mean weight gain of 5.24g/kg/day reported in Tigray Northern Ethiopia (Yebyo *et al.* 2013). Furthermore, these discrepancies could have been due to differences in causes of malnutrition across various settings. Even though the mean weight gain and mean MUAC was significant at 28 days or discharge ( $p < 0.000$ ), only 7(6.0%) had attained nutritional recovery rate (defined as a WHZ equal to or greater than -1SD). Moreover, in this study about half (48.5%) of the children had moderate to good mean weight gain (5 to 10g/kg/day), 46.5% had poor mean weight gain ( $< 5$  g/kg/day) and only 5.0% had good mean weight gain ( $> 10$  g/kg/day). This could be attributed by optimal consumption of RUTF. More so these children did not suffer any co morbidities.

### **5.3 Factors associated with recovery rate**

The multivariate analysis found that the significant predictors of recovery from SAM include mother/guardian being a housewife as opposed to being a casual laborer and the child having received complementary feeds at age 6 months as opposed to receiving feeds early at 2-4 months. Another significant predictor of recovery from SAM is mothers/guardians who thought there were no differences in feeding between boys and girls and those who thought otherwise. Children who had no previous co-morbidity in the last one month and having received an antibiotic were the significant predictors of recovery among severely malnourished children enrolled on outpatient therapeutic program.

The analysis showed that children whose mothers were housewives had a fivefold recovery rate from SAM on outpatient management when compared to children whose mothers/guardians were casual laborers. This could be due to the fact that housewives are with their babies most of the time and therefore they may give more attention to their children including feeding them. On the contrary mothers/guardians who are casual laborers may have less time for child care which can lead to poor recovery rate. Moreover, when the household income decreases, it is usually the women who try earning extra wages causing the mother to have less time for child care (Lipton, 1998). Additionally, housewives may get more financial support from their husbands to enable them buy food for their children.

In this study, introduction of complementary feeds at 6 months of age was found to play a significant role in predicting recovery rate. Children introduced to complementary foods at the age of 6 months had a 9 fold higher chance of recovery than to those introduced to the feeds at two to four months of age. World Health Organization and UNICEF recommends a baby should exclusively breast feed for six months (WHO 2015)

According to Kikafunda *et al.* (2003) introducing feeds too early reduces the amount of breast milk the child is taking and may introduce pathogens to the child and lead to subsequent diarrheal diseases. In most cases in developing countries, these foods are not really tailored to the needs of the infant (Kikafunda *et al.* 2003). It is further argued that most solid foods are lower in calorie than human milk, they are of lower nutritional value, and they can be difficult for young babies to digest. Many feeds can cause unpleasant reactions and even trigger allergies to babies if introduced before six months

of age (Greer *et al.* 2008). This finding is in agreement with those of other studies conducted in informal settlements in Kenya (Kimani-Murage *et al.* 2011; Ochola, 2008; Reygal, 2007; Muchina, 2010). Despite the well-known advantages of exclusive breast feeding and WHO recommendations, many studies have demonstrated a high prevalence of early introduction of water and complementary foods before the age of 6 months especially in the African setting (WHO, 2003). Complementary feeding should be timely, adequate in terms of amounts, frequency, consistency and using a variety of foods to cover the nutritional needs of the growing child.

Children of mothers/guardians who thought there was no differences in feeding between boys and girls were 12 times more likely to recover from SAM. These differences in recovery could be closely linked to culture or traditional norms and gender issues which might be a reflection of preferential treatment, provision of better quality food and health care among the different sexes. A study conducted in Tanzania among children less than four years of age concluded that males had better nutritional status than females (Mbago 1991).

Recovery was higher among children who had no previous co-morbidity with a fivefold higher recovery than among children who had previous illness before enrolling to OTP. This is likely because SAM and illness may lead to reduced appetite, which could lead to poor nutrient intake or poor absorption of essential nutrients (Macallan 2005). Poor nutrient intake will subsequently affect weight gain and recovery (Golden 2000). It is also reported that under-nutrition and childhood morbidity have a synergistic relationship. The interrelationship of the two is in such a way that illness can suppress appetite precipitating under-nutrition of a child while, on the other hand, nutritional deficiencies increase the susceptibility of the child to infectious diseases (Pelletier *et al.* 1995). Infection can suppress appetite and directly affect nutrient metabolism, leading to poor nutrient utilization.

