FEEDING PRACTICES AND NUTRITION STATUS AMONG CHILDREN AGED 6-23 MONTHS FOLLOWING DISCHARGE FROM SUPPLEMENTARY FEEDING PROGRAM IN ISIOLO COUNTY, KENYA

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DECLARATION

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

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DEDICATION

To my mother Cecilia Njeri Macharia who always believed I could make it, to my son Onani for giving me the zeal to get it done and the rest of my family and friends for their encouragement.

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Special thanks go to the research assistants who tirelessly collected the data and the mothers who took time out of their schedules to take part in this study. This study would not have been possible without their consent and involvement. I extend recognition to the efforts made by Dr. Peter Chege who assisted me diligently in the entire data analysis process.

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DEFINITION OF TERMS

Anthropometric measurements: The body measurements used in this study to assess the nutrition status of an individual; they included the weight, height dimensions and age.

Cure rate: the proportion of children who were discharged from the SFP program as cured, from the total SFP program exits. This study used the 75% sphere standard for program performance was used as the reference.

Early life: In this study, it was the period between birth and 24 months of life.

Feeding practices: these were the actions carried out by a caregiver relating to breastfeeding and complementary feeding, solid and semi-solid foods, given to a child (Kamau, 2014). This study dwelt on breastfeeding between 6 and 23 months, frequency of feeding (meal frequency), types of food consumed (dietary diversity) and attainment of acceptable diet.

Global acute malnutrition: this was the accumulated proportion of children who had a weight for length Z-cores of below -2SD

Malnutrition: a state where the bodily functions are weakened affecting adequate maintenance of processes such as growth, disease resistance and subsequent recovery (Kenya MMS and MoH, 2009). While malnutrition portrays as under-nutrition or over-nutrition, this study focused on under-nutrition.

Meal: this entailed the food that was consumed in the previous 24 hours of this study.

Moderate Acute Malnutrition: This is the effect of short-term food deprivation, sometimes with infection, characterized by the degree of wasting. The weight and height anthropometric measurements taken in this study were referenced against the WHO 2006 child growth standards for interpretation. Standard deviation of between -3SD and below

-2SD was termed as Moderate Acute Malnutrition (MAM), an entry criteria into Supplementary Feeding Program (SFP).

Nutrition status: This conveyed the condition of the body as revealed by anthropometric measurements referenced against WHO 2006 child growth standards; weight-for-length, length-for-age and ultimately weight-for-age (Ndanu, 2013).

Optimal growth: Desirable increase in size consistent with the WHO 2006 child growth standards.

Primary caregiver: A person who consistently spends most of his or her time caring for a child to include feeding. This study purposed to interview the mother as the primary caregiver.

Relapse: this term represented deterioration of nutrition status after a period of improvement. At the time of this study, sampled children who were found to have a WLZ score of below -2SD (as referenced against WHO 2006 growth charts) were referred to as relapse cases.

Supplementary Feeding Program: nutrition treatment program that offers a dry ration of Corn-Soy Blend (CSB) and vegetable oil, or RUSF (peanut-based paste); and medical provisions of anti-helminthes, micronutrients supplementation (Vitamin A, Iron and Folic acid) and measles immunization to children 6-59 months (Kenya MMS and MoH, 2009). This study centered on those who were 6-23monts.

Under-nutrition: A state arising from insufficient intake or utilization of nutrients in the body. Stunting, wasting and underweight were the focus of this study.

Z-score: This referred to the index used to show how much a value deviated from the median. The weight for length, weight for age and height for age were the focus.

LIST OF ABBREVIATIONS AND ACRONYMS

ASAL	**:**	Arid and Semi-Arid Land
CHW	**:**	Community Health Worker
CSB	**:**	Corn Soy Blend
DHIS	**:**	District Health Information System
ENA	**:**	Emergency Nutrition Assessment
FEWS NET	**:**	Famine Early Warning Systems Network
FGD	**:**	Focus Group Discussion
GAM	**:**	Global Acute Malnutrition
GoK	**:**	Government of Kenya
IEG	**:**	Independent evaluation Group
IMAM	**:**	Integrated Management of Acute Malnutrition
IMCI	**:**	Integrated management of childhood illnesses
KDHS	**:**	Kenya Demographic Health Survey
KII	**:**	Key Informant Interview
KFSSG	**:**	Kenya Food Security Steering Group
KNBS	**:**	Kenya National Bureau of Statistics
LAZ	**:**	Length for Age Z-score
MAM	**:**	Moderate Acute Malnutrition
MDD	**:**	Minimum Dietary Diversity
MDG	**:**	Millennium Development Goal
MICS	**:**	Multiple Indicator Cluster Survey
MMS	**:**	Ministry of Medical Services

MoEST	**:**	Ministry of Education Science and Technology
MoH	**:**	Ministry of Health
MoPHS	**:**	Ministry of Public Health and Sanitation
NACOSTI	**:**	National Commission for Science Technology Innovation
NGO	**:**	Non-Governmental Organization
OR	**:**	Odds ratio
RUSF	**:**	Ready-to-Use Supplementary Food
RUTF	**:**	Ready to Use Therapeutic Food
SAM	**:**	Severe Acute Malnutrition
SD	**:**	Standard Deviation
SFP	**:**	Supplementary Feeding Program
SMART	**:**	Standardized Monitoring and Assessment of Relief and Transition
SPSS	**:**	Statistical Package for Social Sciences
UNICEF	**:**	United Nations International Children Education Fund
WAZ	**:**	Weight for Age Z-score
WHO	**:**	World Health Organization
WLZ	**:**	Weight for Length Z-score

ABSTRACT

Child under-nutrition is linked to delayed growth milestones and increased severity of otherwise common illnesses. There has been minimal significant change over the years on decline of malnutrition. Although Integrated Management of Acute Malnutrition (IMAM) had been successful in managing acute malnutrition, these children continue to be at risk of illnesses, relapse and ultimate death in the subsequent year after treatment. Children in Isiolo County are at risk of acute malnutrition relapse being prone to frequent dry spells. Still, scientific documentation on their follow-up is scanty and overlooks deteriorating nutrition and health trends. This study purposed to determine the feeding practices and nutrition status of the children aged 6-23 months, following successful discharge from Supplementary Feeding Program (SFP) in Isiolo County. The study used a cross sectional analytical study design on 204 mother-child pairs. The children were sampled purposively from SFP registers in 13 health facilities in Garbatulla sub-County with their mothers as respondents. Researcher-administered questionnaires, focused group discussion guides (FGDs) and Key Informant Interviews (KIIs) were used to collect and triangulate data. ENA for SMART 2011 and SPSS version 17.0 software packages were used to key in data for analysis. Relationship between variables was determined using Chi-square and Pearson Product Moment Correlation. Three-quarter (74%) of the mothers were aged between 25 years and 34 years while most of them were homemakers (71.1%) with an average household size of 6 members. Most of the households bought their food (90.2%) with some who also waited on food aid (23.5%) to meet the deficit. Under-nutrition by Z-scores was indicated by wasting (14.7%), stunting (33.8%) and underweight (19.1%) while the mean duration of time since the discharge was 5 months. The proportion of children who were breastfed in the 24 hours preceding the study was as follows: 95.0% of 6-11months, 76.6% of 12-17months and 40.2% of 18-23months. Nearly all children (99.0%) attained their minimum dietary diversity with the most commonly consumed food groups being grains, roots and tubers (100%) then dairy products (80.4%). More than half (59.8%) of the children received their recommended minimum meal frequency. Barely 50.7% of all the children achieved their minimum acceptable diet whereby most of them were being breastfed (71.6%). Maternal age ($r=-0.352$; $p=0.03$) and time since discharge ($r=-0.25$; $p=<0.001$) had a significant negative association with wasting. Dietary diversity ($r=0.47$; $p=0.045$), meal frequency ($r=0.53$; $p=0.038$) and attaining minimum acceptable diet ($\chi^2=45.71$; $p=<0.001$) exhibited a significant relationship with wasting. In conclusion, maternal age, age of the child, breastfeeding status and period of time since SFP discharge are important regarding the child's nutrition status. The study recommends encouragement of caregivers to continue breastfeeding to at least 2 years with enhanced follow-up after discharge where mothers are advised to visit the clinic consistently for monitoring. Further studies on caloric dietary intake and longitudinal studies are suggested to assess dietary adequacy and determine causality of relapse.

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

Nutrition status of children highly relies on interactions between foods they consume, their general health and the care they receive (KNBS, 2009). Interestingly, there has been a 37% reduction in global underweight levels from the year 1990 to 16% in 2011 (UNICEF, 2013). This progress towards underweight reduction has, however, been considered slow since more than 50% of affected countries failed to achieve the target for underweight reduction that had been set for the year, 2015 (Ainsworth & IEG, 2010). More specifically, acute food scarcity is reported to result in muscle wasting, acknowledged as acute malnutrition, which could be affirmed through the weight and height/length measurements (Park et al., 2012).

The prevalence of wasting is reported to indicate presence and extent of humanitarian crisis in a population (Chowdhury et al., 2012). The 2008 Lancet Series on Maternal and Child under nutrition [as cited by Chowdhury et al., 2012], estimated that 19 million and 55 million children below the age of 5 years had severe and moderate acute malnutrition respectively. In addition, UNICEF (2013) documents an 11% decrease in the wasting levels between the years 1990 and 2011 in the global population of children. In an effort to tackle child related under nutrition, UNICEF (2013) and Eggersdorfer et al. (2013) highlight a shift of focus from reducing underweight prevalence in the population to preventing stunting. Moreover, the first 2 years of life are part of the 1000 days (window of opportunity) said to be critical in reducing the detrimental effects of malnutrition in the population (Eggersdorfer et al., 2013).

Reports document that nutrition changes beyond the second year of life has little effect on recovery due to the lost potential outside the first 1000 days (UNICEF, 2013; Teshome, Kogi-Makau, Getahun, & Taye, 2009). In Africa, 13 million children have been found to be short for their age (stunted), an increase from 9.5 million children in 1990 (Haddad & Cobert, 2013). Kenya has been listed number 12 among nations that have the highest number of stunted children globally (UNICEF, 2013). Even so, childhood stunting reduced to 26% among those aged 6-59 months (KNBS et al., 2015) from 35% in the preceding KDHS 2008-09. Eastern region (former province) has one of the country's highest stunting levels of 30% most of whom lived in the rural areas. UNICEF (2013) highlight that an individual's brain and nervous system development are almost complete by the age of 2 years. Nutrition deficiencies could therefore, impair brain development that would pose long-term effects later in life.

Further, the possibility of stunting as a consequence of suboptimal growth predisposes the individual to being overweight with other chronic diseases (Black et al., 2013; Parikh et al., 2010) in adulthood. It is for these important effects that Bhutta et al. (2013); Black et al. (2013) and UNICEF (2013) suggest the use of stunted linear growth as the main indicator of childhood under-nutrition. Particularly, the KDHS 2014 reveals childhood underweight levels of 11%, a decrease from the previous survey (16%). Wasting within the same population was at 4% with the highest levels in the age group 6-11months (KNBS et al., 2015), which was within the acceptable WHO classification. According to that report, the wasting levels were highest in the North Eastern region that borders Isiolo County partly. In accordance with Uauy et al. (2012) children who were wasted had a

three to four times' higher chance of mortality from diarrhea or pneumonia. In tandem, children in Kenya found to be moderately wasted, with no medical complications, are treated using supplemental feeds in an outpatient program (SFP) until they achieve the target Weight for Length Z-scores (WLZ) ≥ -2SD (Kenya MMS and MoH, 2009).

1.2 Problem Statement

Isiolo County is an Arid and Semi Arid Land (ASAL) that receives irregular rainfall with repeated episodes of famine that increases the risk of under-nutrition among its children, as revealed by its high levels reported over the years (Kenya MoH, 2012; Owigar, 2014; Karimi, 2017). Further, there has been, regular occurrence of the childhood diseases associated with malnutrition to include disease outbreaks, in the County (GoK, 2016). Even though there is insufficient guidance of feeding post-discharge to support recovery (Black et al., 2013; Piwoz et al., 2012), it is suggested to base it on the locally available foods with an emphasis on assorted options including those from animal sources for the extra energy and nutrients (WHO, 2012). A short-rains assessment in the area, however, reported inadequate breastfeeding and dietary practices among its habitats with common foods ranging from milk, vegetables, pulses to cereals (KFSSG & Isiolo CSG, 2016).

These additional nutrition needs of malnourished children are supported during management of moderate acute malnutrition (MAM) while preventing further health deterioration by means of the outpatient program, supplementary feeding program (SFP) (Kenya MMS and MOH, 2009). Discharge to home translates to a halt in the take-home

ration, as the children are fully handed-over to their families and may well return to the setting that could possibly have resulted in their initial under-nutrition.

Studies on those discharged uncovered that the children's recovery from moderate acute malnutrition (MAM), through anthropometry, is not equivalent to physiologic and immunologic restoration (Chang et al., 2013; Eggersdorfer et al., 2013; Stobaugh et al., 2017). This is because they continued to be at risk of sickness, relapse of acute malnutrition and even death in the year following their recovery. Unfortunately, similar studies and literature on the status of these children in Kenya after they have fully recovered from acute malnutrition are insufficient. Nonetheless, the only available literature realized an average of 3.7% children who relapse after recovery from MAM from eight Kenyan districts (UNICEF, 2012b). In essence, the progress towards reduction of under-nutrition is seemingly slow and inconsistent despite the successful management of acute malnutrition. Consequently, there is a need to work towards maintenance of nutrition and health gains for sustained recovery.

1.3 Justification of the Study

An individual's ability to be industrious and contribute to the society's economic growth as an adult is challenged significantly by childhood malnutrition (Dewy & Begum, 2011; Eggersdorfer et al., 2013). The ASAL areas are particularly of concern owing to their heightened risk of food scarcity and challenged socio-economic capabilities among its inhabitants (Ng'aari, 2013; Owigar, 2014; GoK 2016; Karimi, 2017). The KDHS 2014 reveals Isiolo to have the second lowest mean Z-scores for WLZ and WAZ, in Eastern

province. By 2016, the County had about 13% (based on MUAC <135mm) more children at risk of malnutrition and categorized to be at the *serious* phase in line with the Integrated Phase Classification (IPC) (KFSSG & Isiolo CSG, 2016).

The prevalence of under nutrition is studied to be highest within the age group 6-23 months, when complementary feeding is established (KNBS et al., 2015). This age group is well within the first 1000 days of life where the long-term effects of under-nutrition can still be alleviated with timely identification (Teshome et al., 2009; Eggersdorfer et al., 2013; UNICEF, 2013). Unfortunately, documentation of those children's state of nutrition after discharge from the nutrition treatment programs in Isiolo is scanty. This study, therefore, set to generate information that could build towards interventions targeting this critical window of opportunity after previous treatment of acute malnutrition.

1.4 Research Questions

1. What are the demographic and socioeconomic characteristics of caregivers of children 6-23 months after discharge from SFP in Isiolo County?
2. What are the feeding practices among children 6-23 months after discharge from SFP in Isiolo County?
3. What is the nutrition status of children 6-23 months after discharge from SFP in Isiolo County?
4. What is the morbidity status, health seeking behavior, relapse among the children 6-23 months after discharge from SFP in Isiolo County?

5. Are there associations between caregiver demographic and socio-economics characteristics, feeding practices, morbidity and nutrition status?

1.5 Objectives

1.5.1 Broad Objective

To establish the feeding practices and nutrition status among the children aged 6-23 months discharged from SFP.

1.5.2 Specific Objectives

The objectives of this study will be:

1. To establish the demographic and socio-economic characteristics among caregivers of children 6-23 months discharged from SFP in Isiolo County.
2. To determine the feeding practices of children 6-23 months discharged from SFP in Isiolo County.
3. To assess the nutrition status of children 6-23 months discharged from SFP in Isiolo County.
4. To determine the morbidity status, health-seeking behavior and relapse rate of children 6-23 months discharged from SFP in Isiolo County.
5. To determine the associations between caregiver demographic and socio-economics characteristics, feeding practices, morbidity and nutrition status among children 6-23 months after discharged from SFP in Isiolo County.

1.6 Hypotheses

H_{O1}: There is no significant association between demographic and socio-economic characteristics of the caregivers and nutrition status among children 6-23 months after discharge from SFP in Isiolo County.

H_{O2} : There is no significant relationship between feeding practices and nutrition status of children 6-23 months after discharge from SFP in Isiolo County.

H_{O3}: There is no significant association between morbidity status and nutrition status among children 6-23 months after discharge from SFP in Isiolo County.

