FACTORS ASSOCIATED WITH NUTRITIONAL REHABILITATIVE EFFECTIVNESS OF CORN SOY BLEND IN CHILDREN AGED 6 – 36 MONTHS AT MUKURU, NAIROBI

BY

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DECLARATION

I, Juliet Onyuma Omolo, hereby declare that this dissertation is my original work and has not been presented for a degree in any other university.

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To the Almighty God,

My loving husband Gospel Oluoch Omanya,

My devoted sons Immanuel Opiyo, Gideon Odongo and Benjamin Oluoch

My loving parents Flora and John Omolo

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS

ACC/SCN	Administrative Committee on Coordination/ Standing Committee on Nutrition
ARI	Acute Respiratory Infection
CDF	Constituency Development Fund
CHW	Community Health Worker
CSB	Corn Soy Blend
FAO	Food and Agriculture Organisation
FBF	Fortified Blended Flours
FGD	Focus Group Discussion
FNB	Food and Nutrition Bulletin
FSNAU	Food Security and Nutrition Analysis Unit
GB	Great Britain
HAZ	Height for Age z scores
IRIN	Integrated Regional Information Networks
IYCF	Infant and Young Child Feeding
KCal	Kilo Calories
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
MAM	Moderate Acute Malnutrition
MOMS	Ministry of Medical Services
MOPHS	Ministry of Public Health Services
MUAC	Mid- Upper Arm Circumference
OVC	Orphaned and Vulnerable Children

RDA	Recommended Dietary Allowance
RUTF	Ready to Use Therapeutic Food
SFP	Supplementary Feeding Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WAZ	Weight for Age z scores
WFP	World Food Programme
WHO	World Health Organisation
WHZ	Weight for Height z scores

OPERATIONAL DEFINITION OF TERMS

Acute malnutrition: Malnutrition that is characterized by recent and rapid weight loss; it can be categorized as severe acute or moderate acute depending on the severity of weight loss and wasting

Caregivers: Persons who provide care to children at home setting, includes the mothers, relatives and househelps

Complementary feeding: Any food, whether manufactured or locally prepared, suitable as a complement to breast milk or to a breast-milk substitute, when either becomes insufficient to satisfy the nutritional requirements of the infant.

Corn Soy Blend: A fortified flour that comprises maize and soya flour with appropriate composition to be used in a feeding programme

Disability life adjusted years: a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death.

Dry supplementary feeding: a take home ration of fortified flour to be prepared for children at home in a supplementary feeding programme

Fortification: The addition of one or more essential nutrients to a food, whether or not it is normally contained in the food, for the purpose of preventing or correcting a demonstrated deficiency of one or more nutrients in the population or specific population groups.

Infant and young child feeding: Recommended standards for child feeding frequency, quality and quantity

Malnutrition: A condition in the body caused by deficiencies, excesses or imbalances of energy, protein, mineral and vitamin nutrients

Moderately acute malnutrition: Children with moderate wasting, having low weight-for-height indices that lie between –3 and –2 z-scores

Nutritional status: A measurement of the extent to which an individual's physiological needs for nutrients are being met

Nutritional rehabilitative effectiveness: A measurement of progress in a child's nutritional status, 3 weeks or more after admission to the supplementary feeding programme

Recovery rate: Proportion of children recovering from moderate acute malnutrition

Recommended dietary allowance: The average daily dietary nutrient and calorie intake level required to maintain good health

Supplementary feeding: Provision of nutritious food for purposes of rehabilitating malnourished persons, preventing deterioration and mortality

Weight gain: Increase in weight in grams or amount of weight gained while in the feeding programme

Wet supplementary feeding: Porridge prepared from fortified flour and is consumed onsite by children at the supplementary feeding programme centre

ABSTRACT

Child malnutrition is the underlying cause of 3.5 millions of deaths in young children under five years of age in developing countries. Progress in addressing this through improved feeding of children has been insufficient. One way of addressing malnutrition is through supplementation with nutrient rich foods. This study determined the level and factors associated with rehabilitative effectiveness of corn soy blend in children aged 6 - 36 months in a supplementary feeding programme based at Mary Immaculate Nutrition Centre, Mukuru, Nairobi.