Children given antibiotics (amoxicillin) were 13 times more likely to recover from SAM than to those who were not given. Despite the absence of clinical signs, severely malnourished children are nearly all infected with bacteria even if they are asymptomatic. This includes those with moderate, and some with good appetite (Shils 2006; M.O.H 2009). Enteric bacteria are frequently the source of systemic infection by translocation across the bowel wall. Untreated gut or systemic infection can cause mal-absorption, intestinal damage and subsequently lead to diarrhea. The consumed nutrients are either not

absorbed or they are lost through diarrhea leading to poor response to nutritional therapy. Also infection can lead to poor appetite which can result in poor feeding/nutritional intake and poor outcomes of management of SAM. In Kenya amoxicillin is recommended as the first line antibiotic to give systematically (M.O.H. 2009).

In this study the level of education among mother/guardian was not significantly associated to recovery rate. However, maternal education by virtue of mother's involvement in care taking is associated with good recovery. Recommended dietary intake is associated with good recovery. Educated mothers are more informed of the nutritional requirements of their children and they may usually provide improved nutritional care. In addition, the mother's level of education is associated with more efficient management of limited household resources, greater utilization of available health care services, better health promoting behaviors and more child centered caring practices, all of which are associated with better child health and nutrition (Webb and Block 2004).

Based on the 24 hour recall of feeding by the mothers, the study found that about 44.2% children were fed on porridge as their first meal 28.8% consumed ugali plus vegetables on their second meal , 23.1% ugali with soup and 19.2% ugali with vegetable/ or soup respectively in third and fourth meal. All the feeds mentioned were carbohydrate rich foods, while consumption of other food groups especially meat, eggs, milk, and fruits remained very low. Cereal based foods may be energy dense but lack other essential nutrients, such as proteins and micronutrients, required for optimal growth in infants and children. A cross-sectional study in Tanzania reported increased prevalence of under-nutrition among children fed energy-dense (Nyaruhucha *et al.* 2006). Similarly, an increased intake of cereals, poor dietary diversity and low intake of micronutrients resulted in stunting among children aged < 5 years in a rural South African community (Faber and Benadé, 1999; Faber *et al.* 2001).

#### **5.1.4. Summary**

The recovery and weight gain rates were below the acceptable standards (>75%) and (>8g/kg/day) respectively. The defaulter rate was within the acceptable international standards (<15%). The significant predictors of recovery were being a housewife as opposed to being a casual laborer, having received complementary feeds at age 6 months as opposed to receiving feeds early at 2-4 months. Mothers/guardians who thought there were no differences in feeding between boys and girls. The last significant predictor of



recovery from SAM is child having had an illness in the previous month as opposed to having had no illness and having received an antibiotic as opposed to having not received an antibiotic.

## **5.2 CONCLUSIONS AND RECOMMENDATIONS**

### **5.2.1 Introduction**

This section contains conclusions, recommendations based on the findings of this study and also recommendation for further research.

### **5.2.2 Conclusions**

The findings of the study revealed that the overall recovery rate (73.3%) and rate of weight gain (5.1g/kg/day) were below acceptable standards; but, the defaulter rate (2.8%) was within the acceptable international standards.

Special focus should be given on predictors of recovery rate like administering routine antibiotics, prompt and appropriate management of co-morbidities and advising mothers to initiate complementary feeding at the age of 6 month

### **5.3 Recommendations**

The following recommendations are made based on the findings of this study:

- All children with severe acute malnutrition enrolled on outpatient management program should be given routine antibiotics.
- Mothers should be advised to initiate complementary feeding at the age of 6 months (as per the WHO recommendation) through intensified campaigning by the Ministry of Health.
- All children enrolled on OTP should be weighed weekly and RUTF be given according to the weight.
- Tracking system among all SAM children on OTP should be established to monitor on RUTF consumption/potential sharing.