H_{O4}: There is no significant relationship between time beyond SFP discharge and nutrition status of the children 6-23 months after discharge from SFP in Isiolo County.

1.7 Significance of the Study

The information produced through this study could be of use to the ministry of health and program managers of relevant NGOs for enhanced nutrition programming towards sustained recovery. The findings also contributed to the base of knowledge that could enhance collaboration among policy makers and researchers towards more research, for building onto existing strategies that target that window period for healthier growth.

1.8 Delimitations and Limitations

This study was carried out among all children 6-23 months who had been discharged from SFP only regardless of duration post discharge. Any occurrences during treatment were therefore not considered. The research was restricted to areas covered by health facilities in Garbatulla Sub-County that offered IMAM services. The study focused on

continued breastfeeding, meal frequency, dietary diversity and minimum acceptable diet as the indicators for infant and child feeding practices. Micronutrient deficiencies and calculation of caloric intake were, therefore, not included here. The 24-hour dietary recall may not have represented the day-to-day variations in feeding, as well; there might have been recall bias as it relied solely on the caregivers' memory. In addition, only common illnesses in Isiolo County associated with malnutrition (Diarrhea, Malaria and Acute Respiratory Infections) were explored.

1.9 Assumptions

The study assumed that the standard admission, treatment and discharge criteria were adhered to on study population as stipulated in the Kenya IMAM guidelines for the year 2009. It was also assumed that the responses given during data collection were accurate.

1.10 Conceptual framework

Under-nutrition in children could occur due to a number of reasons. The UNICEF (2013) conceptual framework had been used for many years to define the causes and revisions done with the new knowledge acquired. For the purpose of this study, the framework was modified from the reviewed literature (Figure 1.1). Ideally, repeated episodes of malnutrition further divest a child's continued growth, which might initiate growth faltering and finally stunting. Malnutrition related illnesses such as; Diarrhea, Malaria, upper respiratory tract infections and measles are likely to recur. This is not different for the children successfully treated for acute malnutrition. The UNICEF lists poor feeding practices (breastfeeding and complementary feeding) among underlying causes of child

under-nutrition. Feeding that falls short of a child's needs is likely to deprive them of important nutrients and minerals, which would result in poor immunity that trigger illness in addition to appetite loss.

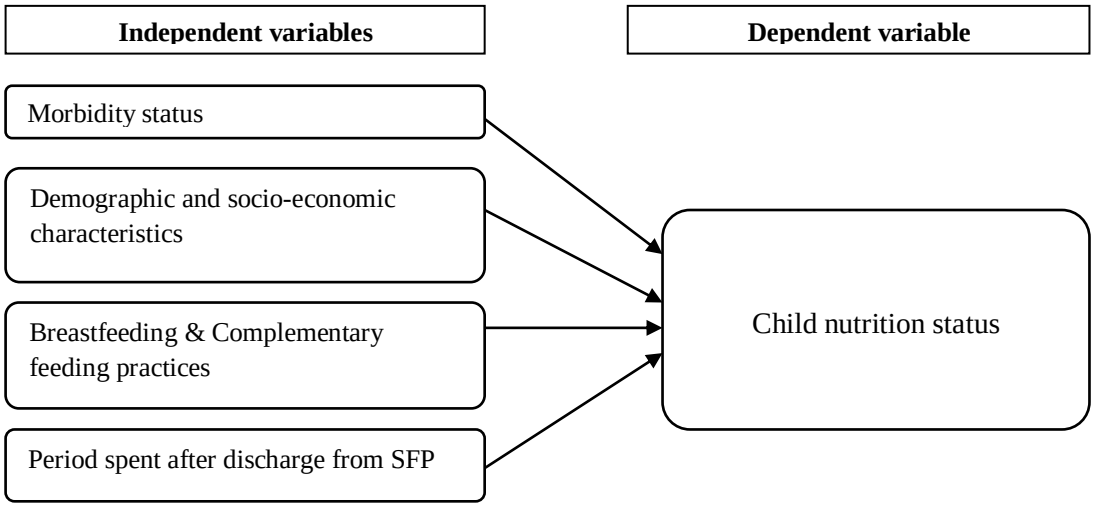

Figure 1.1: Causes of child under-nutrition
***Source**: Adopted and modified from UNICEF (2013) and other literature reviewed*

Indeed, they might have additional dietary requirements to meet possible delayed linear growth due to the previous malnutrition occurrence. It is; however, unclear how time spent beyond malnutrition treatment related with nutrition status of the children after discharge.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview of Child Malnutrition

Child malnutrition represents under-nutrition. The 18 month interval between 6 and 23 months is reported to be especially of importance due to the introduction of solid and semisolid foods to complement the breast milk (Dewey, 2013). In the early life, under-nutrition is directly because of poor feeding practices (breastfeeding and complementary feeding) coupled with high disease occurrence (Kimani-Murage et al., 2011). When the human body goes through instances of low nutrient intake, it survives by slowing down its systems to adapt to the changes through the phenomenon of reductive adaptation (Kenya MMS and MoH, 2009). This mechanism allows the body to stabilize its nutrient and energy needs, with the usage, in order to maintain homoeostasis.

As a result, all functions that require substantial energy are affected and the effectiveness of all systems depleted. In other cases, the physiological phenomenon of reductive adaptation diverts energy from growth while suppressing appetite and the child fails to thrive (Dewey & Mayers, 2011). According to Piwoz et al. (2012) an increase in body length often follows an increase in weight; thereby, signifying that the body is equipped for growth and survival. Certainly, there is need to focus preventive efforts on the first 1000 days of life; also while continuing with the treatment of wasting (Black et al., 2013; Sterling et al., 2012).

2.2 Caregiver Demographic, Socio-economic Characteristics and Nutrition Status of children 6-23 months

A number of studies depict a significant relationship between maternal education and nutrition status of children (Adeladza, 2009; Ojiako, 2009; KNBS and ICF MACRO, 2010; Janevic, Petrovic, Bjelic, & Kubera, 2010; Islam et al., 2013; Ndanu, 2013). Categorically, a study conducted in Kwale by Adeladza (2009) revealed that maternal education reduces the levels of underweight in children whereas; the household size predisposes children to wasting. Further, a study by Ojiako, Manyong, & Ikpi (2009) in Nigeria suggests that educated mothers are better equipped to enhance childcare practices and thus better outcomes. Consistent results whereby; low education levels relates to high child under-nutrition has also been documented (KNBS and ICF MACRO, 2010; Janevic, Petrovic, Bjelic, & Kubera, 2010; Islam et al., 2013).

Additionally, Islam et al. (2013) observes that the level of maternal education could assume less family size and better sources of income that may well save on household resources especially food. Ojiako et al. (2009), underscores a negative relationship between the age of the mother and nutrition status of a child. This is because children with younger mothers portray better nutrition status than those of older mothers. Another study by Ndanu (2013) established that schooling of mothers who are in prison increases the chances of their children to be underweight or wasted, but not stunted. Differential influence is also revealed when relating the type of caregiver occupation and the children's nutrition status (Adeladza, 2009). Despite these diverse effects of caregiver demographic and socio-economic characteristics of the caregivers on children's nutrition

status, studies documenting the effects among children 6-23 months after SFP discharge are scarce.

2.3 Feeding Practices of Children 6-23months

Once a child is 6 months old, the body needs added foods to support the growing nutrition requirements while controlling for susceptibility to infections (UNICEF, 2013). Consequently, breast milk used in conjunction with other foods, including non-human milk, fills the nutrient gap experienced during the rapid growth (WHO, 2008). The recommended IYCF indicators to measure the feeding practices are documented as continued breastfeeding, minimum meal frequency, minimum dietary diversity and minimum acceptable diet (WHO, 2010). Continued breastfeeding beyond 6 months, in Kenya, show decreasing trends with increasing age of the child; from about 99% to 61% by the time the children are between 18 and 23 months (KNBS et al., 2015). The KDHS 2014 highlights that the older a child gets, the more likely they are to meet the minimum feeding standards (minimum acceptable diet) based on, minimum dietary diversity, meal frequency including milk feeds (non breastfed children) (KNBS et al., 2015).

Feeding practices that do not meet the needs of the young children are documented to increase their risk of becoming undernourished; contracting infections and could lead to death in the end (Sphere, 2011). UNICEF (2013) estimates about one third of deaths among children globally, below age of five, to be associated with under-nutrition. Besides, out of every 1000 live births in Kenya, 52 die before their 5^{th} birthday whilst another 39 die by their 1^{st} birthday (KNBS et al., 2015). Under-nutrition is considered life

threatening especially when it occurs before a child attains the age of 24 months; since the immune system became weak and insufficient to fight otherwise common illnesses (Eggersdorfer et al., 2013). Even so, documentation of the feeding practices among the children who have been treated and discharged from SFP is rather scanty.

2.3.1 Continued-breastfeeding beyond Supplementary Feeding Program

Children should continue breastfeeding at least up to their second birthday because breast milk remains an important part of their diet (Eggersdorfer et al., 2013; Dewey & Adu-Afarwuah, 2008; UNICEF, 2013). Aside from providing imperative nutrients and fluids, breast-fed children are more able to fight infections because of the boost to their immunity (Kenya MoPHS, 2007). Additionally, continued breastfeeding is stated to improve child survival by reducing metabolic diseases and obesity in adulthood, along with motor and intellectual development (Kimani-Murage et al., 2011).

A study carried out in Nairobi by Muchina & Waithaka (2010) revealed that cessation of breast-feeding before a child's second birthday increases his likelihood of being under-weight by up to four times. UNICEF (2011) [as cited by Ndanu, 2013] accentuates continued-breastfeeding after the first 12 months as one of the indicators of optimal breastfeeding . However, the duration of breastfeeding has been revealed to significantly dwindle once a child attains this age (Kimani-Murage et al., 2011). In the wider Kenya, almost all infants (98.4%) stuck between 6 and 8 months are breastfed with a sharp decline (61.4%) among those 18 to 23 months old (KNBS et al., 2015).

In contrast to the evidence linking continued-breastfeeding with better nutrition outcomes, a study in Ethiopia by Teshome et al. (2009) show higher stunting levels in children who are breastfed beyond one year than those below one year. Once more, little is known of the status of breastfeeding among children aged 6-23 months beyond SFP discharge. This study categorized nutrition outcomes with the continued breastfeeding practices at below 12 months and above 12 months for comparison.

2.3.2 Complementary feeding beyond Supplementary Feeding Program

Complementary feeding should commence once a child is 6 months of age because his body will have developed enough to receive other foods (WHO, 2008). Vulnerable populations, such as those successfully treated for acute malnutrition, could use complementary feeding to improve linear growth rapidly and significantly while preventing relapse (UNICEF, 2013). Black et al. *(*2013) [as cited by Stewart, Iannotti, Dewey, Michaelsen, & Onyango, 2013] informs the need to use food that would enable recovery after infection, failure to which wasting would occur and afterward may impact on linear growth. Unfortunately, the available dietary requirements for children may not take into account factors that may upset assimilation and utilization of nutrients after malnutrition treatment; thereby increasing the risk of overestimating or underestimating their needs (Piwoz et al., 2012). WHO (2012) agrees with this and adds that the nutrition needs of malnourished and non-malnourished children vary.

Again, instances of food shortage such as in droughts may aggravate the inability of caregivers to provide diets that can be considered sufficient for their children to sustain

recovery from acute malnutrition (WHO, 2012). Nevertheless, WHO (2012) recommends that the foods given to children recovering from illness should be based on the available foods in their locality with an inclination towards a diverse diet that includes foods sourced from animals.

Even so, Minimum Dietary Diversity (MDD) denotes the number of food groups a child consumed in a day. WHO (2010) suggests the use of seven food groups that to determine this infant and young child-feeding indicator. These include Grains, roots and tubers; Legumes and nuts; Dairy products; Flesh foods; Eggs; Vitamin-A rich fruits and vegetables; other fruits and vegetables. It is recommended that all children are fed are with foods from at least 4 food groups, regardless of their breastfeeding status (WHO, 2010). Generally, the commonly eaten foods within Isiolo County households are *ugali* (from maize flour), beans with occasional vegetables addition (KFSSG & CGG, 2016). A study by Aemro et al. (2013) in the neighboring Ethiopia, revealed that only 10.8% of children are fed with the minimum recommended number of food groups. The Ethiopian study continues to suggest that the older a child gets, the more he consumes meals from diverse food groups.

Minimum Meal Frequency (MMF) represents the number of times a child should be fed on in a day. For instance, infants between ages 6 to 8 months who are breast-fed require other foods at least twice daily whereas those 9-23 months, no less than three meals. As well, all the non-breastfed children need a minimum of four daily meals (KNBS and ICF MACRO, 2010; WHO, 2010). The KFSSG and Isiolo County steering group (2016)

reported that across the Isiolo County households feed from at least 2 or 3 meals within 24 hours.

In general, the minimum acceptable diet (MAD) is a compound suggestion that a child has satisfied both the MDD and MMF (UNICEF, 2013). According to the KDHS 2014, maternal education and household wealth tend to influence the ability of child to receive appropriate feeding. At least 6% of childhood deaths can be prevented when children are fed with meals that comply with this standard (Aemro et al., 2013). Unfortunately, only 22% of children in Kenya meet the MAD as reported in the demographic health survey 2014 (KNBS et al., 2015). MAD appears to be a challenging aspect as the percentages attained by many developing countries are low (Aemro et al., 2013), which signifies the need to intensify attention on the quality and quantity of complementary feeding (UNICEF, 2013). Nevertheless, studies in Bangladesh (Zongrone, Winskell, & Menon, 2012; Rah et al., 2010) demonstrates a significant relationship between dietary diversity and stunting levels amongst children, as reiterated by Lutter et al. (2011).

Conversely, studies in Ghana by Nti & Lartey (2008) as well as Nti (2011) associates dietary diversity with all the three anthropometric indicators of nutrition status (WAZ, LAZ and WLZ). Likewise, a research study conducted by Ndanu (2013) in Kenyan prisons found no association between stunting and any of the complementary feeding indicators (MDD, MMF and MAD).

Studies that focus on complementary feeding and nutrition status among the children aged 6-23 months discharged from SFP are quite scarce and thus inconclusive. Moreover, the revealed inconsistency portrays the need for more information regarding the association between complementary feeding and nutrition status.

2.4 Assessment of Child Nutrition Status

Child nutrition status can be determined using different methods such as anthropometry, biochemical (laboratory) screening, body composition (fat and fat-free mass), visible clinical signs, dietary assessments and functional ability. For the purpose of this study, only anthropometric and dietary forms of assessments were employed. According to KNBS et al. (2015) physical growth of children below 5 years can be determined using weight-for-length (wasting), weight-for-age (underweight) and length-for-age (stunting) indices. Length (taken horizontally) is used on children less than 24 months since height (taken vertically) is taken for children equal to or above 24 months old (Mutakaa, 2014). Using the WHO 2006 growth charts, indices that lay below -2SD represent the different forms of under nutrition.

Wasting and stunting have been studied to present together in the populace even as those indices are not routinely monitored (Bergeron & Castleman, 2012). While in SFP, the wasting index is closely followed up until the children recovers from MAM. In contrast, once the children are discharged to home it is not the case henceforth.

As highlighted by Black et al. (2013) measurement of children's wasting and stunting prevalence is not assessed regularly in routine clinical practice. This may delay early detection of dwindling trends especially among the children 6-23 months who have undergone successful treatment for acute malnutrition. This study therefore utilized wasting (acute malnutrition) and stunting (chronic malnutrition) anthropometric dimensions in addition to the underweight index to categorize the nutrition status of those discharged.

2.5 Childhood Morbidity and Child Nutrition Status after Supplementary Feeding Program

Given Dewey & Mayers (2011) insight, children below 2 years of age acquire infections frequently. Equally, Piwoz et al. (2012) emphasized on the need to minimize the occurrence of these infections in early life to enhance growth. The most prevalent diseases in Isiolo that are associated with childhood malnutrition include acute respiratory infections, diarrhea and malaria (Matheka et al., 2013). Presence of malnutrition further increase their occurrence with higher frequency and more longevity (Mutakaa, 2014). Under-nutrition is viewed as a consequence and predisposing factor of infection whereby; further deterioration of nutrition status lead to more bouts of infection that feed back to the undernourished status forming a vicious cycle (UNICEF, 2013).

Little is known of disease occurrence and the source of treatment among the children who had previously experienced acute malnutrition and successfully treated. This study used a

retrospective approach to gather information on morbidity and health seeking by means of a two-week recall period.