The study conducted, between September 2011 to April 2012, applied two phases; i) a cross sectional study with an analytical approach of the household demographic and socio economic characteristics, food security and health factors, utilization and compliance to the use of corn soy blend by mothers/caretakers, dietary intake and morbidity experience of the children and ii) a retrospective study on weight gain, length of stay in the programme as compared to the recommended performance indicators. A total of 150 children participated in the cross sectional study through exhaustive sampling. Mothers of the children were interviewed using a pretested semi structured questionnaire to obtain information on the children and their households. Eleven mothers were interviewed using a focus group discussion guide, and 5 key informants were interviewed to obtain data on their experience and perceptions related to the feeding programme. Data for 153 children was collected from records of children in the feeding programme in the previous one year upto October 10th 2011, for the retrospective study. Data was coded, entered and analyzed using means and standard deviation for continuous data, proportions and frequency

distributions for categorical data. T test, analysis of variance, correlations and Chi – square were used to test for significant differences and associations between group characteristics at p values < 0.05 and generalized linear model regression was used for inferential statistics.

Most of the mothers were of primary level education (57.7%) and not employed (61.7%) in any income generating activity. Stunting, underweight and wasting were very high in the study children at admission and after three weeks in the programme at 48%, 39% and 22% respectively. However, the mean z scores for stunting, underweight and wasting increased significantly by 0.68, 0.59 and 0.23 respectively after 3 weeks in the programme. Nevertheless, the mean daily weight gain was lower than 5g at 1.65g/kg body weight and mean length of stay was longer than the recommended 4 weeks at 12 weeks. This may be attributed to diet inadequacy of the children, not using CSB flour as recommended by 54.5% of the mothers and missing supplementary feeding programme (SFP) sessions or illnesses. Though CSB contributed 33 -55% of Kilo calories, Iron, Vitamin A and Zinc, only half of the children (54%) had consumed a diet that was adequate in KCalories, 91% in protein, 80% in Vitamin A, while no child consumed a diet adequate in bio available iron and zinc. The study established that almost half of the respondents missed the SFP sessions at least once in the previous month. Most of the children (73%) had experienced an ailment in the previous 2 weeks. The factors associated with dietary intake were distance to water source (r=-0.170, p=0.039), household size (r=-0.234, p=0.004), marital status (χ^2=11.218, p=0.016), and gender of the household head (χ^2=5.875, p=0.047). The factors associated with the child's progress in the SFP were the employment status of the mother and length of stay of the child in the programme (Fishers Exact Test =11.389,

p=0.020); employment status and change in WHZ (χ^2=3.335, p=0.05) and WAZ scores (χ^2=5.041, p=0.025); person who fed the child and change in WAZ (Fishers Exact Test =12.034, p=0.021)and WHZ scores (Fishers Exact Test =8.296, p=0.027). The lack of association or correlation between dietary intake of energy and Vitamin A and child nutritional status except for protein intake that was significantly associated with change in HAZ scores, is attributed to low and inadequate intake of energy, protein, iron and zinc in the diets of the study children. Length of stay, household dietary diversity and occupation of the mother had significant effects on change in WHZ scores (χ^2=4.979, p=0.026), (χ^2=3.853, p=0.05) (χ^2=9.512, p=0.002) respectively. While length of stay had significant effects on change in HAZ scores (χ^2=9.182, p=0.002).

The study concludes that employment status (whether a mother is employed or not) and household dietary diversity are important for progress of a child who is wasted in a SFP. The duration of stay of a child in a SFP is also important for the child's progress with respect to stunting and wasting. Smaller, male headed and monogamous households are significantly associated with high dietary diversity. High dietary plant proteins and CSB significantly impact stunting positively but not wasting and underweight, while a diet of low to average energy, vitamin A, iron and zinc, despite the contribution of CSB supplement has no significant effect on progress of children who are wasted, stunted or underweight. It is recommended that nutrition education and other interventions for the mothers whose children are in a SFP, should emphasize on the importance of household dietary diversity for the child's nutritional progress and the importance of the mother's presence in caring and feeding the child.

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND INFORMATION

1.1.1 MALNUTRITION AND ITS CONSEQUENCES

In developing countries, maternal and child under nutrition is the underlying cause of more than one-third (3.5 million) of all child deaths under the age of 5 years (Black et al, 2008) and disease in children. Malnutrition is defined as the state when the body does not have enough of the required nutrients i.e under nutrition or has an excess of the required nutrient, i.e over nutrition (MOMS and MOPHS, 2009). Under nutrition encompasses stunting, wasting, and deficiencies of essential vitamins and minerals, collectively referred to as micronutrients. Under nutrition is an important determinant of maternal and child health The immediate cause of under nutrition is a poor dietary intake that may not provide sufficient nutrients for the body, and/or common infectious diseases, such as diarrhea (Black et al, 2008) as a consequence of inadequate household food insecurity, care for the mother and child, health services and unhealthy environment. These arise from basic causes; namely lack of human and environmental resources, non supportive economic systems and political and ideological factors as outlined in the UNICEF conceptual framework (Figure 1) (UNICEF, 2007).