### **5.4 Areas of further research**

Further studies are required in the future to cover the following subjects:

1. Similar studies on community based and hospital based need to be carried out to determine the outcomes (recovery, and default rate among others) and their risk factors.
2. A prospective study for a longer time should be done to determine specific risk factors of outcomes among SAM children enrolled on OTP

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## APPENDICES

### Appendix I: Informed Consent Form for parents/guardians in English

**Title of Study:** Outcomes of severely malnourished children aged 6 – 59 months on outpatient management in Kitui county hospital

#### Investigators:

Researchers	Institution	Contact
Dorothy Mbaya	University of Nairobi	0720397226
Dr. Lucy Kivuti Bitok	University of Nairobi	0710499700
Prof. Anna K. Karani	University of Nairobi	0721850910
Dr. Bonface Osano	University of Nairobi	0722646720

#### Introduction

You are cordially invited to participate in this research which will be carried out at Kitui County Hospital.

#### Purpose

The purpose of the study will be to establish the outcomes of outpatient management of severely malnourished children aged 6 – 59 months in Kitui County Hospital.

You have been invited because your child qualify to be recruited in this study as it targets children aged 6-59 months enrolled in OTP at Kitui county Hospital of which you are one of them. Approximately 104 children will be recruited to participate in the study.

#### Procedure

If you agree to participate in the study you will be required to give some information which will be filled in a questionnaire about socio-demographic, socio-economic and socio-cultural characteristics in a private room. Moreover, your child will be weighed, height/length measured, left mid upper arm circumference taken, observations of temperature and respirations taken and an appetite test will be conducted. Two readings will be taken weekly during follow up until 4 weeks. The questionnaire is expected to take approximately 30 – 45 minutes to be filled.

**Risks**

There are possible minimal risks involved in the study and it will not involve any invasive procedures. Your time being spent on responding to the questionnaire will be very much appreciated.

**Benefits**

Regarding benefits, there may not be any direct benefits for you as an individual participant, but the information collected will help us identify the gaps in outpatient management of severely malnourished children.

**Reimbursement**

If you agree to participate in the study, there will be no cost or reimbursement for participating as you will participate in the study at your convenient time during your regular visit.

**Voluntary participation and withdrawal**

Your participation is entirely voluntary and you have the right to withdraw from Participating in the study at any time without penalty.

**Confidentiality**

The serial numbers will be used instead of participants' names on the questionnaires. The questionnaires will be kept under key and lock whereby the researcher and the supervisor shall be the only people to access.

**Contact persons**

Please contact the following people when you have questions or concerns about the content of this study or your rights as a participant.

**Principal Investigator:**

Dorothy Mbaya, University of Nairobi, School of Nursing – 0720397226

**KNH/UoN-Ethics and Research Committee:**

The Chairperson, KNH/UoN-ERC, P.O. BOX 20723, Tel: 020-2726300-9; Fax: 2725272;

Email: [uonknh\\_erc@uonbi.ac.ke](mailto:uonknh_erc@uonbi.ac.ke).

**Confirmation of consent**

Are you willing to participate in this study?

Yes\_\_\_\_\_ No\_\_\_\_\_

If yes, please sign

Sign:\_\_\_\_\_Time\_\_\_\_\_Date\_\_\_\_\_

Witness:\_\_\_\_\_Sign\_\_\_\_\_Time\_\_\_\_\_Date\_\_\_\_\_

## **Appendix II: Consent form in Kiswahili**

### **Fomu ya kukubaliya mzazi/mlezi na mtoto**

Mada ya masomo: Matokeo ya watoto walioathiriwa pakubwa na utapia mlo wa miaka sita – miezi hamsini na tisa-wakiwa wagonjwa wan je-katika hospitali ya gatuzi la Kitui.

#### **wachunguzi**

Watafiti	Chuo	Nambariyasimu
Dorothy Mbaya	Chuo Kikuu cha Nairobi	0720397226
Dr. Lucy KivutiBotok	“	0710499700
Prof. Anna K. Karani	“	0721850910
DrBonfaceOsano	“	0722646720

#### **Kuanzishwa**

Umekaribishwa kwa moyo mkunjufu kushiriki katika uchunguzi huu ambao utafanyika katika hospitali ya gatuzi la Kitui.