2.5.1 Acute Respiratory Infections

The renowned leading cause of malnutrition related deaths in early life has been acute respiratory infections (Rodriguez et al., 2011; Walker et al., 2013). Again, presence of malnutrition and lack of breastfeeding heighten the risk of getting ARI (Walker et al., 2013; Qaisar et al., 2009). This is for the reason that weakened respiratory muscles are not effective in clearing respiratory tract secretions (UNICEF, 2012c). By the year 2011, pneumonia related deaths among children below the age of five had reached 1.3 million worldwide (Chopra et al., 2013). Further, UNICEF (2012c) documents Sub-Saharan Africa as the region most hit by the fatalities being home to 46% of the global pneumonia deaths. In Kenya, the disease affects most children in the age groups 6-11 months (11.4%) and 12-23 months (10.0%), characterized by a cough and short rapid breaths (KNBS et al., 2015). In the recent long rains assessment, the prevalence of pneumonia in all populations in Isiolo had increased by 19% in the months of January and June between 2012 and 2013 (Matheka et al., 2013).

A common cold associated with a running nose, a cough, and low-grade fever is termed as Upper Respiratory Tract Infection (URTI). While URTIs would be more prominent in children who present with acute malnutrition, lower respiratory tract infections prevail in children with both acute and chronic malnutrition (Rodríguez et al., 2011). Then again, a study by Chalabi (2013) in Iraq found no significant link between underweight and

stunting with ARI. The possible occurrence of ARI among those children (6-23 months) who had been treated and discharged from SFP is rather insufficient.

2.5.2 Diarrheal Disease

Globally, children who die before their 5th birthday have an 11% chance of dying as a result of diarrhea (Chopra et al., 2013). Before a child can reach the age of 24 months in developing countries, Dewey & Mayers (2011) suggests a recurrence of diarrheal episodes by three to five times. The KNBS and ICF MACRO (2010) further reports that diarrheal occurrence in Kenya varies according to seasons and is treatable at the health facility or at home using locally available fluids. Most diarrheal episodes seem to manifest in the age group 6-11 months (26.6%) and 12-23 months (24.2%) as reported 2 weeks preceding the KDHS (KNBS et al., 2015). Isiolo County has the lowest prevalence of diarrhea (6.8%) in Eastern region whereby, more children in the 6-11 months age group (65.2%) seek medical advice from health facility than those 12-23 months (57.7%).

Dewey & Mayers (2011); Drake (2012) and UNICEF (2013) reveal that the children who experience repeated episodes of diarrhea before the age of 24 months have; poor absorption of nutrients and poor appetite with a higher likelihood of stunted growth as well as other malnutrition forms. Even so, little is known of the occurence of diarrhea after successful treatment of MAM among those children between 6 and 23 months old in Garbatulla Sub-County.

2.5.3 Malaria

Malaria is a preventable and treatable vector borne disease that threatens the lives of children below five years globally (WHO, 2013b; Fillol et al., 2009). Those young children are at a greater risk of contracting malaria, as their immune system is under-developed, which challenge its effectiveness to perform the protective function. In Kenya, malaria is responsible for 30% of patients treated as outpatients and 19% of inpatients (Kenya MoPHS, 2009). According to Dewey & Mayers (2011) fever signifies the activation of the immune system that closely relates to loss of appetite and redistribution of nutrients that would otherwise promote growth. Conversely, poor feeding that results in under-nutrition further weakens the body's ability to fight infections and lead to increased susceptibility to the disease.

Nonetheless, there have been inconsistencies concerning the association between malaria and malnutrition as revealed in some studies (Deribew et al., 2010 ; Mitangala et al., 2013). Concurrently, inadequate data exists on morbidity and nutrition status targeting children previously treatment and discharged from SFP.

2.5.4 Health Seeking Behaviour for Common Childhood Illnessess

The likelihood of a caregiver to seek treatment for their child's illness is affected by maternal education and household wealth (KNBS et al., 2015). Further studies have shown that differential care is sought depending on the type of illness or symptom presenting in the child (Diaz et al., 2013; KNBS et al., 2015; Geldsetzer et al., 2014).

Those studies report Pneumonia as the illness highly considered for treatment whereby most caregivers of the children seek care from a health facility.

Nonetheless, the choice of treatment care during illness is reported to rely on; severity of illness, economic capability of the caregiver and walking distance to the health facility (Geldsetzer et al., 2014; Diaz et al., 2013). Even so, a systematic review done by Geldsetzer et al. (2014) revealed that not many caregivers are able to recognize the childhood illnesses relating to malnutrition (diarrhea, pneumonia and malaria) at home. Being that the children receive treatment for malnutrition at the health facilities, it is vital to find out where the caregivers seek treatment after children are successfully discharged from nutrition treatment programs.

2.6 Government Efforts to Curb Under-nutrition

The Children aged 6-59 months identified to have severe acute malnutrition without any underlying medical conditions such as dehydration, hypothermia; hypoglycemia, septic shock and severe anemia, are admitted into the Outpatient Therapeutic Program (OTP). The nutrition feed used in OTP management of severe under-nutrition is a high-energy peanut-based Ready to use Therapeutic Food (RUTF) capable of providing a severely wasted child with all the nutrients it requires for a day (Kenya MMS and MoH, 2009). Thereafter, these children graduate to Supplementary Feeding Program (SFP) where they receive a biweekly dry ‘take-home’ ration of fortified blended flour based premixed product or a peanut-based paste (Corn Soy Blend - CSB with vegetable oil or Ready to Use Supplementary Food RUSF sachets). This is for continued treatment of moderate

acute malnutrition providing the now moderately wasted child with part of the nutrient requirement for a day. In addition, the respective caregivers are offered nutrition counseling on feeding practices at home whereas; medicine treatment using Vitamin A, anti-helminths, iron-folate and measles immunization is being given as routine to the children with regards to the Integrated Management of Childhood Illnesses (IMCI) guidelines (Kenya MMS and MoH, 2009).

Discharge from SFP equates to a halt in the biweekly dry ration of CSB and reliance on available foods provided at home. An analysis done on the trends in admission within Kenya, between January and May, attested to lower trends in 2013 than the two previous years (Kenya MoH, 2013). Nevertheless, there are limited published studies that focused on the children's outcomes discharged from the nutrition treatment programs in relation to long-term outcomes after the initial program recovery (WHO, 2013a). Furthermore, the WHO (2013a) IMAM guidelines recommend periodic follow-up of these children after their exit from the program. This study seeks to add to the understanding of nutrition related outcomes of children 6-23 months following their discharge from the nutrition treatment program.

2.6.1 Food related interventions in Isiolo County

Aside from the nutrition treatment programs, Isiolo County receives developmental and emergency assistance through collaborative efforts of various non-governmental organizations and the county government (Action Against Hunger 2014). More specifically, these have been in the areas of nutrition, health, water, sanitation and

hygiene and in food security and livelihoods. By early 2016, interventions specific to nutrition were being offered as Food for Assets (FFA), Cash transfers, General Food Distribution (GFD) in addition to Home-grown School Meals Program (HSMP) for the school going pupils (KFSSG & Isiolo CSG, 2016).

By early 2017, the then ongoing drought was declared a national disaster in Kenya and Isiolo County remained targeted to receive emergency food aid through Blanket supplementary feeding program (BSFP) (Karimi, 2017). In light of the various food interventions supporting the households, the feeding practices and nutrition status of the children beyond exit from SFP have received minimal documentation.

2.7 Occurrence of Relapse after Supplementary Feeding Program

Recurrence of acute malnutrition after its correction through a nutrition treatment program denotes relapse. In accordance with Park et al. (2012) it is only through collaborative efforts eyeing the different dimension of health that under-nutrition can be better addressed. Ashraf et al., 2012 [as cited by Stobaugh et al., 2017] corroborates this through a 17.8% relapse rate realized through a 6-month follow up period following acute malnutrition treatment in Bangladesh. Moreover, a randomized control trial among children discharged as “cured”, from SFP, in Malawi also reported a 41% relapse proportion where some of them experienced multiple relapse episodes within a 12-month period (Stobaugh et al., 2017). An evaluation of the IMAM program within eight districts in Kenya reported a general relapse rate of 3.7% after management of MAM (UNICEF, 2012b; Akparibo et al., 2017). This recurrence was likely to occur from soon

after discharge as revealed in the Malawi study, where 12% of the children relapsed by the third month (Chang et al., 2013).

There being no sphere standard for relapse comparison (Sphere, 2011), the available studies portray a seemingly limited attention to the occurrence of relapse of acute malnutrition among children (UNICEF, 2012a). Despite the inadequacy, the available studies associate the phenomenon of relapse with geographical location, seasonal food insecurity, age as well as gender of the children (McCray, 2011; Chang et al., 2013; Stobaugh et al., 2017). Subsequently, there have been scarcities of research that relate time spent by children 6-23 months old beyond recovery from SFP with relapse of acute malnutrition.

2.8 Summary of the Literature Review Isolating the Gap

Indeed, early childhood nutrition is core to a healthier adulthood. The body of a child requires nutritive support to cater for the rapid growth and development, failure to which the body survives by slowing down growth characterized by stunting. Discharge from nutrition treatment programs should not liken to a complete well being of the child, as they continue to be at risk of infections in addition to repeated episodes of acute malnutrition. Unfortunately, little is known of the feeding practices and nutrition status of the children aged 6-23 months after SFP. Moreover, some available studies have inconsistent findings on how the diverse factors relate in line with change of living scenarios. This study added more knowledge on the feeding practices and nutrition status of children aged 6-23 months in the period following their discharge from SFP.

CHAPTER 3: MATERIALS AND METHODS

3.1 Research Design

A cross-sectional analytical study design was applied in the study of feeding practices and nutrition status among children aged 6-23 months discharged from SFP in Garbatulla Sub-County. The design provided an insight on the feeding practices and nutrition status among the young children at a point in time while allowing for hypothesis testing and relating variables.

3.2 Variables

3.2.1 Independent Variables

The independent variables encompassed demographic and socio-economic characteristics of the caregiver/mother, feeding practices (continued breastfeeding, dietary diversity, meal frequency and attainment of minimum acceptable diet), morbidity status and time spent after SFP discharge among children 6-23 months at the time of study.

3.2.2 Dependent Variable

The dependent variable in this study was nutrition status was assessed as wasting (acute malnutrition), stunting (chronic malnutrition) and underweight among the children 6-23 months after SFP discharge, which was determined through Z-score anthropometry.

3.3 Location of Study

This study was carried out in Garbatulla Sub-County (also known as Isiolo South Constituency) in Isiolo County (Appendix 8). The Sub-County was purposively selected

from the three Sub-Counties in Isiolo County (Merti, Garbatulla and Isiolo) because despite the gradual decrease in malnutrition level in the County, the severe acute malnutrition level in Garbatulla sub-County was reported to increase by 85.7% between 2012 and 2013 (Matheka et al., 2013). As well, the short rains assessment 2016 revealed there was increasing movement of livestock in search of pasture internally and influx from neighboring counties such as Garissa.

This, seemed to fuel border conflict due to the depletion of resources between the neighboring counties especially Garissa and Meru (KFSSG &CSG, 2016). Garbatulla Sub-County had three wards namely: Garbatulla, Kinna and Sericho served by a total 14 health facilities that supported IMAM with 9,818.90 sq. km area and a population of 43,118 (KNBS, 2009b; Directory for Kenya facilities). According to a SMART survey in May 2013 [as cited by Matheka et al., 2013] the GAM rate was 8.6%. Garbatulla Sub-County is an ASAL locale predominantly inhabited by the Borana community whose majority depended on pastoralism for their livelihood (Matheka et al., 2013).

3.4 Study Population

The study focused on children in the age group 6-23 months who were previously admitted through SFP and discharged to home as “cured”. Their mothers accompanied the children as the respondents in the study while the nutrition status of the children was assessed through anthropometry. The mothers who could not manage to get to their nearest health facility at the suggested dates were mobilized once more and asked for their more convenient time instead.

3.4.1 Inclusion Criteria

Children who were aged 6-23 months at the time of the study and were previously enrolled and discharged (as cured) to home through the SFP, were included in the study. They were residents of Garbatulla Sub-County whose parents assented to their participation in the study. Their mothers accompanied them to act as respondents (mother-child pairs).

3.4.2 Exclusion Criteria

Children who were aged between 6-23months at the time of study and were previously discharged as cured in the SFP registers but were still in the program as re-admissions were excluded from the sample.

3.5 Sample size Determination

The Fisher's equation $n = (z^2 \times pq)/d^2$ when N > 10,000 was applied whereby; ***n*** = desired sample size and ***z*** = standard normal deviate at required confidence level (1.96). ***P*** = proportion of children who were discharged as 'cured' from moderate acute malnutrition (cure rate is within >75% as per Kenya MoH, 2013) hence 75% or 0.75, ***q*** = (1-p) =25% or 0.25 and ***d*** = marginal error for degree of accuracy (95%) = 0.05.

$n=(1.96^2\times0.75\times0.25)/0.05^2$. $n= 288.12$

However, only Six hundred and thirty (630) children aged 6-59months were reported as admissions into the SFP in the 18 months between January 2013 to June 2014 (DHIS Garbatulla Sub-County). Therefore the equation $Nf=(n)/(1+n/N)$ was applied, as

suggested by Fisher for population below 10,000, whereby: ***Nf*** = sample estimate when population is <10,000 (≈198), ***n***= (288.12) and ***N***= estimate of the actual population. *Nf*=(288.12)/(1+288.12/630). *Nf*=197.7 ≈ 198 children.

According to the Multiple Indicator Cluster Survey conducted in 2008 within Isiolo County, the response rate in relation to the children below 5 years was about 98% (KNBS, 2009). Four (4) children (2% of 198) were thus added in case of non-response to achieve **sample size** = **202** children. During the study, **204** mother-child pairs participated in the study.

The achievement of this sample was attributed to the use of different strategies during the exercise. The study found it best to sample all the children from the 13 facilities SFP registers who fit the inclusion criteria, without limit of the calculated sample number per facility being that some fell short of the calculated minimum. The exercise necessitated the assistance of the facility based Community Health Workers (CHWs) to mobilize the mothers and their sampled children to the interview points. This eased the mobilization process as the community acknowledged them, as their representatives serving in their nearest health facilities.

Facilities with more sampled children mobilized a few numbers of the mothers at a time considering the number of interviews that could be conducted within a day, feasibly. Further, research assistants who took part were selected from each of the respective facility areas to administer the tools. All the 14 research assistants were independent of

the health facilities to enhance confidentiality of the interviews. Even though the data was collected once from the respondents, the period of data collection took 2 months to take into account the logistical aspects and availability of the mothers with their sampled children for the interviews.

3.6 Sampling Technique

The Isiolo County has three Sub-Counties that included Garbatulla, Merti and Isiolo (Matheka et al., 2013). Purposive sampling was used in selection of the Garbatulla Sub-County that had 14 health facilities with IMAM services. One of the facilities was purposively sampled for pretesting hence leaving 13 facilities for distribution of the sample size. The number was then assigned proportionately to each of the 13 IMAM health facilities within the Sub County with respect to each facility's proportion of calculated "cured" SFP exits. Individual children were purposively sampled, from the SFP registers, to ensure that only those who were exited as "cured" and were still within 6 and 23 months at the time of study were considered.

As the study commenced, it was noted that there were slightly fewer children that had been admitted into the SFP and therefore, fewer children who fit the criteria in a few facilities. Deficits in the minimum sample per facility were filled in by sampling all children that fit the criteria in each of the 13 SFP registers, despite the initial minimum sample size per facility and period of time since they were exited (Table 3:1). In addition, time-frame after exit from SFP was not used as the main criterion because it would further limit the sample size.

Table 3:1 Distribution of the proportionate sample size for the 13 health facilities

No	Facilities	New admissions (children 6-59 months) Jan 2013 –June 2014	75%(cure rate) of new admissions	Sample size achieved
	Garbatulla ward			
1	Muchuro	34	26	11
2	Malkadaka	16	12	5
3	Garbatulla	168	126	57
4	Gafarsa	9	7	3
	Kinna ward			
1	Barambate	30	23	10
2	Boji	17	13	5
3	Kinna	52	39	16
4	Kulamawe	45	34	14
5	Rhapsu	13	10	4
	Sericho ward			
1	Sericho	91	68	33
2	Modogashe	32	24	12
3	Iresaboru	74	56	28
4	Badana	16	12	6
	Cumulative Total	630	475	**204**

This sampling process to identify the children from the registers was conducted once for each facility. The CHWs were asked to mobilize the mother-child pairs of those sampled (children and their respective primary caregivers) to visit the facilities for the data collection exercise. The main health facilities and in each of the three wards (Garbatulla District hospital, Kinna and Sericho Health Centers) were sampled for the 3 FGDs due to their highest numbers of targeted mother-child pairs in each ward. This ensured that the mothers' experiences from across the wards were represented, as well, the numbers made it possible to sample randomly to achieve the FGD sample of 8-12 participants. Of the 10 remaining facilities, one in each ward was selected by use of simple random sampling for the 3 Key Informant Interview on the facility-based CHWs. Being facility-based, the

CHWs serve alongside the MoH staff in the management of acute malnutrition and could hence corroborate the caregiver responses for triangulation.