In young children during the period when complementary foods (foods other than breast milk) should be introduced to supplement breast feeding, the prevalence of malnutrition increases substantially in many countries because of increased infections and poor feeding practices. Poor complementary feeding practices and low-quality complementary

foods are significant causes of growth faltering and child mortality throughout the developing world (Ickes et al, 2010).

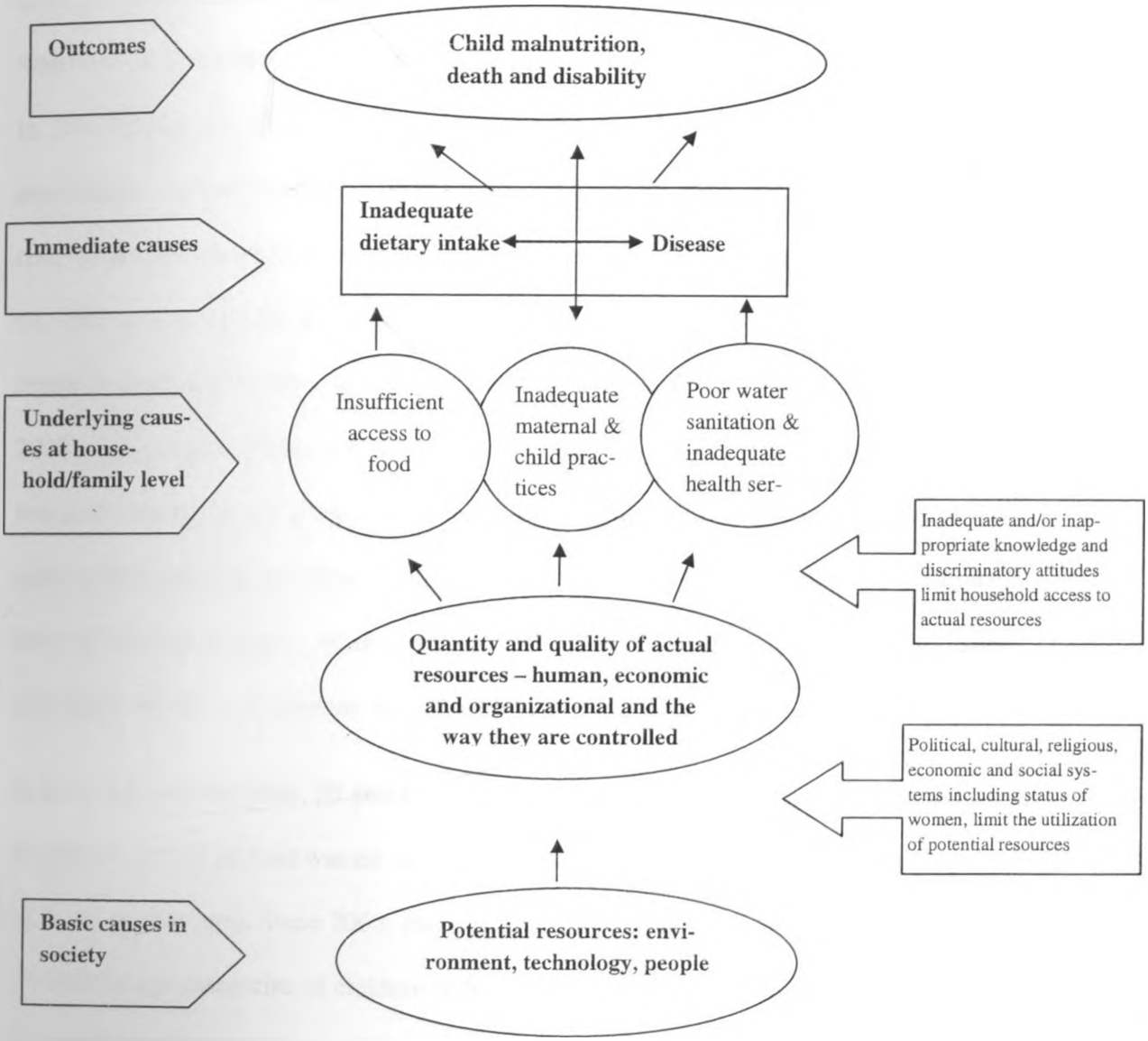

Figure 1: UNICEF conceptual framework for analyzing the causes of malnutrition
Source: UNICEF, 2007