#### **Kusudi**

Kusudi la utafiti litakuwa la kuthibitisha matokeo ya wangonjwa wanje ambao wameathiriwa pakubwa na utapiamlo wa miezi kati ya sita na miezi hamsini na tisa katika hospitali ya gatuzi la kitui.

Umealikwa kwa sababu mtoto wako amehitimu kuchukuliwa katika utafiti huu kwani unalenga watoto wa umri wa miezi sita mpaka miezi hamsini na tisa ambao wamesanjiliwa kama wangonjwa wanje katika hospitali yagatuzi la kitui ambapo wewe ni mmoja wao.

Takriban watoto mia moja na nne watasajiliwa kujiunga na utafiti huu.

#### **Utaratibu**

Kama utakubali kushiriki katika utafiti, utahitajika kutoa baadhi ya taarifa ambayo itajazwa katika dodoso kuhusu tabia za kijamii, kijamii na kiuchumi na kijamii na kiutamaduni katika chumba binafsi. Aidha, mtoto wako atapimwa kilo, urefu, mzingo wa sehemu ya kati ya mkono wa kushoto, uchunguzi wa hali ya joto na kupumua na kuchukuliwa kwa hamu ya mtihani itafanyika . Masomo mawili yatachukuliwa kila wiki wakati wa kufuatilia hadi wiki 4. Dodoso inatarajiwa kuchukua takriban 30-45 dakika ya kujazwa.

## **Madhara**

Madhara n imachache inayohusiana na utafiti na haitahusisha taratibu ngumu. Wakati wako utakao utumia katika kushughulikia kidasi utapokelewa kwa shukruani nyingi.

## **Faida**

Kuhusu faida ,kunaweza kuwa hakuna faida za moja kwa moja kama mshiriki, lakini habari iliyokusanywa itatusaidia kutambua mapengo katika kusimamia wangonjwa wanje (watoto) walio na makali ya utapiamlo.

## **Kulipia**

Kama utakubali kushiriki katika utafiti huu, hakutakuwa na gharama au Kulipia kwa ajili ya kushiriki, jinsi wewe utashiriki katika jaribio wakati wako rahisi wakati wa ziara yako ya kawaida.

## **Kujitolea kushiriki na kujiondoa.**

Kushiriki kwako nikwa kujitolea na unahaki ya kujiondoa katika kushiriki katika utafiti wakati wowote bila adhabu.

## **Siri**

Nambari za usajili zitatumika badala ya majina ya washiriki katika kidasisi. Vidadisi vitahifadhiwa vizuri ambapo mchunguzi na msimamizi watakuwa ndio pekee wakuvitumia.

## **Mtu wa kuwasiliana naye.**

## **Mchunguzi mkuu**

Dorothy mbaya wa chuo kikuu cha Nairobi shule ya uuguzi nambari ya simu;  
0720397226

## **KNH/UoN-ERC-Ethics and research committee**

Mwenyekiti wa KNH/UoN-ERC, SLP 20723, nambari ya simu: 020-2726300-9; Fax: 2725272; Email: [uonknh\\_erc@uonbi.ac.ke](mailto:uonknh_erc@uonbi.ac.ke).

**Thibitisho la kukubali**

Unakubali kushiriki katika utafiti huu?

Ndio.....La.....

Sahihi.....wakati.....Tarehe.....

Shahidi.....sahihi.....wakati.....Tarehe.....





**Socio- economic history**

(7) What is the family’s approximate income per month in Kshs

< 3000	<input type="checkbox"/>	3000-5000	<input type="checkbox"/>
5000-10000	<input type="checkbox"/>	10000-15000	<input type="checkbox"/>
15000-20000	<input type="checkbox"/>	20000-30000	<input type="checkbox"/>
>30000	<input type="checkbox"/>	Don’t know	<input type="checkbox"/>

(8) What is your occupation: \_\_\_\_\_

(9) What is your spouse’s occupation: \_\_\_\_\_

(10) Have you changed your job in the last 3 months?