3.7 Data Collection Tools

A researcher-administered questionnaire was prepared using both closed ended and open-ended questions as it was used as the main tool. The anthropometry form (Appendix 2 Section D) was used to collect data on the child's weight and length, which were compared, to the WHO growth standards for 2006 for analysis and interpretation. The WHO (2010) initiated a questionnaire on IYCF recommended as flexible to different settings (Korir, 2014). This questionnaire, based on the 24-hour dietary recall (Appendix 2 Section E), was adapted and used to establish the feeding practices of the children aged 6-23 months in the study. In essence, the use of the 24-hour dietary recall is considered widespread in describing dietary practices among children (WHO, 2008). An FGD guide (Appendix 2 Instrument 2) constructed using open-ended questions was to elicit more information with the focus on caregivers' general concerns after SFP discharge, their sources of food for the children and coping mechanisms.

Mothers interviewed about their discharged children in the study were sampled randomly for an FGD at a date of their availability. The FGD guide (Appendix 2 Instrument 2) was utilized in this study to elicit more information from the mothers (primary caregivers) of the sampled children. Each FGD consisted 8-12 mothers and was conducted in each ward to be representative of the sub County. Key Informant interviews (KIIs) (Appendix 2 Instrument 3) were carried out on the facility-based CHWs who were found in three

health facilities (one in each ward). Their interviews aimed to uncover follow-up conducted after children are discharged from SFP, occurrence of relapse, the health seeking behaviors among those discharged, along with suggestions on what form of support should be given to those children after discharge from nutrition treatment programs. In essence, this was done to triangulate the information collected.

3.8 Data Collection Procedures

Thirteen research assistants were recruited from areas served by the 13 facilities that were visited for data collection. The process demanded they had completed their high school studies and were knowledgeable in data collection for surveys. All the successful assistants exhibited fluent speech in both English and Kiswahili. They were taken through a day's training on the use of the data collection tools and the consent forms, with role play exercises to familiarize with the tasks and uniformity of the process. The anthropometric measurements made use of calibrated Salter scales to take weight in kilograms (to the nearest 0.1kg) and standard length boards for length measurements (to the nearest 0.1cm). These equipments were available in each of the 13 facilities.

After their weights were taken, the a child length was read out and recorded when it was certain that the child's body lay flat of the length board. This exercise was carried out twice for each child and the average of the two figures taken to be final. All the anthropometric indices were then referenced against the WHO 2006 growth reference charts for Z-scores interpretation of the nutrition status. Even as the age of the children

was projected using the information from SFP registers at the health facilities, child health cards were also utilized for certainty.

Feeding practices were measured using 3 indicators; minimum meal frequency, minimum dietary diversity and minimum acceptable diet by means of the 24 hour dietary recall. The guidelines by WHO, 2010 guidelines on measuring the 3 indicators was utilized for analysis and interpretation. To attain minimum meal frequency, breastfed infants in age group 6 -8 months were to have received at least two meals whereas those breastfed 9-23 months three or more meals in the previous 24 hours. All non-breastfed infants, regardless of their age, were to have received at least 4 meals within 24 hours. The 7 food groups referenced (WHO, 2008) included grains, roots and tubers, legumes and nuts, dairy products, flesh foods, eggs, vitamin-A rich fruits and vegetables; other fruits and vegetables. Children who consumed at ≥ 4 groups regardless of their breastfeeding status were considered to have attained the minimum dietary diversity.

Further, breastfed children were regarded to have achieved minimum acceptable diet after having consumed at least the minimum number of food groups, as well as in the minimum number of meals for their age category. Non-breastfed infants must have consumed a combination of minimum meal frequency, minimum dietary diversity and milk feeds to have achieved minimum acceptable diet.

3.9 Pre-testing

The data collection tools were pretested on 10% of the total sample in Eldera health facility area, of Sericho ward, that was not included in the actual study. The area was selected for the exercise being that it hosted the two majority tribes in the area (both Boranas and Somalis) some of who had to cross a nearby river to access the facility. In essence, Eldera provided a better picture of the understanding of the tools across the two major tribes in the area in addition to approximate timing of the exercise including ease of getting the study population.

3.9.1 Validity

Two supervisors from the Kenyatta University reviewed them after which, adjustments were made to the tool. Further, the data collection tools were translated into Swahili to ease common understanding of the questions among the research assistants.

3.9.2 Reliability

The questionnaire was tested on a group of 20 mother-child pairs aged 6-23 months and internal consistency was determined using Cronbach's Alpha (α) test of reliability. The coefficient was 0.7 that was termed as acceptable (Cronbach et al., 2004).

3.10 Data Analysis

The coded data from the questionnaires was cleaned using the MicroSoft excel software before analysis. ENA for SMART 2011 computer package was used to analyze the anthropometric measurements that were interpreted using the WHO 2006 cut off points.

Indices (Weight for Age Z-scores, Length for Age Z-scores and Weight for Length Z-scores) that fell below -2SD up to -3SD Z score signified moderate underweight, stunting and wasting prevalence respectively while the severe under nutrition status were below -3SD Z score. SPSS version 17.0 was used to aid further cross analysis of the study variables after which, the data was presented in charts and tables.

Chi-square test was executed to determine relationships between categorical variables (occupation of the mother, marital status, breastfeeding status and attainment of minimum acceptable diet) and nutrition status (wasting, stunting and underweight) among the children. The Pearson product moment correlation was used to determine the relationship between non-categorical variables (household size, number of children in the household, mother's age, time beyond discharge, number of food groups and meals consumed (dietary diversity and meal frequency) in addition to nutrition status among the children. Statistical significance was established by use of a P-value of < 0.05. Information from FGDs and KIIs was transcribed to identify and compile common themes.

3.11 Logistical and Ethical Considerations

The study was approved by the Kenyatta University graduate school while the Ethical clearance was received from Kenyatta University Ethical Review Committee (KU-ERC) number PKU/354/I 328 (Appendix 3). The National Council for Science and Technology, Innovation (NACOSTI) was approached for the research permit (Appendix 4). Further authorization was given at the Isiolo County level offices of: the Commissioner,

Education and Public Health (Appendix 5-7). Support was sought from facility in-charges and nutritionists of respective sampled areas. Individual caregivers gave consent to their participation and assented to their children's' involvement in the study (Appendix 1). The MoH staff in charge of the health facility allowed the use of the available length boards and Salter scales for this study on site.

CHAPTER 4: RESULTS

4.1 Demographic and Socio-economic Characteristics among Caregivers

This section was sub-categorized as household characteristics, maternal characteristics and then child characteristics. The average household size was 6 members where each household had at least 2 children below five years old (Table 4:1).

4.1.1 Household Characteristics

Out of a total 204 interviews performed, almost all (90.2%) of the represented households were headed by men. Almost half (47.5%) of the household heads had not been through formal education with many families depending on small-scale businesses (47.0%) as on casual labor (46.1%) for their source of income (Table 4.1). Moreover, almost all households bought (90.2%) their food before waiting on donations (23.5%) or farming (7.3%) their produce as also revealed through the FGDs: *"We buy foods from shops. Some people have farms but they are not able to cultivate because of the children as much time is given to them. There is also no time for farming especially during the dry season"*. Another discussant stated, *"Yes there was a time food was not enough, when there was no specific aid from government or NGO's"*.

Household responsibilities were divided in a way that the fathers provided food in almost all households (85.3%) whilst having to make most of the income usage decisions (57.8%). On the other hand, the wives (92.6%) had the responsibility to decide the foods to be cooked in the households (Figure 4:1).

Table 4:1: Distribution of household members by demographic and socioeconomic characteristics

	n=204	Frequency	%
Household head	Male	184	90.2
	Female	20	9.8
Household size	2-4	36	17.6
	5-7	124	60.8
	≥ 8	44	21.6
	Mean (SD) 6.07±1.90		
No. of Children in the household	1-2	53	26.0
	3-4	94	46.1
	≥5	57	27.9
	Mean (SD) 3.53± 1.39		
No. of child under five	1	83	40.7
	2	106	52.0
	3	15	7.3
	Mean (SD) 1.67±0.61		
Occupation of household head	Small scale trading	91	44.6
	Casual labor	75	36.8
	Farmer	14	6.8
	Employed with salary	13	6.4
	Herding animals	11	5.4
Education level of household head	No formal education	97	47.5
	Primary	81	39.7
	Secondary	20	9.8
	Tertiary	6	2.9
Main source of family income	Small scale businesses	91	44.6
	Casual labor	75	36.8
	Sale of animals	25	12.3
	Formal employment	13	6.4
Household food source[1]	Farming	15	7.3
	Buying	184	90.2
	Food aid/donation	48	23.5

[1] Multiple responses allowed

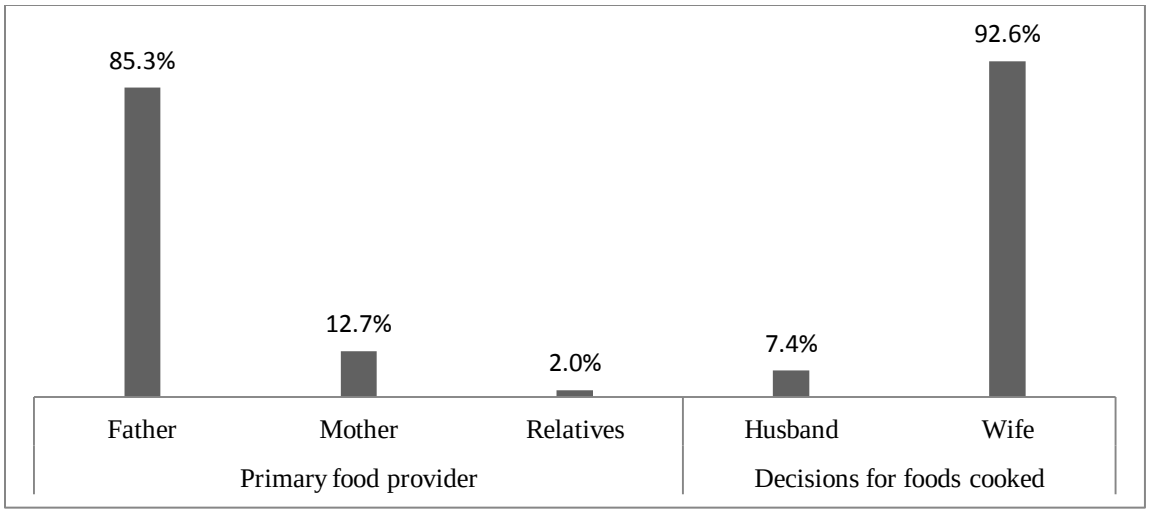

Figure 4.1: Primary food provider and decision maker in the household

4.1.2 Maternal Characteristics

The mean age of mothers was 28 years from a majority of the mothers (88.2%) who were married and homemakers (71.5%) (Table 4:2).

Table 4:2: Distribution of maternal age, marital status and occupation

Characteristic (n=204)	Category	Frequency	%
Age	15-24	33	16.2
	25-34	151	74.0
	35-44	20	9.8
	Mean (SD) 28.62±4.46		
Marital status	Married	180	88.2
	Separated	11	5.4
	Widowed	8	3.9
	Single	5	2.5
Occupation of the mother of child	Housewife	146	71.5
	Casual labor	53	26.0
	Employed with salary	4	2.0
	Small scale trading	1	0.5

4.1.3 Child Characteristics

Generally, the boys constituted 58% whilst the girls 42% of the total share. The age group was categorized as suggested by WHO (2010) on IYCF indicators for uniformity in data presentation. The mean age of the children's age was 17 months (Table 4:3).

Table 4:3: Distribution of age and sex of the study children

Age groups (months) (n=204)	**Girls**		**Boys**		**Total**	
	f	**%**	**f**	**%**	**f**	**%**
6-11	6	30.0	14	70.0	20	9.8
12-17	33	42.9	44	57.1	77	37.7
18-23	46	43.0	61	57.0	107	52.5
Total (6-23)	**85**	**41.7**	**119**	**58.3**	**204**	**100**
Mean (SD) 17.16±3.97 ≈ 17 months						

4.1.3.1 Time since Discharge from Supplementary Feeding Program

Most of the children had been at home one to five months since they were discharged as cured from the SFP. The average duration since they had been discharged was 5 months where the minimum and maximum were 1 and 14 months, respectively (Table 4:4)

Table 4:4: Distribution of time since the children were discharged

	(n=204)	**Frequency**	**% total**
Duration since discharge (months)	1 – 5	138	67.6
	6 – 10	54	26.5
	11 – 15	12	5.9
	Mean (SD) 4.75 ± 3.18 months ≈ 5 months		

The success of follow up after SFP discharge was highly dependent on the directive by the health care workers as was revealed through an FGD: *"The last day of discharge the*

nurse told me to come to the hospital after one month for follow up. I came to the hospital after that month. They measured my child and told me she was okay. From there no follow-up was done again".

4.2 Feeding Practices of Study Children after Supplementary Feeding Program Discharge

All the children in the study who were between 6 and 8 months had been received to solid, semi-solid or soft foods in the 24 hours leading to the study, otherwise referred to as complementary feeding. Continued breastfeeding at 1 year was recorded at 84.3% while that at 2 years, 28.8%.

4.2.1 Continued Breastfeeding Status of Study Children

More than half (58.8%) of the study children were still being breastfed at the time of the study, 95.0% of whom were within the 6-11 months age group. The number of the breastfed children reduced, as they grew older as seen the fewest children being breastfed being in the age group 18-23 months (Figure 4.2).

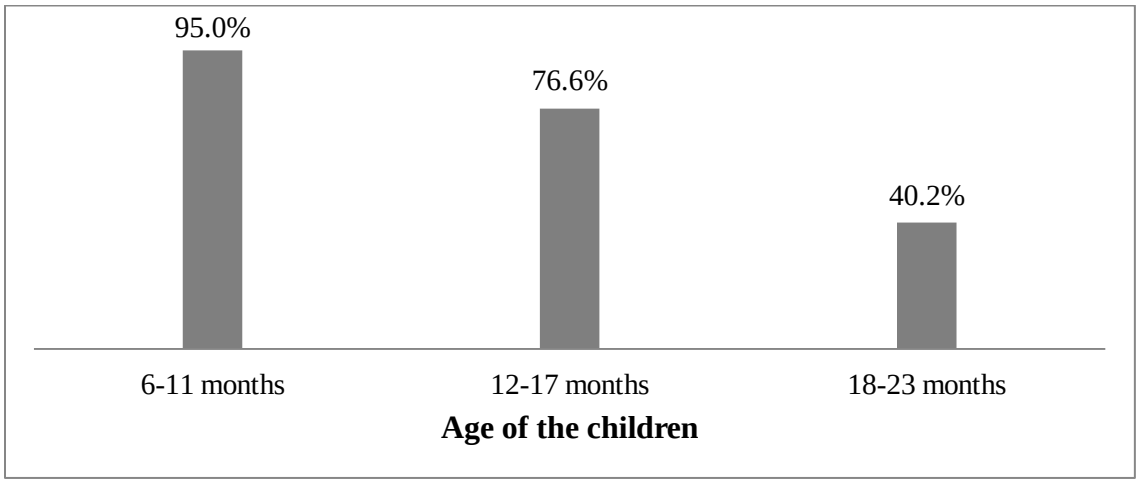

Figure 4.2: Proportion of study children by breastfeeding status

4.2.2 Meal Frequency

A majority of children (74.0%) were fed on solid, semi solid or soft foods 3 times in 24 hours before the study. The mean number of meals was 3 meals (2.94 ±0.54) (Table 4:5).

Table 4:5: Distribution of meals fed to the study children in the preceding 24 hours

No. of meals	Frequency (n=204)	%
1	1	0.5
2	32	15.7
3	151	74.0
4	19	9.3
5	1	0.5
Mean (SD)	2.94±0.54 ≈ 3 meals	

The FGDs with the mothers of the sampled children also revealed some coping strategies used during times of household food shortage*: "We reduce number of times we eat and go without food especially night meals (supper). We take tea only during the night". "We sometimes send our children to relatives to have lunch there therefore preserving food for the next day".*

4.2.3 Minimum Meal Frequency

The minimum number of meals for the breastfed children 6-8 months and 9-23 months was 2 and 3 meals respectively; whereas, the non-breastfed children 6-23 months were to have received 4 meals in 24 hours. The number of children who had received their recommended age group minimum declined steadily with their age. Additionally, few of the non-breastfeeding children met their minimum meal frequency (Table 4:6).