Under nutrition is manifested as intrauterine growth restriction resulting in low birth weight; underweight which is low weight-for-age; stunting, a chronic restriction of

growth in height indicated by a low height-for-age; wasting, an acute weight loss indicated by a low weight-for-height; and less visible micronutrient deficiencies (Black et al, 2008). Global estimates indicate that 55 million (10%) children under 5 years are wasted, while for all developing countries, an estimated 178 million (32%) were stunted and 20% in low-income and middle-income countries were underweight in 2005. The highest prevalence of severe wasting in children was found in south-central Asia and middle Africa; of 40 countries with a child stunting prevalence of 40% or more, 23% were in Africa, 16% in Asia, and one% in Latin America. The highest prevalence of underweight was found in south central Asia and eastern Africa at 33% and 28% respectively (Black et al, 2008). Sub-Saharan Africa has not reduced stunting since mid 1990s. The trend of prevalence of stunting in pre-school children in Asia, Latin America and the Caribbean indicates a decrease with the years unlike in Africa. The East African region has the highest level of stunting in Africa, where stunting is increasing at 0.08 % annually This translates into larger numbers of children stunted each year.

In Kenya at national level, 35 percent of children under five years of age are stunted (low height-for-age), 7 percent wasted (low weight-for-height) and 16 percent are underweight (low weight-for-age). Since 2003, stunting levels increased in the 6- 11 months and 48 – 59 months age categories of children in Kenya (KNBS and ORC Macro, 2010). Analysis by various age groups shows that stunting is highest (46 percent) in children aged 12-23 months and lowest (11 percent) in children age less than 6 months. A higher proportion of male children (37%) are stunted than female (33%). In Nairobi province since 2003, stunting increased by 4 percentage points. Nationally the proportion of children who are wasted has not changed much since 2000. Similarly the proportion of underweight chil-

dren has not changed much nationally. However although Nairobi has the lowest level at 6% it has doubled since 2003 (KNBS and ORC Macro, 2010).

The effect of child malnutrition if not addressed before a child is 2 years old leads to irreversible impairment of cognitive development and stunting. If stunting is not addressed through each generation it can become cyclic. The level of stunting has been used to indicate the economic potential of a country where increasing levels denote a decline in economic potential due to the negative effects on the human resource (Victora et al, 2008). Healthy birthweight and weight-for-age are associated with higher economic productivity, but the best determinant of future capital is a child's height-for-age at 2 years old (Victora et al, 2008). The Lancet Child Development Series recognized three nutritional problems; iron deficiency, iodine deficiency and stunting that limit children's ability to reach their developmental potentials (Lancet, 2008). In Kenya, children under 3 years have the highest prevalence of anemia, and this has been classified as a nationwide public health concern of a scale sufficient to impede socioeconomic growth (Lungaho and Glahn, 2009).

1.1.2 INFANT AND YOUNG CHILD FEEDING IN KENYA

Child malnutrition persists in Kenya the face of known recommendations and interventions to remedy this. Key indicators on Infant and Young Child Feeding (IYCF) have been on the decline for the past two decades in Kenya (Table 1) and poor breastfeeding and infant feeding practices have contributed to more than 10,000 deaths per year (MOPHS, 2007). The IYCF outlines recommended standards for child feeding frequency, quality and quantity. These standards encompass initiation of breastfeeding within an

hour of birth, exclusive breastfeeding for the first six months,feeding frequency of 2 -4 meals a day for children aged aged 6 -23 months (WHO, 2008), feeding of foods adequate in energy and nutrient density, safe preparation and storage of complementary foods, continued breastfeeding for at least 2 years and feeding of safely prepared and nutritious foods from six months onwards (MOPHS, 2007).