Yes  No

If yes, in what way has it changed?

(11) What type of a house do you live in? permanent(stone)   
 semi permanent(timber)  temporary(mud thatched with  
 grass)  others specify-----

(12) How many people live in the house on a regular basis?

Adults----- children-----.

(13) What is the main source of water for the family?

Piped water  borehole  shallow well   
 River/ stream  others specify.....

**Socio cultural factors**

(14) When should other food be introduced to a child?  
 -----

(15) What complementary food should be used for a child?-----  
 -----  
 -----

(16) How often should the child be fed these complementary meals you have  
 named above in a day?-----

(17) Are there specific times of the day that a child should eat specific foods?

Yes  No

If yes specify.....

(18) Are girls and boys fed differently?

Yes  No

(19) If yes, what differences?-----  
-----  
-----

(20) Are children allowed to share food from the same plate?  
Yes  No

**Diet**

(21) How long was the child exclusively breastfed? -----

(22) Is the child still breastfeeding? Yes  No

(23) Have you introduced other food to this child? Yes  no

(24) How many times do you feed your child?-----

(25) How many times did the child feed yesterday?-----

(26) List the foods given at each meal

1st.....

2nd .....

3rd.....

4th.....

Others (specify).....

**Medical history**

(27) Has your child been sick in the last one month?  
Yes  No

What was the illness? \_\_\_\_\_

Has your child suffered any of the illnesses below in the last one month?

(28) Diarrhea  
 Yes (.....acute < 14 days/..... chronic>14 days/..... blood stained)  
 No

Is the child still diarrheating?

Yes  no

(29) Vomiting  
Yes  (.....vomits everything/.....not everything)  
No

Is the child still vomiting? yes----- No-----

- (30) Ability to drink/ breast feed  
Yes  No   
Is your child able to drink/ breast feed? Yes  No

- (31) Fever  
Yes  (record temperature.....  
No

**Anthropometry:** (Please weigh the child, measure the height/length, take MUAC in a private room and record in the spaces provided)

- (32) Weight (kg) .....
- (33) Height/Length (cm) .....
- (34) Left mid upper arm circumference (cm).....

**Physical examination:** (Please observe the child for the signs listed below then for question 38 conduct an appetite test as per Appendix IV in a private room and fill the spaces provided).

- (35) Visible severe wasting  
Yes   
No
- (36) Bilateral pitting edema of lower limbs  
Yes   
No
- (37) Pallor  
Yes   
No
- (38) Appetite test  
Good   
Poor   
Refused
- (39) Superficial infections  
Yes   
No

**Treatment given**

- (40) What antibiotic was child given? Amoxicillin   
Don't know

Others (specify).....

- (41) Was the child given Vitamin A? Yes  No
- (42) Was the child given the measles vaccine? Yes  No
- (43) How many sachets of RUTF was the child given in the last visit?.....
- (44) How much RUTF has the child consumed since the last visit?.....  
(Evidenced by amount of empty sachets brought back).

**Final outcome**

- (45) Mean Weight Gain.....g/kg/day
- (46) WHZ on day 28 or at discharge.....
- (47) Recovered (WHZ  $\geq$  -2SD)  
Yes  (Days to Recovery.....)  
No
- (48) Defaulted  
Yes   
No
- (49) Transferred to inpatient  
Yes   
No
- (50) Failure to respond  
Yes  No

Name-----sign-----date-----

PI-----sign-----date-----

#### Appendix IV: Questionnaire in Kiswahili(mtafiti kusimamiwa)

Matokeo ya watoto walio na utapiamlo walio na umri wa miezi sita hadi miezi hamsini na tisa ambao niwagajwa wa nje wanaotibiwa katika hospitali ya gatuji ya Kitui.

#### Maagizo

Tafadhali soma maswali yafuatayo kwa mhajibika na uandike kwa nafasi iliopeanwa kwa halama hii [√]kwa maswali na pale maoni yanaitajika uandike kwa kifupi.

Tafadhali usiandike njina lako mahali popote, kwa hojazi hili.