Table 4:6: Distribution of study children who met the minimum meal frequency in the preceding 24 hours

Number that met minimum meal frequency (n=204)	Frequency	% age group who met criteria
Breastfed children 6-8 months (n=6)	6	100
Breastfed children aged 9-23 months (n=114)	108	94.7
Non-breastfed aged 6-23 months (n=84)	8	9.5
Minimum meal frequency for breastfed 6-8 months is at least 2 meals Minimum meal frequency for breastfed 9-23 months is at least 3 meals Minimum meal frequency for non-breastfed 6-23 months is at least 4 meals		

4.2.4 Dietary Diversity

The mean dietary diversity score among the study children was 5 (4.73±0.84) where nearly all (99.0%) of the children were in the medium and high terciles (Table 4:7). More so, mothers in the FGDs revealed some of their challenges in using different foods on their children after SFP discharge to home, *"Since children enjoyed and loved the porridge and plumpynut they still need them. At home sometimes they do not take the food we give them".*

Table 4:7: Dietary diversity score of food groups consumed in the preceding 24 hours

Tercile (n=204)	Frequency	%
Lower ≤ 3	2	1.0
Medium 4-5	161	78.9
High ≥ 6	41	20.1
Total	**204**	**100.0**
Mean (SD) 4.73±0.84 ≈ 5 groups		

The most popular foods consumed by all of the children came from grains, roots and tubers 96.1%, dairy products (80.4%) and other fruits and vegetables (73.5%), which

were not red or yellow nor dark-green, respectively (Figure 4:3). Children who were fed using foods that were rich in iron or iron fortified were only 48.6%.

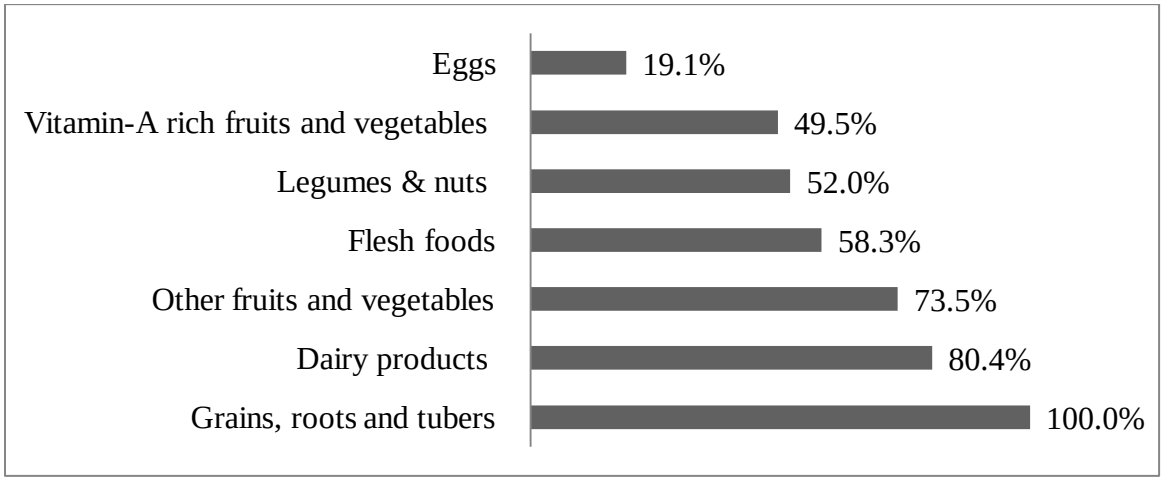

Figure 4.3: Food groups consumed by study children in the preceding 24 hours

Likewise, when asked on foods commonly given to children 6-23 months mothers in the FGDs mentioned porridge, rice, maize, tea, milk, *matoke*, beans, potatoes, fruits and vegetables. Besides, the residents face challenges in getting the food commodities from time to time as revealed in the FGDs with the mothers, *"Currently vegetables and fruits are not available in this area due to physical insecurity. Roads have been closed. There is no milk especially cow's milk due to drought. Packaged milk is expensive and some families cannot afford to buy".*

4.2.5 Minimum Dietary Diversity

This was assessed by the number of study children who were fed on 4≥ food groups out of 7 food groups (WHO, 2010). Barely 1% was not able to achieve the minimum dietary diversity all of whom belonged to the 18-23 months age group (Table 4:8).

Table 4:8: Distribution of study children who achieved the minimum dietary diversity on foods consumed in the previous 24 hours

Age group (n=204)	Frequency	% age group who met criteria
6-11 months n=20	20	100.0
12-17 months n=77	77	100.0
18-23 months n=107	105	98.1
Total (6-23 months) n=204	202	99.0

Minimum dietary diversity is the number of children who consumed at least 4≥ of 7 food groups

4.2.6 Minimum Acceptable Diet

Children who were fed on the recommended minimum number of meals for their age and minimum dietary diversity (including milk with feeds for the non-breastfed) were taken to have met the minimum acceptable diet. This ability decreased with the children's age whereas more breastfed children met their minimum acceptable diet than their non-breastfed counterparts did meet (Table 4:9).

Table 4:9: Distribution of study children who met the minimum acceptable diet based in the previous 24 hours

Age group (n=204)	Frequency	% age group who met criteria
6-11 months (20)	17	85.0
12-17 months (77)	51	66.2
18-23 months (107)	31	29.0
Total 6-23 months (204)	99	48.5
Total 6-23 months Breastfed (120)	75	62.5
Total 6-23 months Non-breastfed (84)	24	28.6

4.3 Nutrition Status of the Study Children

The mean (SD) of the z-scores for wasting, stunting and underweight were -0.82 ±1.55, -1.55±1.89 and -0.08±2.23 respectively. The prevalence of wasting (GAM), stunting and underweight were 14.7%, 33.8% and 19.1% in that order. At the time of the study, no bilaterally pitting oedema cases were found among the assessed children.

4.3.1 Acute Malnutrition (Wasting)

Acute malnutrition was presented as severe (SAM), moderate (MAM) and total wasted (GAM). More boys (17.6%) has low weight for their length (wasting) than girls (10.6%) at a significant p=0.021 (Table 4:10).

Table 4:10: Distribution of acute malnutrition (wasting) by sex and age of the study children

Nutrition status Wasting (WLZ)	**Boys (n=119)**		**Girls (n=85)**		**Total (n=204)**		**Chi-square P-value**
	f	**%**	**f**	**%**	**f**	**%**	
Severe wasted (SAM) < -3SD WLZ	5	4.2	1	1.2	6	2.9	
Moderate wasted (MAM) ≥-3SD to <-2SD WLZ	16	13.4	8	9.4	24	11.8	
Total wasted (GAM) <-2SD	**21**	**17.6**	**9**	**10.6**	**30**	**14.7**	χ^2= 6.32; df=1; p=0.021*****
Normal ≥ -2SD to <+2SD WLZ	72	60.5	55	64.7	127	62.3	
Over-nourished > +2SD	26	21.8	21	24.7	47	23.0	
Oedema present	0	0	0	0	0	0	
By age	**6-11 months**		**12-17 months**		**18-23 months**		
	f	**%**	**f**	**%**	**f**	**%**	
Severe wasted (SAM) < -3SD WLZ	0	0	2	2.6	4	3.7	
Moderate wasted (MAM) ≥-3SD to <-2SD WLZ	3	15.0	12	15.6	9	8.4	
Total wasted (GAM) <-2SD	**3**	**15.0**	**14**	**18.2**	**13**	**12.1**	

*****Means significant by chi-square test at p=<0.05

4.3.2 Chronic Malnutrition (Stunting)

More than half (66.2%) of all the children in the study had a normal length in relation to their age. More boys (41.2%) were significantly (p=0.002) short for their age than girls (23.5%) were while; stunting was highest in the age group 12-17 months (Table 4:11).

Table 4:11: Chronic malnutrition (stunting) by sex and age of the study children

Nutrition status stunted (LAZ)	**Boys (n=119)**		**Girls (n=85)**		**Total (n=204)**		**Chi-square P-value**
	f	**%**	**f**	**%**	**f**	**%**	
Severe stunted< -3SD LAZ	24	20.2	9	10.6	33	16.2	
Moderate stunted≥-3SD to <-2SD LAZ	25	21.0	11	12.9	36	17.6	
Total stunted<-2SD	**49**	**41.2**	**20**	**23.5**	**69**	**33.8**	χ^2= 4.63; df=1; p=0.002*
Normal ≥ -2SD to <+2SD LAZ	70	58.8	65	76.5	135	66.2	
By age	**6-11 months (n=20)**		**12-17 months (n=77)**		**18-23 months (n=107)**		
	f	**%**	**f**	**%**	**f**	**%**	
Severe stunted< -3SD LAZ	3	15.0	19	24.7	11	10.3	
Moderate stunted≥-3SD to <-2SD LAZ	4	20.0	17	22.1	15	14.0	
Total stunted<-2SD	**7**	**35.0**	**36**	**46.8**	**26**	**24.3**	

*****Means significant by Chi-square test; p=<0.05

4.3.3 Underweight

About 20.0% of all the children in the study had a low weight for their age with only 15.0% originating from the 6-11 months age group. There were significantly (p=0.036) more boys (23.5%) who were underweight than girls (12.9%) were. In addition, the age group 18-23 months had the majority of severely undernourished children (6.5%) of the featured groups (Table 4:12).

Table 4:12: Underweight by sex and age of the study children

Nutrition status Underweight (WAZ)	**Boys (n=119)**		**Girls (n=85)**		**Total (n=204)**		**Chi-square P-value**
	f	**%**	**f**	**%**	**f**	**%**	
Severe underweight < -3SD WAZ	5	4.2	3	3.5	8	3.9	
Moderate underweight≥-3SD to <-2SD WAZ	23	19.3	8	9.4	31	15.2	
Total underweight<-2SD	**28**	**23.5**	**11**	**12.9**	**39**	**19.1**	χ^2= 7.54; df=1; p=0.036*****
Normal ≥ -2SD to <+2SD WAZ	91	76.5	74	87.1	165	80.9	
By age	**6-11 months (n=20)**		**12-17 months (n=77)**		**18-23 months (n=107)**		
	f	**%**	**f**	**%**	**f**	**%**	
Severe underweight < -3SD WAZ	0	0	1	1.3	7	6.5	
Moderate underweight≥-3SD to <-2SD WAZ	3	15.0	16	20.8	12	11.2	
Total underweight<-2SD	**3**	**15.0**	**17**	**22.1**	**19**	**17.8**	

*****Means significant by chi-square test; p=<0.05

4.3.4 Under-nutrition by Demographic Characteristics, Feeding Practices and Time after discharge from Supplementary Feeding Program

Most of the children who presented with wasting had mothers who were either 35 years or beyond (20.0%) and had less than 3 meals (21.2%) in the preceding 24 hours. The levels of wasting increased steadily with the length of time taken since the children were discharged from the SFP (Table 4:13).

Table 4:13: Nutrition status by demographic characteristics, child feeding practices and duration of time after program exit

n=204		Wasting		Underweight		Stunting	
No. of children in the household (n)		**f**	**%**	**f**	**%**	**f**	**%**
≤ 2	53	4	7.5	3	5.7	18	34.0
3	53	10	18.9	14	26.4	28	52.8
4	41	7	17.1	10	24.4	10	24.4
≥5	57	9	15.8	12	21.1	13	22.8
Total	**204**	**30**	**14.7**	**39**	**19.1**	**69**	**33.8**
Age of the mother (n)		**f**	**%**	**f**	**%**	**f**	**%**
≤ 24	33	5	15.2	6	18.2	8	24.2
25-34	151	21	13.9	30	19.9	55	36.4
≥ 35	20	4	20.0	3	15.0	6	30.0
Total	**204**	**30**	**14.7**	**39**	**19.1**	**69**	**33.8**
Meal frequency (No. of meals) (n)		**f**	**%**	**f**	**%**	**f**	**%**
<3	33	7	21.2	9	27.2	13	39.4
3	151	19	12.6	26	15.9	49	32.5
>3	20	3	15.0	4	20.0	7	35.0
Total	**204**	**30**	**14.7**	**39**	**19.1**	**69**	**33.8**
Dietary diversity (No. of food-groups) (n)		**f**	**%**	**f**	**%**	**f**	**%**
≤4	102	15	14.7	23	22.5	42	41.2
5	65	10	15.4	9	13.8	15	23.1
≥6	37	5	13.5	7	18.9	12	32.4
Total	**204**	**30**	**14.7**	**39**	**19.1**	**69**	**33.8**
Time beyond SFP (n)		**f**	**%**	**f**	**%**	**f**	**%**
1 – 5	138	16	11.6	26	18.8	46	33.3
6 – 10	54	11	20.4	9	16.7	17	31.5
11 – 15	12	3	25.0	4	33.3	6	50.0
Total	**204**	**30**	**14.7**	**39**	**19.1**	**69**	**33.8**

4.4 Morbidity Status of the Study Children and Health Seeking Behavior

Most of the children had not been sick in the previous two weeks prior to the study (Table 4:14). Cough and fever were the most common symptoms reported while diarrhea (27.2%) and cough with difficult breathing (16.0%) had the least mention. All the

mothers whose children had been ill sort medical consultation, most of whom declared the health facility as their first point of contact.

Table 4:14: Morbidity status of study children and health seeking behavior

	f	%
Morbidity (n=204)		
Child sick	81	39.7
Symptom[1] (n=81)		
Diarrhea	22	27.2
Cough	51	63.0
Cough with difficult breathing	13	16.0
Fever	51	63.0
Duration of illness (n=81)		
<6 days	71	87.7
≥ 6 but ≤ 10days	10	12.3
Source of consultation (n=81)		
Health facility	79	98.8
Chemist	2	1.2

[1]Multiple answers allowed

4.5 Acute Malnutrition Relapse

Recurrence of acute malnutrition (denoted by wasting) was 14.7%. Information gathered from the FGDs showed the challenges faced in relation to the children's deterioration to malnutrition: *"Sometimes it becomes difficult to get some meals"*. Respondents of the KII corroborated this information: *"Some parents are telling us they do not have food to feed their children, so it is poverty that makes them to relapse"*. Nevertheless, some caregivers confessed through the FGDs that sometimes their children would refuse to feed even when there was food: *"Since children enjoyed and loved the porridge and plumpynut they still need them. At home sometimes they do not take the food we give them."* Some caregivers had received home visits as follow up by community health workers while

others had not benefitted from the service. To the caregivers who were visited after their children were discharged from the program, the FGDs participants revealed that they were advised by the CHWs to visit the health facility where the anthropometric measurements would be assessed: *''The last day of discharge the nurse told me to come to the hospital after one month for follow up. I came to the hospital after that month. They measured my child and told me she was okay. From there one no follow-up was done again''*.

4.6 Associations between Caregiver Demographic, Socio-economic Characteristics, Feeding Practices, Morbidity status and Nutrition Status

Chi-square and Pearson product moment correlation was the statistical test utilized in for associations between the study variables and nutrition status. The indicators of the children's nutrition status were assessed as wasting, underweight and stunting. The highlighted variables were only those that exhibited significant associations with any of the nutrition status indicators.

4.6.1 Demographic and Socio-economic Characteristics with Child Nutrition Status

The only caregiver characteristics that showed significant associations with nutrition status (wasting) were age of the mother and number of children in the household (Table 4:15).

Table 4:15: Association between caregiver demographic and socio-economic characteristics and nutrition status of the study children

Caregiver characteristic	Status	Pearson statistic (r)	p- value
Age of the mother	Wasting	- 0.352	0.030*****
	Stunting	0.081	0.248
	Underweight	- 0.103	0.142
No. of children in the household	Wasting	- 0.321	< 0.001*
	Stunting	0.130	0.064
	Underweight	- 0.118	0.093

*Means p is < 0.05; significant relationship using Pearson product moment correlation

The older the mother, the lower the Z scores (r= - 0.352; p= 0.030) where children from older mothers were more likely to be acutely malnourished. The more the children in the household, the lower the Z scores of the concerned child (r= - 0.321; p= < 0.001*).

4.6.2 Feeding Practices and Nutrition Status among Study Children

The infant and young feeding practices in the preceding 24 hours of this study were analyzed against wasting, stunting and underweight status of the children (Table 4:16).