Table 1: Key indicators of breastfeeding and complementary feeding in Kenya

Practices	1998 KDHS	2003 KDHS	2008-2009 KDHS*
Initiation of breastfeeding % of babies fed within one hour of birth	58%	52%	58%
Exclusive breastfeeding 1% of babies 6 months of age exclusively breastfed in the last 24 hours	3.5%	2.6%	-
Duration of breastfeeding Median duration in months of breastfeeding of children under three years of age	21 months	20 months	21 months
Bottle feeding % of breastfed babies 0 to < 12 months of age fed from bottles in the last 24 hours	17.7%	27.6%	-
Complementary feeding % of breastfed babies 6 to < 10 or 7 < 10 months of age who received complementary foods in the last 24 hours	94.8%	84.2%	83%

Source: MOPHS, 2007; * KNBS and ORC Macro, 2010

Only 39 percent of all children aged 6 -23 months are fed in accordance with Infant and Young Child Feeding (IYCF) practices (KNBS and ORC Macro, 2010). Exclusive breastfeeding rates at 6 months are less than 3 percent (MOPHS, 2007) while complementary feeding (introduction of other foods in addition to breast milk) for children begins as early as 2 months of age when a child should be exclusively breastfeeding (KNBS and ORC Macro, 2010). These complementary foods are low in energy and micronutri-

ents and coupled with unhygienic preparation and storage conditions predispose many infants to diarrhea and inadequate diets. There is also widespread promotion and use of inappropriately constituted cereal and legume mixes (MOPHS, 2007).

Children may become malnourished due to sudden recent changes termed acute malnutrition or due to long term food deficiency termed chronic malnutrition. Acute malnutrition can be categorized as severe acute or moderate acute depending on the severity of weight loss and wasting. Supplementary feeding programmes (SFP) are used to rehabilitate moderate acute malnutrition (MAM) in children while severely acute malnourished children receive therapeutic care. SFPs are implemented when there are large numbers of malnourished individuals indicating a prevalence of 10 -14 % acute malnutrition (UNHCR and WFP, 1999). SFPs contribute to reduce the level of malnutrition, otherwise vast populations will continue to be affected, leading to an increase in disease burden and the use of economic resources. This may have been the case in Kenya that led the government to introduce SFPs in urban slums. The level of malnutrition, specifically stunting in Makadara district, Nairobi was found to be high at 39% (Concern Worldwide, 2009). Poverty and high food prices seemed to be the contributing factors as families lack income to purchase sufficient food to meet the dietary requirements of household members (Oxfam GB et al, 2009).

1.1.3 SUPPLEMENTARY FEEDING AT MUKURU PROMOTION CENTRE, NAIROBI

Mukuru Promotion Centre (MPC) is an organization that has been operating since 1985 in Mukuru slums under the leadership of Sisters of Mercy. It supports the Mukuru community which comprises about 20 villages, in health and development activities as fol-

lows; provides early childhood education, primary and secondary education, rehabilitates boy street children, provides youth skills training, adult education, and runs the Mary Immaculate Clinic which provides general health services including voluntary counseling and testing for HIV and nutrition. The Mary Immaculate Nutrition Centre is a unit located next to the clinic and is run by MPC in collaboration with Hope for the Sick and Poor of the Slovak Mission from the Slovak Republic. The goal of the centre is to prevent malnutrition in children and to manage malnourished children from the Mukuru community. The centre carries out nutrition and health education, anthropometric assessment of children, community outreach, provides nutritional supplements and refers malnourished children to the clinic for deworming and curative treatment. The centre implements SFP for moderately acute malnourished (MAM) and Out Patient Therapeutic Programme (OTP) for severely acute malnourished children (SAM) involving approximately 300 children. Malnourished children are identified through active case finding, referral from the Mukuru clinic and other clinics or agencies and self referral by a few mothers. Active case finding occurs when Community Health Workers (CHWs) and Program staff identify the children from the Mukuru community during bi -month community mobilization, subsequently referring them to the centre. The malnourished are also referred from Mary Immaculate and other clinics like the South B clinic that conduct growth monitoring and offer curative services. Self referral occurs when mothers come to the clinic on their own initiative. As from October 2010 the Ministry of Public Health and Sanitation, Makadara district has been supporting the centre's SFP and OTP. In the SFP, the centre implements a dry feeding programme whereby mothers receive a porridge flour ration to prepare at home for the moderately malnourished children.