Halafu peleka mtoto kwa chumba cha siri kisha uchukue uchunguzi wa maumbile.

Nambari ya usajili.....

Tarehe .....

#### Sehemu ya kwanza.

#### Data ya demografia ya mgonjwa.

1. Umri wa mgonjwa kwa miezi .....
2. Mpango wa kuzaliwa.....
3. Jinsia mume  mke

#### Majibu ya data ya demografia

1. Una umri wa miaka ngapi?
2. Jinsia yako ni? Mume  mke
3. Una uusiao gani na mtoto?-----
4. Wewe niwa ndini gani?  
Mkristo  muislamu  mbutadesturi  bila   
nyingine(eleza)\_\_\_\_\_
5. Hali ya ndoa yako?  
Hujaolewa  umeolewa  mjane  talakiwa
6. Kiwango chako cha juu cha elimu?  
Shule ya msingi  sekondali  chuo kikuu   
sijawahi kuhudhuria shule.



## Historia ya uchumi wajamii

7. Mapato ya familia kwa mwenzi ni pesa ngapi za Kenya  
Elfu tatu  kati ya elfu tatu na tano  kati ya elfu kumi na  
kumi na tano ka  elfu kumi na tano na ishirini   
Kati ya ishirini na therathini  Juu ya therathini
8. Unafanya kazi gani?.....
9. Mume wako ama mke wako anafanya kazi gani?.....
10. Umebandirisha kazi yako miezi mitatu iliopita?  
Ndio  la   
Kama ndio umeibandilisha kwa njia gani?-----  
.....
11. Je, unaishi ndani ya nyumba ya aina gani? Ya kudumu  kudumu kiasi  
 ya muda   
nyingine(eleza)-----  
.....
12. Ni watu wangapi huwa nyumbani kwa wakati mwingi?-----  
Watu wazima----- watoto-----
13. Maji yakutumia nyumbani hutoka wapi?  
Maji ya mfereji  kisima  kisima kifupi  mtoni  
nyingine (eleza) .....

## Historia ya utamaduni wa jamii

14. Ni wakati gani mtoto anafaa kupewa vyakula vingine?-----  
-----
15. Je, chakula gani zinatumiwa kwa ajili ya kumwachisha ziwa mtoto?-----  
-----
16. Ni mara ngapi lazima mtoto kulishwa chakula hizo nyongeza kwa siku?-----  
-----
17. Je, kuna wakati maalumu wa siku kwamba mtoto lazima kula vyakula maalumu?  
Ndio  La   
Kam ndio eleza-----  
-----
18. Wasichana na wavulana huitazi chakula tofauti?
19. Ndio  La

20. Kama ndio eleza-----  
-----

21. Watoto wanakubaliwa kula chakula kutoka katika sahani moja?

Ndio  la

**Mlo kamili/ utaratibu maalum wa chakula**

22. Kwa muda gani mtoto alinyonyeshwa pekee?-----

23. Mtoto angali ananyonya?

Ndio  La

24. Je, imeanzisha huyu mtoto chakula nyingine?

Ndio  La

25. Je, ni mara ngapi uliisha huyu mtoto?-----

26. Mtoto alikula mara ngapi jana?-----

27. Orodhesha chakula alichopewa kwa kilamlo

.....  
.....  
.....  
.....  
.....

**Historia ya kiafya**

28. Mtoto wako amekuwa mgojwa hivi majuzi?

Ndio  la

Nini kilisababisha ugonjwa huo?-----

29. Kuendesha/kuhara

Ndio  (.....kali chini ya siku kumi na nne/.....kuendelea siku nyingi

Zaidi ya kumi na nne.....kuwa na damu)

La

30. Kutapika

Ndio  (.....kutapika kila kitu.../kutapika kiasi)

La

31. Uwezo wa kunywa/kunyonya

Ndio

La

32. Hali ya joto

Ndio (nakili kiwango cha joto-----)

La

**Maendeleo ya mtu**(Tafadhali katika chumba cha siri pima mtoto uzani,urefu na mzingo wa sehemu ya kati ya mkono , halafu jaza kwa pengo uliopewa.