Table 4:16: Relationship between number of meals, number of food groups consumed with nutrition status of the study children

Feeding practice	Status	Pearson test (r)	p- value
Meal frequency (No. of meals)	Wasting	0.53	0.038*****
	Stunting	0.08	0.123
	Underweight	0.19	0.121
Dietary diversity (No. of food groups)	Wasting	0.47	0.045*****
	Stunting	0.01	0.521
	Underweight	0.13	0.073

*****Means p is < 0.05; significant relationship using Pearson Product Moment Correlation

Meal frequency (number of meals), dietary diversity (number of food groups) and attainment of minimum acceptable diet were the significant feeding practices, in relation to nutrition status (wasting).

The higher the number of meals a child was given, the higher the Z scores (r=0.53; p=0.038). Likewise, the children who were fed from more food groups had higher Z scores meaning they had less malnutrition levels (r=0.47; p=0.045). Stunting and underweight did not exhibit significant relationships with meal frequency or dietary diversity. Consequently, most of the children who satisfied the minimum acceptable diet were not wasted (acute malnutrition) (χ^2; p=<0.001) (Table 4:17).

Table 4:17: Relationship between achievement of minimum acceptable diet and nutrition status of the study children

		Acceptable diet		Chi-square statistic		
		Met f(%)	**Not met f(%)**	χ^2	**df**	**p**
Wasting	**Yes**	9(8.8)	21(20.6)	45.71	1	< 0.001*****
	No	93(91.2)	81(79.4)			
Stunting	**Yes**	40(39.2)	29(28.4)	0.002	1	0.965
	No	62(60.8)	73(71.6)			
Underweight	**Yes**	31(30.4)	8(7.8)	0.12	1	0.625
	No	71(69.6)	94(92.2)			

*****Means p is < 0.05; therefore, significant relationship using Chi-square test

The children who met their recommended MAD were 1.32 times less likely to be wasted than those who did not meet the indicator (OR=1.32; p=0.035). Child-feeding practices are linked to nutrition status as revealed through the participants of FGDs: "*Our concern*

was fear of children going back to same situation as before or not progressing because they do not have enough food in the house". The respondents of the KIIs affirmed this caregivers concern: *"Some parents are telling us they do not have food to feed their children, so it is poverty that makes them to relapse"*. The feeding practices between the boys and the girls was further tested with regard to meeting the Minimum acceptable diet which, showed no significance (χ^2=0.084; p=0.848). Consequently, the occurrence of malnutrition amongst more boys is then attributed to high activity level as reported by the mothers in the FGDs. *"Even when you feed the boys and girls the same, these boys play a lot more that than their sisters to the point they do not seem to gain weight"*.

4.6.3 Morbidity status and Nutrition Status of Study Children

There was no significant relationship between morbidity in the previous 2 weeks and wasting, stunting or underweight (Table 4:18).

Table 4:18: Association between morbidity and nutrition status of the children

		Were sick	Were not sick	Chi-square Statistic
Wasting	**Yes**	13(43.3%)	17(56.7%)	χ^2= 2.483; df = 1; p = 0.115
	No	67(38.5%)	107(61.5%)	
Stunting	**Yes**	24(34.8%)	45(65.2%)	χ^2= 0.680; df = 1; p = 0.409
	No	57(82.6%)	78(17.4%)	
Underweight	**Yes**	17(43.6%)	22(56.4%)	χ^2= 0.63; df= 1; p= 0.427
	No	64(38.8%)	101(61.2%)	

4.6.4 Duration after discharge from Supplementary Feeding Program and Nutrition Status

Time after discharge had a significant negative relationship with wasting (r=- 0.25; p= <0.001*). The Pearson product moment correlation instigated that the longer the duration since a child had been discharged, the lower the Z scores (wasting) that translated to poorer nutrition status (Table 4:19).

Table 4:19: Relationship between duration of time post SFP discharge and nutrition status of the children

Characteristic	Status	Pearson statistic (r)	p- value
Time post SFP	Wasting	- 0.250	< 0.001*
	Stunting	- 0.214	0.086
	Underweight	0.080	0.253

*****Means p= < 0.05 therefore significant relationship using Pearson product moment correlation

CHAPTER 5: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Caregiver Demographic and Socio-economic Characteristics

Almost all mothers in the study were considered youthful by age and in a marital union. This is in line with other studies in Ethiopia (Gatahun et al, 2015), Nigeria (Akeredolu et al., 2014), Ghana (Konyole, 2014; Adokiya, 2010) and Kenya (Ng'aari, 2013; Kamau, 2014; Ndiku et al., 2010; Abuya et al., 2010; Muchina and Waithaka, 2010; KNBS et al., 2015). Further, the average household size in the study was higher (6.1) than the national average 4.4 for rural households (KNBS et al., 2015). This suggests that the represented households may have more strain on their resources especially given that; the bigger the household size the more food needs translating to more income required (Aidoo et al., 2013 in Ghana; Sakyi, 2012 in South Africa and Bashir et al., 2012) in Pakistan).

The findings of this study on maternal age and nutrition status of the children concurs with other Kenyan studies that reported significant negative associations (Abuya et al., 2010; Korir, 2014). This suggests that younger mothers are possibly more amenable to new information regarding health; therefore, better nutrition outcomes for their children than their older counterparts. Albeit higher household size than the national average (4.4) for the rural households (KNBS et al., 2015), it did not seem to relate significantly with the nutrition status. This could have meant that the nutrition status was considerably equal across the board maybe due to the possibility of relief or remittance from relatives even where children from large families were sometimes sent to relatives for food (revealed through the FGDs).

Besides, the significant relationship between number of children in the household with wasting and not stunting differed with study done in Nigeria by Lawam et al. (2014), which showed no significance with wasting, but significant with stunting . Aside from the geographical differences in the populations, the other possible reason for the discrepancy could have been that maybe not all the children in those households were from one mother. This variable should therefore be studied more before generalization to control for confounders especially age of the children.

Time had a rather important role to play in relation to child nutrition status where; children who had been discharged much earlier tended to have lower Z sores on wasting and underweight as in similar studies (McCray, 2011; Chang et al., 2013). In those studies, more children relapsed to moderate and severe acute malnutrition as the period of follow-up progressed. Reliance on relief (or aid) by the represented households concurs with the findings of the study on food security carried out by African women studied centre & KNBS (2014) in Isiolo County. Largely, the results on more women being the deciding party when it comes to food intake coincides with a comparative study carried out in Kenya, which realized the assumption by women on the role of ensuring the nutrition well being of their families (Pelto, & Armar-Klemesu (2015).

5.1.2 Feeding Practices of the Children

Children who exhibit the recommended breastfeeding and complementary feeding practices are less likely to experience under-nutrition (WHO & UNICEF, 2008). Unfortunately, the children's physiology only allows space for minimal food at a time

thus challenging this concept (Dewey & Vitta, 2013). It is thus crucial for them to be fed a number of times in a day with foods from different groups to meet their needs.

5.1.2.1 Minimum Dietary Diversity

The achievement of MDD in this study was much higher than that established in studies carried out in the Kenyan slum (Korir, 2014) and other ASAL areas (Kimiywe and Chege, 2015) in addition to the national figures (KNBS et al., 2015). This could be attributed to the area receiving government and NGO related aid consequently probably increasing the diversity (African Women's Studies Centre & KNBS, 2014). More specifically, grains, roots and tubers food group was the most consumed in the study while eggs seemed not to be as popular. The findings were similar to those found in studies conducted in Kenya (Kimiywe and Chege, 2014; Ndiku et al., 2010; Kamau, 2014; Korir, 2014), Ethiopia (Mesfin et al., 2015; Gatahun et al., 2015) and Ghana (Adokiya, 2010). Dairy products (mainly milk) consumption followed in popularity (also listed among foods used on children during the FGDs) that could be explained by the area being of a pastoralist community with livestock.

Even though the pastoralist community had readily available livestock, only a few children had been fed on flesh foods in the previous 24 hours as found by Kimiywe & Chege (2014) in Kitui. Besides, Vitamin-A rich fruits & vegetables was among the least consumed as found in other studies (Korir, 2014; Ndiku et al., 2010; Kimiywe and Chege, 2014; Gatahun et al, 2015). This could have been due to fruits seasonality and the reported insecurity (reported in one FGD) by the Isiolo-Meru border at the time, which

strained transport of produce. Similar tensions in the County were also captured in the national food security study by African women studies centre & KNBS (2014).

5.1.2.2 Minimum Meal Frequency

The 2015 long rains assessment took note of the austerity and high frequency, at which coping strategies were adopted towards frequent breaks in food consumption within the arid area (GoK, 2015). The average number of meals in this study (3) was lower than that of a study carried out in Kitui by Kimiywe and Chege (2015) in another ASAL region (4). This could have been attributed to this study area being in the former "northern frontier district" that was generally arid unlike Kitui, which is a semi-arid area with probable more favorable arable land (African Women's studies centre & KNBS, 2014).

The proportion of children in this study who met their recommended minimum meal frequency was as found in other studies in India (Parashar et al., 2015; Jain et al., 2014), Nepal (Joshi et al., 2012) and Kenya (Korir, 2014; Kimiywe and Chege, 2015). These studies looked into the complementary feeding practices among infant and young children and found that majority of the children in the studies attained their recommended minimum meal frequencies. Even so, the ability to meet the standard dwindled with age with less than half of those 18-23 months achieving it, which could be linked to the skipping meals and reducing amount of food prepared per day. The age group is also likely to have been fully incorporated to the family pot for their meals hence they would likely feed when the rest of the family had their meals. Concomitantly, it is expected that

the more meals taken would translate to more ability to meet energy needs (Kenya MoPHS, 2007).

5.1.2.3 Minimum Acceptable Diet

Food insecurity in Isiolo was reported as likely to increase between July and September because of the early start of the dry season, which led to faster depletion of rangeland resources (FEWS NET, July-Dec 2015). According to the 2015 long rains assessment, Isiolo had 62% of its population listed to already be in dire need of food assistance until early 2016 (GoK, 2015; African Women's Studies Centre & KNBS, 2014). These factors could explain why barely half of the children in the study received their minimum acceptable diet. This was higher than studies done by Korir (2014) and the national figures reported by KNBS et al. (2015). As the sphere emphasizes, children who meet their minimum acceptable diet are more likely to achieve adequately their nutrition needs (Sphere, 2011).

This was accurate for this study as well as other studies (Korir, 2014; Kimiywe and Chege, 2015) that showed a relationship between meeting minimum acceptable diet and nutrition status (wasting). Lawam et al. (2014) also found a relationship between infant feeding practices and wasting. A study by Ndanu (2013) found no significant association between meeting minimum acceptable diet and wasting among the children with incarcerated mothers. This could have been because of different living conditions of the study respondents that would have induced varying challenges affecting nutrition status of children.

5.1.3 Nutrition Status of the Children Aged 6-23 months after Discharge from Supplementary Feeding Program

The prevalence of wasting (14.7%), stunting (33.8%) and underweight (19.1%) were above that reported in the KDHS 2014 (KNBS et al., 2015), where wasting, stunting and underweight for children 6-59 months were 4.0%, 26.0% and 11.0% respectively. The difference could have mainly been in the difference in age categories used. Moreover, WHO (1995) classifies the wasting level (14.7%) as "critical" while stunting (33.8%) as "high" and underweight (19.1%) as "medium" [as cited by WHO, 2010b]. This categorization could be attributed to the geographical area being an arid zone (Ombati et al., 2015); where many residents seem to depend on aid for food needs, in addition to the sense of food insecurity as depicted by the stringent coping strategies such as: skipping meals and reducing amount per meal that may affect adequacy.

Really, children in Isiolo County were already experiencing heightened risk of acute malnutrition by August same year (GoK, 2015). More boys were undernourished than girls according to all the studied nutrition status indicators (wasting, stunting and wasting) as found by Katepa-Bwalya et al. (2015) in a similar study. In this study, the lack of significant relationship in feeding (according to MAD) and gender of the children attributes the difference to boys being more active in play than girls. The trend in stunting coincides with findings in a study done in Nairobi by Muchina and Waithaka (2010) where, stunting rises between 7 and 12 months and drops towards 2 years. As well, that of underweight matches Korir (2014) finding which was highest at 12-17 months.

5.1.4 Morbidity Status, relapse rate and Nutrition Status of the Children

Most of the children had not been ill as in other similar study in Zambia that compared 2 districts in IYCF practices and nutrition status (Katepa-Bwalya et al., 2015). Cough and fever being the most common symptoms were typical of the arid area just before the rains where sand storms and malaria characteristic fever are common. Even though some children had been ill within the 2 weeks preceding the study, this variable did not seem to way in heavily on the nutrition status (wasting, stunting and underweight) of the children. This finding differed with Ndanu, 2013 study among children with incarcerated mothers in Kenyan prison that found a significant relationship with underweight.

Recurrence of acute malnutrition (denoted as wasting) was considered to be high (14.7%) even though the comparison WHO cut offs are not available for relapse. The longer the time since discharge, the more the children were likely to be malnourished. This tallies with longitudinal studies done in Malawi by Chang et al. (2013) and Mc Cray (2011) on relapse after nutrition treatment. Even though Mc Cray found girls and younger age being more predisposed to relapse of malnutrition, this study found more boys and to have relapsed than girls. The older the child grew towards 2 years the more likely they were to have a recurrence of acute malnutrition. More research should therefore be done to understand child characteristics in relation to their health and nutrition. The relapse in the study area may have been likely to result from the area's reported food insecurity, reliance of purchase of food and aid as well as area insecurity.

5.1.6 Summary of Study Findings

1. The indicators for nutrition status (wasting, stunting and underweight) among the study children were considered high in comparison to WHO categorization (WHO, 1995).
2. Maternal age was inversely associated with nutrition status where children of younger mothers had less wasting levels than their counterparts with older mothers were. In addition, the longer a child had spent since successful SFP discharge to home, the more he was likely to have relapsed into acute malnutrition.
3. Mothers rely on directive from healthcare workers to visit facility with their children for follow up after SFP discharge.
4. Although many children satisfactorily attained dietary diversity at the time of this study whereas, the continued breastfeeding at 2 years and meal frequency fell short of the expectation of WHO (2010). As well, the older a child got the less likely he/she was to attain those recommended feeding practices.
5. Even so, attainment of minimum acceptable diet was significantly related to nutrition status (wasting) of children.
6. Morbidity did not seem to impose on nutrition status of the study children significantly.

5.2 Conclusions

In the context of Isiolo County, maternal age should not be disregarded where nutrition status of the children is in question. As revealed through the study, younger mothers seem to have better-nourished children. Being that maternal age was the only significant caregiver characteristic, the null hypothesis that stated, "There was no significant association between demographic and socio-economic characteristics of the caregivers and nutrition status among children 6-23 months after discharge from SFP in Isiolo County", remained inconclusive. This may require more studies to look into other caregiver demographic and socioeconomic aspects that may be linked to nutrition status of children after program exit, for a conclusion to be made.

Infant and child feeding practices were still below the WHO standard guidelines whereby older children were less able to adopt the practices. In the face of good dietary diversity, the reported meal frequency was average and likened to the infrequent food availability in the area. This puts emphasis on the importance of food security in maintenance of child nutritional status. Overall, attainment of minimum acceptable diet was key for better nutrition status (based on wasting) and consequently; the null hypothesis, "There was no significant relationship between feeding practices and nutrition status of children 6-23 months after discharge from SFP in Isiolo County", was rejected.

Based on the findings of this study, the nutrition status of children 6-23 months post SFP discharge was of apprehension where the prevalence of the indicators (wasting, stunting and underweight) among the study children were higher than the WHO acceptable values

(WHO, 1995). Additionally, follow-up on the children's nutrition status by the mothers is highly dependent on healthcare worker instruction, after discharge, without which it becomes inconsistent. Time beyond discharge made the difference in the levels of under-nutrition (based on wasting) experienced by the children. Therefore, the null hypothesis that read, "There was no significant relationship between periods of time spent beyond discharge from SFP and nutrition status of the children 6-23 months in Isiolo County", was rejected.

The study failed to reject the null hypothesis "morbidity was not significantly associated with nutrition status among children 6-23 months after discharge from SFP in Isiolo County". The findings suggest that there could be other ideas surrounding morbidity that relate to nutrition status aside from merely being sick that could be explored through a prospective study on a similar population.