1.2 PROBLEM STATEMENT

Supplementary feeding programmes (SFP) are introduced when it has been ascertained that a population has high levels of malnutrition cases (Sphere, 2009). SFPs use fortified blended flours such as corn soy blend to address child malnutrition. However studies are lacking that provide evidence on the performance of supplementary feeding programmes (Navaro- Colorado et al, 2008). Also the available scientific evidence on the efficacy and effectiveness of fortified flours for improving the nutritional status of vulnerable populations is very limited and weak (Pérez-Expósito and Klein, 2009). Various factors have been found in different countries and settings to affect nutrition rehabilitation and children may stay in the programme as long as 4 months before they recover as opposed to the recommended duration of 2 months. Children's recovery may be influenced by a variety of factors including frequency of attendance at SFPs, non compliance in use of the feeding ration, dietary intake, morbidity, mother's education, care giver practices, nutrition education, health access, water and sanitation. Since inception of the SFP at Mary Immaculate Nutrition Centre the effectiveness and factors that may influence recovery have not been assessed.

1.3 JUSTIFICATION

The government through the Ministry of Public Health and Sanitation has been supporting the Mukuru feeding programme with other joint partners namely Concern Worldwide and World Food Programme. However though the monitoring of the programme activities is done at Mukuru Nutrition centre, how the corn soy is used and factors affecting its

use, for the benefit of the children are yet to be assessed and documented. Given the grave consequences of persistent malnutrition and that scarce resources must be utilized effectively there is need to conduct an independent in depth study and localized study to establish the effectiveness of supplementary feeding which will provide evidence based knowledge. The information generated will be used not only to improve this activity at Mukuru but also to assist similar programmes supported by the government.

1.4 AIM OF THE STUDY

To contribute towards improving the effectiveness of supplementary feeding programmes in urban areas in developing countries

1.5 PURPOSE OF THE STUDY

To generate information on nutritional rehabilitation of children that can be utilized for improving effectiveness of supplementary feeding programmes

1.6 MAIN OBJECTIVE

To determine factors associated with nutrition rehabilitative effectiveness of corn-soy blend in children aged 6 -36 months (CSB) at Mukuru Promotion Centre, Nairobi

1.7 SPECIFIC OBJECTIVES

1. To determine the demographic and socio-economic factors of the households of the study children
2. To determine the nutritional status and morbidity experience of children under rehabilitation

3. To establish dietary intake for energy, protein, iron, vitamin A and zinc nutrients and adequacy for the children under rehabilitation
4. To determine the progress in nutritional status of children under rehabilitation
5. To establish the contribution of CSB to dietary intake of the children

1.8 HYPOTHESIS

1. There is no association between demographic and socioeconomic factors and progress in nutritional status of the children

2. There is no association between dietary intake of the children and progress in nutritional status of the children

CHAPTER 2: LITERATURE REVIEW

2.1 CHILD MALNUTRITION

Child malnutrition involves deficiencies of macro and micro nutrients, whereby macro nutrients are carbohydrates, fats and proteins while micronutrients consist of essential vitamins and minerals. Protein energy deficiency is the most widespread form of malnutrition in the world. Over 500 million children face starvation and suffer the effects of severe malnutrition and hunger. Protein energy malnutrition (PEM) is prevalent in Africa, Central and South America, Middle East, East and South East Asia (Sizer and Whitney, 2000). PEM has two forms namely marasmus and kwasiokor which start early in childhood. Marasmus reflects chronic inadequate food intake i.e extreme food deficiency and develops slowly. Kwasiokor reflects extreme protein deficiency, commonly occurs with infection, has a rapid onset and may result from SAM (Sizer and Whitney, 2000). Moderate malnutrition includes all children with moderate wasting, defined as a weight-for-height between –3 and –2 z-scores of the World Health Organization (WHO, 2006) child growth standards, and all those with moderate stunting, and defined as a height-for-age between –3 and –2 z-scores of the WHO (2006) child growth standards. Most of these children will be moderately underweight (weight-for-age between –3 and –2 z-scores). Moderate malnutrition increases the risk of death from common diseases and, if not adequately treated, may worsen, resulting in severe acute malnutrition (severe wasting and/or edema) and/or severe stunting (height for- age < –3 z-scores), which are both life-threatening conditions (Shoham and Duffield, 2009).