33. Uzani kwa kilogram.....

34. Urefu kwa kimo.....

35. Mzingo wa sehemu ya kati ya mkono wa kushoto.....

**Uchunguzi wa maumbile** (tafadhali katika chumba cha siri angalia mtoto kwa dalili zilizo orodheshwa hapa chini, halafu swali nambari therathini na nne fanya kipimo cha hamu ya chakula kama ilivyo andikwa kwa kiambatanisho IV kisha ujaze pengo ).

36. Hali ya kukonda

Ndio

La

37. Kubonyea kwa pande mbili ya mikono/miguu

Ndio  La

38. Musawajiko/kukwajuka

Ndio

La

39. Kipimo cha hamu ya chakula

Nzuri

Mbaya

Alikataa chakula

40. Maambukizi juujuu

Ndio

La

**Matibabu aliopewa:**

41. Ni dawa gani mtoto alipewa? Amoxicillin

Sijui

Nyingine (elezea)-----

42. Mtoto alipewa vitamin A? Ndio  La

43. Mtoto alipewa chanjo ya surua? Ndio  La

44. Mtoto alipewa sachet ngapi za RUTF?.....



45. Mtoto ametumia RUTF ngapi tangu mara ya mwisho alipopelekwa hospitalini?  
.....( kiwango cha sacheti zilizotumiwa zibebwe kama ithibati)

**Matokeo ya Mwisho**

46. Kadiri ya uzani aliongezea.....g/kg/siku

47. WHZ siku ya ishirini na nane au ya kuruhusiwa kwenda nyumbani

.....

48. Alipata nafuu (WHZ  $\geq$  -2SD)

Ndio  ( siku za kupata nafuu-----)

La

49. Aliachana na matibabu

Ndio

La

50. Alilazwa hospitalini

Ndio

La

51. Dawa hazikufanya kazi

Ndio

La

Jina -----sahihi-----tarehe-----

Mchunguzi mkuu-----Sahihi-----tarehe-----

-----

## Appendix V: Follow up Outpatient Therapeutic Care

Serial number.....

Age .....

Gender .....

Indicators	VISITS IN WEEKS			
	Admission (1st)	2 <sup>nd</sup>	3th	4 <sup>th</sup> Exit
<b>Anthropometric measurements</b>				
Weight (grams)				
Height (cm)				
MUAC(cm)				
Edema +, ++,+++				
<b>Medical history</b>				
Diarrhea				
Vomiting				
Fever				
Ability to drink/ breast feed				
<b>Physical Examination</b>				
RUTF Good/poor/refused				
Temperatures(°C)				
Respiratory rate(bpm)				
Anemia				
Superficial infections				
RUTF (no. of sachets given)				
<b>Outcome</b>				

\*D= defaulter, T= transfer to inpatient, C= Cured, NR=Non respondent

## **Appendix VI: Appetite test.**

WHO (2011) states that malnutrition changes the way infections and other diseases express themselves and maintain that children severely affected by the classical IMCI diseases, who are malnourished, frequently show no signs of these diseases. It is further argued that all the major complications lead to loss of appetite hence assessment of the appetite is often the only way to differentiate complicated from uncomplicated case of SAM. It is therefore suggested that identification of the severely malnourished is by anthropometric Measurements and that there is not a perfect correlation between anthropometric and metabolic malnutrition never the less metabolic malnutrition causes death and the best sign of severe Metabolic- malnutrition is a reduction in appetite WHO (2011) concluded that Appetite test is the most important criterion to decide if a patient should be sent for in- or out- patient management.

### **Procedure to conduct the Appetite Test**

- The appetite test should be conducted in a separate quiet area.
- It will be explained to the caregiver the purpose of the Appetite Test and how it will be carried out.
- The caregiver will wash her hands, and the child's hands and face, with soap and water.
- The caregiver will sit comfortably with the child on her lap and either offers the RUTF from the packet or put a small amount on her finger and gives it to the child.
- The caregiver will offer the child the RUTF gently, encouraging the child all the time. If the child refuses, the caregiver will continue to quietly encourage the child and take time over the test. The test usually takes a short time, but may take up to one hour. The child must not be forced to take the RUTF.
- The child needs to be offered plenty of water to drink from a cup while he/she is taking the RUTF.