5.3 Recommendations

5.3.1 For Policy and Practice

1. The government should come up with strategies to ensure that children discharged from nutrition treatment programs are followed up periodically and their nutrition stratus documented to enhance timely identification of possible relapse cases.
2. There is need to emphasize on breastfeeding until a child attains 2 years or beyond to enhance attainment of minimum acceptable diet among children below 2 years, even after malnutrition treatment. The community strategy personnel

could ensure the support of these caregivers in partnership with the County nutritionist and MoH.

5.3.2 For Further Research

1. This study was based on a 24-hour dietary recall during a dry weather spell with the focus on meal frequency, dietary diversity and acceptable diet, the indicators of feeding practices. There is therefore, need to conduct a similar study in a different timeline and with the focus on caloric adequacy of the diet and food frequencies in the same study area.
2. This study looked at retrospective timelines since SFP discharge as proxy for relapse of malnutrition in early life. It would be beneficial to have similar studies that follow up similar target population from the time of SFP discharge to establish actual timelines of relapse and possible causes. The longitudinal study should purpose to identify predictors of relapse of childhood under nutrition for programming already in place, incorporating identified factors to minimize adverse effects of malnutrition.

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APPENDICES

APPENDIX 1: INTRODUCTORY NOTE AND INFORMED CONSENT

FEEDING PRACTICES AND NUTRITION STATUS AMONG CHILDREN AGED 6-23 MONTHS FOLLOWING SUPPLEMENTARY FEEDING PROGRAM DISCHARGE IN ISIOLO COUNTY, KENYA

Hello, my name is Jacqueline Macharia, a postgraduate student at Kenyatta University school of Public Health. As part of the academic requirements, I am conducting a study to establish the feeding practices and nutrition status among children aged 6-23 months after discharge from SFP. The findings will present a better understanding of the nutrition related issues surrounding children after successful treatment from malnutrition.

Procedures: You will be requested to visit the health facility that treated your child for malnutrition where you will find my research team. My research team will ask you (the parent) some questions and take your child's weight and length measurements. This information will be written in a coded questionnaire without names or any of your personal identification. You will be referred for treatment if your child is moderately or severely malnourished. You might also be asked to take part in a group discussion with other caregivers of children like yours on general health of the community and this information will be written in a notebook. The entire process could take at least an hour.

Risks and benefits: The study carries no specific risks other than asking you to share your views on the health of the children. There is no financial or other personal benefit from participating in this study. It is however hoped that this will be an opportunity to look into ways to progress existing interventions for improved health of these young children.

Voluntary participation: Your participation in this study is voluntary and at any point during the interview, you are free to decline without any consequences.

Reward: If you agree to take part, you will not receive any form of reward nor will you be asked to pay anything for your participation.

Confidentiality: The interviews will be conducted in a private setting within the clinic you will be asked to visit. The responses you give throughout the interview will remain

confidential and will only used for the sole purpose of this study. If results of this study are published or presented, individual names and other personally identifiable information will not be used.

Contact information: If you have any questions or concerns about the study, you may contact Dr. Kimani on 0725552475 or Dr. Mbithe on 0728379785 or the Kenyatta University Ethical Review Committee secretariat on chairman.kuerc@ku.ac.ke or secretary.kuerc@ku.ac.ke or ercku2008@gmail.com.

Participant statement: I have understood the above information concerning my participation in the study. I choose to participate in this study voluntarily knowing that my personal information will be treated with the confidentiality it deserves. I have been given a chance to ask questions which have been answered to my satisfaction. My thumbprint or signature below indicates my consent.

Thumbprint or signature ———————— **Date** ————————

Investigator's statement: I, the undersigned, have explained to the volunteer in a language she/he understands the procedures to be followed in the study and the risks and benefits involved.

Name of interviewer ———————— Signature ————Date ————————

APPENDIX 2: DATA COLLECTION TOOLS/INSTRUMENTS

INSTRUMENT 1: STRUCTURED QUESTIONNAIRE

FEEEDING PRACTICES AND NUTRITION STATUS AMONG CHILDREN AGED 6-23 MONTHS FOLLOWING SUPPLEMENTARY FEEDING PROGRAM DISCHARGE IN ISIOLO COUNTY, KENYA

SECTION A: ADMINISTRATIVE DETAILS

Facility name: ……..	Questionnaire number: ……..
Interviewer name: ……..	Name of questionnaire reviewer: ……..
Date of interview: ……..	Date of questionnaire review: ……..

SECTION B: DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

(Instructions on how to record answers). Circle the number corresponding to the response that the mother/primary caregiver provides. Record the appropriate responses in the areas where choices have not been given. All "Any other" responses should be specified. ***[****Weka mviringo kwa nambari inayoambatana na jibu la mama au mlezi mkuu. Andika majibu yanayosemwa pasipo na mfano wa majibu. Fafanua majibu yote yaliyo kati ya "ingine yoyote"****]****.*

	Question ***(Swali)***	**Answers** ***(Majibu)***	**Choices** ***(Jawabu)***
B1	Sex of the household head *(Maumbile ya mwenye boma)*	Male *(Mwanamume)* Female *(Mwanamke)*	1 2
B2	Age of the mother *(Umri wa mama)*	…… Years *(Miaka)*	
B3	Marital status *(Hali ya ndoa)*	Single Married Separated Widowed	1 2 3 4
B4	Occupation of the household head (skip to B6 if the mother is the household head). *(Kazi anayofanya mweye boma. Ruka maswali hadi B6 kama mama ndiye mwenye boma)*	Not employed *(Hafanyi kazi)* Employed with salary *(Ameajiriwa na malipo mwisho wa mwezi)* Casual labour *(Vibarua)* Small scale trading *(Biashara*	1 2 3 4 5

		ndogo) Any other-specify *(Ingine yoyote-fafanua)*	
B5	Occupation of the mother *(kazi anayofanya mama)*	Housewife *(Mke nyumbani)* Employed with salary *(Ameajiriwa na malipo mwisho wa mwezi)* Casual labour *(Vibarua)* Small scale trading *(Biashara ndogo)* Any other-specify *(Ingine yoyote-fafanua)*	1 2 3 4 5
B6	Education level of the household head *(Kiwango cha masomo alichofika mweye boma)*	No education *(Hakusoma)* Primary *(Masomo ya msingi)* Secondary *(Masomo ya upili)* Tertiary *(Chuo kikuu au Masomo ya ziada)*	1 2 3 4
B7	Household size (people who normally eat from the same pot). *(Ukubwa wa boma. Ni watu wangapi hula kutoka nyungu moja?)*	…….. people *(watu)*	
B8	How many children do you have? *(Una watoto wangapi?)*	…….. children *(watoto)*	
B9	How many children are below 5 years of age? *(Ni watoto wangapi walio chini ya miaka mitano?)*	……children *(watoto)*	
B10	Main source of family income. *(Mapato makuu ya familia hutoka wapi?)*	Formal employment *(Kuajiriwa rasmi)* Casual labour *(vibarua)* Small scale business *(Biashara ndogo)* Any other-specify *(Ingine yoyote-fafanua)*	1 2 3 4
B11	How is food obtained in the family? Probe for all responses. *(Mnapata chakula cha familia vipi?)Ulizia majibu zote.*	Farming *(Kulima)* Buying *(Kununua)* Food aid or donation *(Usaidizi)* Any other-specify *(Ingine yoyote-fafanua)*	1 2 3 4

B12	Who has the primary responsibility for providing food for the household? *(Nani analo jukumu kuu la kutafutia boma chakula?)*	Father *(Baba)* Mother *(Mama)* Grandparent *(Nyanya au babu)* Relatives *(familia)* Any other –specify *(Ingine yoyote-fafanua)*	1 2 3 4 5
B13	What is the estimated percentage of household income that is allocated to food? *(Ni kiwango gani cha mapato ya boma kinachotumiwa kwa chakula?)*	Largest percentage *(Kiwango cha juu)* Medium percentage *(Kiwango cha kati)* Smallest percentage *(Kiwango kidogo)* No specific allocation *(Hakuna kiwango maalum)*	1 2 3 4
B14	Who usually decides how family income is used? *(Kwa kawaida ni nani huamua vile mapato ya familia itatumika?)*	Husband/partner *(Mume)* Wife/mother *(Mke/mama)* Any other- specify *(Ingine yoyote-fafanua)*	1 2 3
B15	Who usually decides the foods to be cooked each day in the household? *(Kwa kawaida ni nani huamua chakula kitakachopikwa kila siku kwa boma?)*	Husband/partner *(Mume)* Wife/mother *(Mke/mama)* Any other- specify *(Ingine yoyote-fafanua)*	1 2 3

SECTION C: CHILD'S INFORMATION

	Question *(Swali)*	**Response *(Jibu)***	**Choices *(Jawabu)***
C1	Child's name (this NAME is to be used in the questions that follow). *(Jina la mtoto. Hili JINA litumiwe katika kuuliza maswali yatakofuata)*	……	
C2	Sex of the child *(Maumbile ya mtoto)*	Male *(Mvulana)* Female *(Msichana)*	1 2
C3	Child's age (months). Please confirm age using the mother child booklet, if not available, probe using memorable dates until mother provides the most accurate answer. *(Umri wa mtoto ukitumia miezi. Tafadhali angalia*		

	kitabu cha mtoto cha kliniki, kama hakiko, uliza mama ukitumia tarehe zilizo na kumbukumbu hadi akupe umri ulio sawa)	…….
C4	How long since discharge from SFP. Please confirm from the SFP register.*(Muda aliokaa nyumbani baada ya kumaliza matibabu ya SFP. Tafadhali angalia kitabu cha SFP).*	……months *(Miezi)*

SECTION D: CHILD'S ANTHROPOMETRY

	Measurement	First reading	Second reading	Average
D1	**Weight** (to the nearest 0.1 Kgs)	……Kgs	……Kgs	……Kgs
D2	**Length** (to the nearest 0.1 Cms)	……Cms	……Cms	……Cms
D3	**Oedema**	Present……	Absent……	

SECTION E: FEEDING PRACTICES

No.	Questions	Coding categories
E1	Has **(NAME)** ever been breastfed? ***(JINA)*** *amewahi nyonyeshwa?)*	Yes *(Ndio)*……1 No *(Hapana)*……2 Don't know *(Sijui)*…98
E2	Was **(NAME)** breastfed yesterday during the day or at night? ***(JINA)*** *alinyonyeshwa jana aitha mchana ama usiku?)*	Yes *(Ndio)*……1 No *(Hapana)*……2 Don't know *(Sijui)*…98
E3	Are you still breastfeeding **(NAME)**? *(Bado unamnyonyesha* ***(JINA)****?*	Yes *(Ndio)*……1 No *(Hapana)*……2
E4	If No, how old was the child when you stopped breastfeeding? *(Kama hapana, uliwacha kumnyonyesha akiwa na umri upi?*	…….months *(miezi)*

E5 Ask: Please describe everything that (NAME) ate yesterday during the day or night, whether at home or outside the home. ***(Uliza: Tafadhali nieleze kila chakula (JINA) alikula jana mchana ama usiku, akiwa nyumbani au kwingine.)***

Start from when **(NAME)** woke up yesterday up to the time **(NAME)** went to sleep at night. As the respondent mentions the foods, please <u>underline</u> each of them in the list below. *(Anza kutoka wakati* ***(JINA)*** *aliamka asubuhi, mpaka wakati* ***(JINA)*** *alipokwenda kulala usiku. Vyakula ambavyo atakueleza, <u>piga mstari</u> chini ya vyakula kwenye orodha uliyopewa).*

Keep asking for "anything else" per the times **(NAME)** was fed, until the respondent replies with "nothing else". *(Kila baada ya kuelezwa **(JINA)** alichokula kwa wakati, uliza kama kuna "kitu kingine" hadi atakapokueleza "hakuna kitu kingine").*

If respondent mentions foods that present as mixed dish, ask of the ingredients and "anything else" until she says "nothing else". Foods used in small amounts or as condiments include them in the condiments food group. (Akitaja vyakula ambavyo ni vya mchanganyiko, uliza aeleze vitu vile vilikuwa kwa mchanganyiko huo na kama kuna"kitu kingine" *hadi atakapokueleza "hakuna kitu kingine". Vyakula vilivyotuimka kwa kiwango cha chini mno viweke kwenye kikundi cha "condiments").*

Once the respondent has said everything she remembers, circle "1" on the row where a food was underlined. Then, read each food group on the row where "1" was not circled in the list and ask if **(NAME)** ate any of them yesterday during day or night. Circle "1" if Yes, "2" if No and "98" if Don't know. *(Akishasema kila kitu anachokumbuka, weka mviringo kwa "1" mahali kuna chakula ulipiga mstari. Kisha, soma vyakula vilivyo kwenye mstari ambayo haina mviringo na uulize kama (JINA) alivikula jana mchana au usiku. Weka mviringo kwa "1" kama Ndiyo, "2" kama Hapana na "98 kama Hajui).*

			Yes	No	Don't know
A	Porridge, bread, rice, noodles, or other foods made from grains	A..	1	2	98
B	Pumpkin, carrots, sweet potatoes that are yellow or orange inside	B..	1	2	98
C	White potatoes, white yams, cassava, or any other foods made from roots	C..	1	2	98
D	Any dark green leafy vegetables	D..	1	2	98
E	Ripe mangoes, ripe pawpaw, watermelon and other yellow and red fruits	E..	1	2	98
F	Any other fruits or vegetables	F..	1	2	98
G	Liver, kidney, heart, or other organ meats	G..	1	2	98
H	Any meat, such as beef, lamb, goat, chicken, or camel	H..	1	2	98
I	Eggs	I..	1	2	98
J	Fresh or dried fish, shellfish, or seafood	J..	1	2	98
K	Any foods made from beans, peas, lentils, nuts, or seeds	K..	1	2	98
L	Cheese, yogurt, or other milk products	L..	1	2	98
M	Any oil, fats, or butter, or foods made with any of these	M.	1	2	98
N	Any sugary foods such as chocolates, sweets, pastries, cakes, or biscuits	N..	1	2	98
O	Condiments added for flavor such as chilies, spices and herbs.	O..	1	2	98
P	Insects such as termites	P..	1	2	98
Q	Foods made with red palm oil, red palm nut, or red palm	Q..	1	2	98

nut pulp sauce
R Other foods

E6 How many times did (***NAME***) eat solid, semi-solid, or soft foods other than liquids yesterday during the day or at night?

Number of times…….