Vitamin and essential mineral deficiencies (VMD) are caused by diets that are poor in vitamins and minerals and the deficiencies are made worse by losses or poor absorption related to illness. VMD particularly Vitamin A, Iron, Iodine, Zinc and Folate deficiency is a public health problem that affects one of three people in developing countries i.e 2 billion people world wide, especially in Africa and Asia. The main options of addressing VMD are food fortification and supplementation. Support of optimal breastfeeding and appropriate complementary feeding are key food based approaches that support good micronutrient status during the risk period of infancy. Public health interventions especially control of malaria and intestinal parasites, and measles immunization has helped reduced deficiency diseases (Sanghvi et al. 2007). Deficiencies of vitamin A and zinc were estimated to be responsible for 0·6 million and 0·4 million deaths, respectively, and a combined 9% of global childhood disability adjusted life years (DALYs). Iron and iodine deficiencies resulted in few child deaths, and combined were responsible for about 0·2% of global childhood DALYs. Iron deficiency as a risk factor for maternal mortality added 115 000 deaths and 0·4% of global total DALYs (Black et al, 2008). Suboptimum breastfeeding was estimated to be responsible for 1·4 million child deaths and 44 million DALYs (10% of DALYs in children younger than 5 years). In an analysis that accounted for co-exposure of these nutrition-related factors, they were together responsible for about 35% of child deaths and 11% of the total global disease burden (Black et al, 2008).

2.2 INFANT AND YOUNG CHILD FEEDING (IYCF) PRACTICES AND MALNUTRITION

Infant and young child feeding practices directly affect the nutritional status of children under two years of age and, ultimately, impact child survival. Improving infant and

young child feeding practices in children 0–23 months of age is therefore critical to improved nutrition, health and development of children (WHO, 2008). Children 6 – 23 months of age should be fed animal source foods daily if they do not have access to fortified foods or vitamin and mineral supplements. The WHO (2002) recommended dietary allowance (RDA) for infants 6- 8 months is at least 200 Kcal/day and 500kcal for 12 -23 months. Energy densities recommended for CSB with dried milk and sugar is 1.44 kcal/g. Number of servings depending on age is 0.7 -2.0 per day, assuming average breastmilk feeding. Higher densities require less frequent feeding. IYCF indicators include dietary diversity, feeding frequency, consumption of breast milk or other milk or milk products. Young children recommended dietary energy requirements ranges from 600- 900 Kilocalories (KCal) if not breastfeeding and 200-550 KCal if breast feeding (Zlotkin et al, 2010) (Table 2). Breast fed children are considered as being fed with minimum standards if they consume at least 3 food groups other than breast milk at least twice a day for infants 6 -8 months, and at least 3 times per day for children 9 -23 months. Non breast fed children are considered to be fed in accordance with the minimum standards if they consumed milk or milk products and food from four or more food groups including milk products and are fed at least four times per day (KNBS and ORC Macro, 2010).

Table 2: Recommended feeding frequency and energy needs for children in developing countries

Age (Months)	Recommended feeding frequency of complementary foods (No. of meals and snacks)		Energy needs from complementary foods (Kilo calories)	
	Breastfed	Not breast fed	Breastfed	Not breastfed
6-8	2-3	4-5	200	600
9-11	3-4	4-5	300	700
12-23		4-5	550	900

Source: Zlotkin et al, 2010

2.3 INTERVENTIONS TO IMPROVE INFANT AND CHILD FEEDING

Interventions to improve infant feeding include breastfeeding promotion, quality complementary feeding, supplementation with vitamins and micronutrient rich flours, and improving maternal nutrition during pregnancy (Bhutta et al, 2008). Supplementary feeding interventions beyond 36 months of age may not reduce stunting and might be inadvisable, since rapid weight gain in later childhood is associated with adverse long-term outcomes (Victora et al, 2008). A study by Gibson et al (2010) indicated that most indigenous and commercially processed various cereal based complementary foods used in sub-Saharan Africa have very high concentrations of phytate which are likely to inhibit the absorption of iron, zinc and calcium resulting in inadequacy to provide sufficient nutrients and thence the need for fortification. There is need also to identify optimal combinations that increase dietary nutrient intake. However the Flour Initiative Initiative (2008) argue that flour fortification is unlikely to improve micronutrient status of infants and toddlers because their intake is low; rather this approach is more suitable for women of child bearing age. Use of amylase in increasing porridge density has been studied and findings indicated that children's intake of flour through the prepared porridge increased and resulted in increase of growth though not significant (Hossain et al, 2005). The lack of significance could be due to the study being conducted in a short period of (6 weeks, 3 months) or that the children had a low nutritional status. Anemia in low income countries is unlikely to be addressed by economic growth which translates into higher incomes and it is recommended that iron supplementation and fortification be pursued as these are cost effective alternative approaches to reduce iron deficiency. Cereal fortification has contributed to meeting dietary and nutrient requirement needs of children in USA. The issue

of affordability of the cereals may have promoted this. A study on complementary foods in Kenya by Lungaho and Glahn (2009) found that Cerelac had higher amounts of nutrients as compared to the locally manufactured complementary foods. Though being nutritious, Cerelac's cost makes it unaffordable to many. A combination of corn, sweet potato, omena and cassava was found to have the highest nutrients after cerelac, while local foods like cassava were found to enhance the bioavailability of iron. This holds promise for development of complementary foods using locally available foods with increased bioavailability and affordability.