A child who takes at least the minimum amount for their weight as per the table below will have passed the appetite test. A child that does not take at least the amount of RUTF as shown in the table below will be referred for inpatient care.

**Table 3.1:** Minimum amount of RUTF (Plumpy nut) per kg of body weight required to pass the Appetite Test

<b>Plumpy'nut</b>	
<b>Body weight (Kg)</b>	<b>Sachets</b>
Less than 4 kg	1/8 to 1/4
4-6.9kg	1/4 to 1/3
7 – 9.9kg	1/3 to 1/2
10 – 14.9kg	1/2 to 3/4
15 – 29kg	3/4 to 1
Over 30 kg	Above 1

# Appendix VII: Approval Letter from KNH/UON, Research and Ethics Committee

## Appendix IV: Letter of Authorization



UNIVERSITY OF NAIROBI  
COLLEGE OF HEALTH SCIENCES  
P O BOX 19676 Code 00202  
Telephone: 254732716309  
(254-020) 2726309 Fax 44355



KNH/UON-ERC  
Email: [knh\\_erc@uonbi.ac.ke](mailto:knh_erc@uonbi.ac.ke)  
Website: <http://erc.uonbi.ac.ke>  
Facebook: <https://www.facebook.com/knh.erc>  
Twitter: @UONNH\_ERC Website: [www.uonbi.ac.ke](http://www.uonbi.ac.ke)



KENYATTA NATIONAL HOSPITAL  
P O BOX 20723 Code 00302  
Tel: 736306-9  
Fax: 725272  
Telegram: MEDSCP, Nairobi

Ref: KNH-ERC/A/229

Dorothy Mbaye  
Reg. No.H56/88641/2013  
School of Nursing Sciences  
College of Health Sciences  
University of Nairobi

Dear Dorothy

**Research Proposal : Outcomes of severely malnourished children aged 6- 68 months on outpatient management in Kitul county Hospital (P160/03/2015)**

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 18<sup>th</sup> May 2015 to 17<sup>th</sup> May 2016.

This approval is subject to compliance with the following requirements:

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN-ERC before implementation.
- Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN-ERC within 72 hours of notification.
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN-ERC within 72 hours.
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (Attach a comprehensive progress report to support the renewal).
- Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- Submission of an executive summary report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN-ERC website [www.erc.uonbi.ac.ke](http://www.erc.uonbi.ac.ke)

Yours sincerely,

PROF. A. L. CHINDA  
SECRETARY, KNH/UON-ERC

C/o: The Principal, College of Health Sciences, UoN  
The Deputy Secretary, KNH  
The Chair, KNH/UoN-ERC  
The Director, School of Nursing Sciences, UoN  
Supervisors: Dr. Lucy Wanjau MBEK, Prof. Ann N. HANEN, Dr. Beatrice OGIENI

## Appendix VIII: Approval Letter from Kitui District Hospital

Mobile: 0724036822  
E.mail: dmsokitui@gmail.com

**REPUBLIC OF KENYA**

**KITUI DISTRICT HOSPITAL**  
P.O. BOX 22, 90200,  
KITUI



**COUNTY GOVERNMENT OF KITUI**

**Ref:** DMSO/VOL.V/142

**Date:** 2<sup>nd</sup> July 2015

Dorothy Mbaya,  
School of Nursing Sciences,  
University of Nairobi,  
PO Box 19679-00202,  
Nairobi.

Dear Dorothy,

**RE: APPROVAL TO CARRY OUT STUDY AT KITUI DISTRICT HOSPITAL**

Please refer to the above subject matter.

Your request to carry out a study titled "**Outcomes of Severely Malnourished Children aged 6-59 Months Management in Kitui County Hospital**" was approved by the hospital on 26<sup>th</sup> May 2015.

We hope that you will share your findings with the hospital management.

Yours faithfully,

**Dr Allan Owino**

**Medical Superintendent**

**Kitui District Hospital**