Don't know…….98

SECTION G: MORBIDITY STATUS AND HEALTH SEEKING BEHAVIOR

	Question	Response	Choices	Skip
G1	Did **(NAME)** become sick in the previous 2 weeks? ***(JINA)*** *aligonjeka katika wiki mbili zilizopita)?*	Yes *(Ndiyo)*	1 →	Continue to **G2** *(Endelea **G2**)*
		No *(Hapana)*	2 →	End the interview *(Malizia hapa)*
G2	If yes, for how many days was **(NAME)** sick? *(Kama Ndiyo **(JINA)** aliugua kwa muda gani)?*	……..		
G3	Please describe the symptoms **(NAME)** had. *(Tafadhali elezea dalili **(JINA)** alizoonyesha).*	Diarrhea *(Kuhara)*	1	
		Cough *(Kukohoa)*	2	
		Cough, difficult breathing and short rapid breaths *(Kukohoa na kupumua haraka na kwa shida)*	3	
		Fever *(Joto mwilini)*	4	
		Any other- specify *(Ingine yoyote fafanua)*		
G4	Did you seek advice concerning the sickness? *(Ulitafuta mawaidha kuhusu kugojeka kwake)?*	Yes *(Ndiyo)*	1 →	Continue to **G5**
		No *(Hapana)*	2 →	Go to **G6** (Enda swali **G6**)
G5	If yes, where did you go for the first consultation? *(Kama Ndiyo, ulitafuta mawaidha ya kwanza*	Health facility *(Hospitali)*	1	
		Traditional healer *(Daktari wa miti shamba)*	2	

	kutoka wapi)?	Chemist *(Duka la dawa)*	3
		Friend/Family *(Rafiki au jamaa)*	4
		Any other –specify *(Ingine yoyote-fafanua)*	5
G6	If no, why did you not seek advice? *(Kama Hapana, kwa nini hukutafuta mawaidha)?*	……	
		……	
		……	
		……	

INSTRUMENT 2: FOCUS GROUP DISCUSSION GUIDE

FEEEDING PRACTICES AND NUTRITION STATUS AMONG CHILDREN AGED 6-23 MONTHS FOLLOWING SUPPLEMENTARY FEEDING PROGRAM DISCHARGE IN ISIOLO COUNTY, KENYA

1. What are the foods commonly given to children 6-23 months in this Garbatulla area? *(Kwa kawaida, ni chakula gani watoto walio kati ya miezi 6 na 23 hupatiwa hapa Garbatulla?)*
2. In your community, are there any differences between the girls and the boys in terms of food and feeding? If yes, what differences? *(Katika kijiji chenu, kuna tofauti gani katikati ya watoto wasichana and wavulana kuchusu chakula na wanavyolishwa?)*
3. What are the main sources of food in this Garbatulla area? *(Mara nyingi, nyinyi hutoa chakula wapi?)*
4. In the previous year, have there been times you faced food shortages? If yes, how did you cope in terms of feeding? *(Katika mwaka uliopita, kulikuwa na upungufu wa chakula? Kama ndiyo, mlipambana ki vipi?)*
5. What were your concerns following your children recovery from the acute malnutrition and discharge? Ask more if the response given includes the health and feeding of the child. Ask if it is different for boys and girls *(Ni mambo yapi mlikuwa mnahofia baada ya watoto wenu kupona na kumaliza matibabu ya lishe bora?Ulizia zaidi kama katika majibu kuna hofu kuhusu afya na lishe.Ulizia zaidi kama kuzo hizo tofauti motto akiwa msichana au mvulana)*
6. Since discharge, have you received any form of follow up? How many say yes they received? How was it done? What would you recommend to enhance follow-up? *(Tangu kumalizia matibabu hayo ya lishe, hali ya lishe ya mtoto ilipata kufuatiliwa kwa njia yoyote ile?Wangapi walipata kufuatiliwa? Nini ilitendeka wakati wa kufwatiliwa? Ni mawaidha gani mgepeana ili kuendeleza jinsi hali ya watoto inafuatiliwa baada ya haya matibabu?)*
7. In your opinion, what should be done to enhance the nutritional status of these children after discharge? *(Kwa maoni yenu nyote, ni nini inapaswa kufanywa ili kuendeleza lishe bora kwa hawa watoto baada ya kumaliza matibabu ya lishe bora?)*

INSTRUMENT 3: KEY INFORMANT INTERVIEW GUIDE

FEEEDING PRACTICES AND NUTRITION STATUS AMONG CHILDREN AGED 6-23 MONTHS FOLLOWING SUPPLEMENTARY FEEDING PROGRAM DISCHARGE IN ISIOLO COUNTY, KENYA

1. Once the children 6-23 months are discharged from SFP, do their caregivers visit the health facility? If so, how often? *(Baada ya watoto walio kati ya miezi 6 na 23 kumaliza matibabu ya SFP, walezi wao huwarudisha hospitalini? Kama ndiyo, kila baada ya muda gani?)*
2. Who does the follow up after the children are discharged from SFP? If the CHW, how often do you do so? *(Ni nani ambaye hufuatilia hawa watoto baada ya kumaliza matibabu ya lishe ya SFP? Kama ni CHW, mnawafuatilia kila baada ya muda gani?)*
3. How long does it take these children to relapse after discharge? In your own opinion, what makes them to relapse? *(Inawachukua muda gani kwa hawa watoto kurudi katika hali ile ile waliyotibiwa?Kwa maoni yako ni nini ambayo inawasababisha kurudi katika hali hiyo?)*
4. In your own opinion, what should be done to enhance the nutritional status of these children even after discharge from SFP? *(Kwa maoni yako, ni nini inapaswa kufanywa ili kuendeleza hali ya lishe bora kwa hawa watoto, hata baada ya SFP?)*

APPENDIX 3: ETHICAL CLEARANCE

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Email: chairman.kuerc@ku.ac.ke
secretary.kuerc@ku.ac.ke
ercku2008@gmail.com
Website: www.ku.ac.ke

P. O. Box 43844 - 00100 Nairobi
Tel: 8710901/12
Fax: 8711242/8711575

Our Ref: KU/R/COMM/51/522

Date: 19th August, 2015

Macharia Jacqueline Wairimu
Kenyatta University,
P.O Box 43844, Nairobi

Dear Wairimu

RE APPLICATION NUMBER PKU/354/I 328– "NUTRITIONAL STATUS AND ITS DETERMINANTS AMONG CHILDREN AGED 6-23 MONTHS FOLLOWING SUPPLEMENTARY FEEDING PROGRAM DISCHARGE IN ISIOLO COUNTY, KENYA – VERSION 2

1. IDENTIFICATION OF PROTOCOL
The application before the committee is with a research topic **"Nutritional Status and its Determinants among children aged 6-23 months following supplementary feeding program discharge in Isiolo County, Kenya"** – **Version 2** dated 16th August, 2015.

2. APPLICANT
Macharia Jacqueline Wairimu, Department of Community Health

3. STUDY SITE
Isiolo County, Kenya.

4. DECISION
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines **AND APPROVED that the research may proceed for a period of ONE year from 19th August, 2015.**

5. ADVICE/CONDITIONS
i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

KENYATTA UNIVERSITY OFFICE OF THE CHAIRMAN ETHICS REVIEW COMMITTEE P.O. BOX 43844

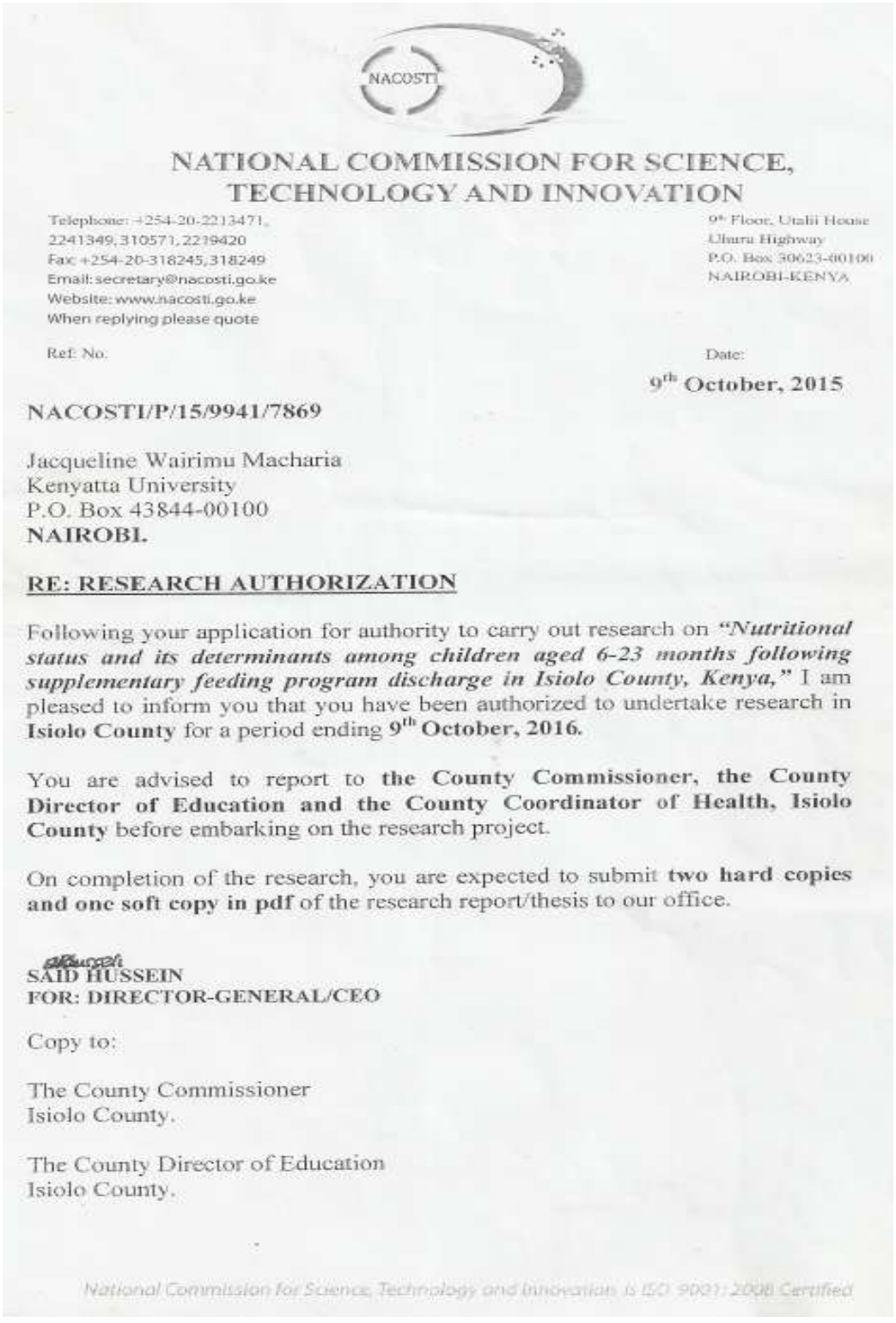
PROF. NICHOLAS K. GIKONYO
CHAIRMAN ETHICS REVIEW COMMITTEE

I JACQUELINE MACHARIA accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of 24/8/15 2015.

cc. Vice-Chancellor

APPENDIX 4: NACOSTI RESEARCH AUTHORIZATION



NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. NACOSTI/P/15/9941/7869

Date: 9th October, 2015

Jacqueline Wairimu Macharia
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Nutritional status and its determinants among children aged 6-23 months following supplementary feeding program discharge in Isiolo County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Isiolo County** for a period ending **9th October, 2016.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Coordinator of Health, Isiolo County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

SAID HUSSEIN
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Isiolo County.

The County Director of Education
Isiolo County.

National Commission for Science, Technology and Innovation is ISO 9001:2008 Certified

APPENDIX 5: COUNTY COMMISSIONER CLEARANCE

THE PRESIDENCY
MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL GOVERNMENT

Telegrams 'DISTRICTER' Isiolo
Telephone: Isiolo 064-52011.
isiolocc@yahoo.com
Fax :064- 52160
When replying please quote

Ref: No. ADM/15/19/VOL.III/77

and dates

OFFICE OF COUNTY COMMISSIONER
P.O. BOX 3-60300
ISIOLO.

14th October, 2015

Jacqueline Wairimu Macharia
Kenyatta University
P.O. Box43844-00100
NAIROBI

RESEARCH AUTHORIZATION

The above mentioned person is a student from Kenyatta University.

She is carrying out a research on "Nutritional status and its determinants amount children aged 6 - 23months following supplementary feeding program discharge in Isiolo County.

Any assistance accorded to her will be highly appreciated.

COUNTY COMMISSIONER
ISIOLO COUNTY
P. O. Box 3 - 60300
ISIOLO

KIPCHUMBA RUTTO
FOR: COUNTY COMMISSIONER
ISIOLO COUNTY

APPENDIX 6: COUNTY EDUCATION CLEARANCE

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

Telegrams 'EDUCATION' Isiolo
Telephone: 064-52049/52069
Email: isiolocde2@gmail.com

County Education Office,
P.O. Box 56 - 60300,
ISIOLO.

When Replying Please quote

REF:ISL/CTY EDU/MISC/3/VOL.I/80

Date: 14st October, 2015

JACQUELINE WAIRIMU MACHARIA
KENYATTA UNIVERSITY,
P.O. BOX 43844 - 00100,
NAIROBI.

RE: RESEARCH AUTHORITY GRANTED

Following your application for authority to research on **"Nutritional status and its determinants among children aged 6 - 23 months following supplementary feeding programm discharge in Isiolo County, Kenya" in Garbatulla Sub-County** vide Ref.NACOSTI/ P/15/9941/7869 dated 9th October 2015 for a period ending 9th October 2016, I am pleased to inform you that authority is hereby granted to you.

On completion of the research, you are required to submit a **hard** and **soft** copy in pdf of the research report/thesis to this office.

GITONGA A. NDEKE
For: COUNTY DIRECTOR OF EDUCATION
ISIOLO.

Copy to:

County Commissioner,
ISIOLO.

APPENDIX 7: COUNTY PUBLIC HEALTH CLEARANCE

ISIOLO COUNTY GOVERNMENT
DEPARTMENT HEALTH SERVICES

When replying lease quote

E-Mail gurachasarite@gmail.com

COUNTY PUBLIC HEALTH OFFICE
P. O. BOX 673 -60300
ISIOLO

Ref. No.IC/CPHO/G.1VOL.I/39

14th October 2015

TO WHOM IT MAY CONCERN

RESEARCH AUTHORIZATION
JACQUELINE WAIRIMU MACHARIA

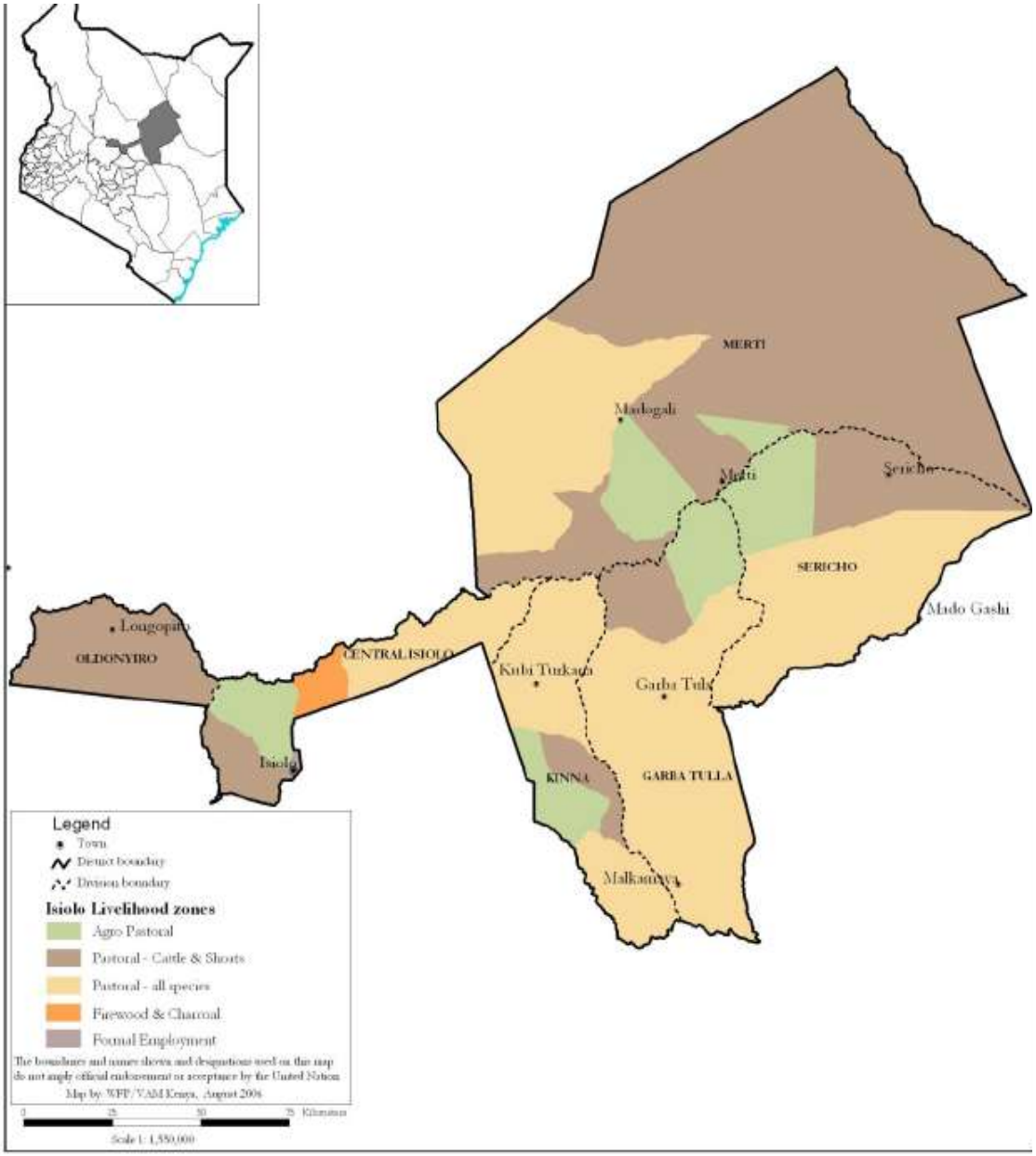
The above named is a student from Kenyatta University taking Master of Public Health.

She is carrying out a research on "Nutritional status and its determinants among children aged 6-23 months following supplementary feeding program discharge in Isiolo County" (Garbatulla Sub County) for the period ending 9th October 2016 as requested in the letter Ref. NACOSTI/P/15/9941/7869.

Any assistance accorded to her is highly appreciated.

SIAD GUYO
FOR: COUNTY PUBLIC HEALTH OFFICER
ISIOLO COUNTY

APPENDIX 8: MAP OF STUDY SITE



Source: *Isiolo County Long rains 2013 assessment report 29th July-2nd August 2013*