2.4 SUPPLEMENTARY FEEDING

There are two types of Supplementary Feeding Programmes; targeted and blanket. Targeted SFPs aim to prevent those who are already moderately malnourished from becoming severely malnourished by providing a food supplement to the general ration. For this type of programme to be effective it is essential that an adequate general food distribution for the whole household is in place so that the ration is not shared with other members of the family. Otherwise there is a substantial risk that the malnourished individual does not receive enough of the supplement to recover from moderate malnutrition. Blanket SFPs are usually implemented where prevalence of malnutrition is already very high, or where many people in a particular group are at risk of becoming malnourished. They aim to prevent widespread malnutrition and related mortality in nutritionally vulnerable groups by providing a supplementary ration for everyone in the vulnerable demographic group, i.e. individuals are targeted on the basis of whether they belong to a specific age/gender/ physiological group, irrespective of whether they are malnourished or not (Navarro-

Colorado et al, 2008). Mary Immaculate Nutrition Centre implements targeted SFP, whereby they provide mothers with take-home fortified flour ration which they use to prepare porridge for the malnourished children aged 6 -36 months.

2.5 CORN SOY BLEND AND NUTRIENT COMPOSITION

Mary Immaculate Nutrition Centre uses a corn - soy blended flour called Unimix to improve the health and growth status of moderately malnourished children. WFP supplies the fortified blended foods as complementary foods for the food basket. The foods comply with the "Guidelines on Formulated Supplementary Foods for Older Infants and Young Children'' of the Codex Alimentarius (FAO/WHO,1991). Fortified Blend Flour (FBFs) contains adequate calories (400/100 g) and protein (15g/100 g). The CSB is made of corn meal, soy flour, a mineral premix, vitamins and oil (Table 3) and is fortified with essential micronutrients (66 percent of the daily requirements of young children per 100 g) (Table 4). FBFs are pre-cooked and distributed as flour and therefore require only limited amounts of fuel for cooking. In supplementary feeding programmes, the Fortified Blend Flour ration size for children and expectant and nursing mothers is about 100-150 g for dry rations and 200-250 g for take home rations (WFP, 2008).

Table 3: Nutritional composition of corn-soya blend (CSB)

Component	Percent
Processed, gelatinized, cornmeal	69.7%
Defatted, toasted, soy flour	22.0%
Mineral pre-mix	2.7%
Vitamin, antioxidant pre-mix	0.1%
Refined, deodorized, stabilized soy oil	5.5%

Source: WFP, 2008

Table 4: Nutritive value per 100 g of CSB

Component	Value/100g CSB	Component	Value/100g CSB
Food energy (Kcal)	380	Minerals	
Protein (g)	18	Calcium (mg)	800
Carbohydrates (g)	60	Phosphorous (mg)	600
Fat (g)	6	Magnesium (mg)	100
Vitamins		Iron (mg)	18
Vitamin A (I.U)	1700	Zinc (mg)	3
Vitamin D (I.U)	200	Sodium (mg)	300
Vitamin E (I.U)	8	Potassium (mg)	700
Thiamine (mg)	0.7	Iodine (mg)	50
Riboflavine (mg)	0.5		
Niacin (mg)	8		
Vitamin B6 (mg)	0.7		
Vitamin B12 (mcg)	4		
Pantothenic acid (mg)	3		
Folacin (mg)	0.2		

SOURCE: WFP, 2008

2.6 FACTORS INFLUENCING SUPPLEMENTARY FEEDING

2.6.1 EFFECTIVE SUPPLEMENTARY FEEDING PROGRAMME

For a SFP to be considered effective (high recovery rate and high coverage), a large proportion of children recruited in the programme recover from moderate acute malnutrition, and therefore will not develop severe malnutrition. However, children in a programme may default and stop attending the Supplementary Feeding Programme (SFP), drop out, recover, deteriorate or die. Meanwhile, other children in the community would still develop moderate malnutrition, as the SFP has no direct effect on them. Recovery from

moderate acute malnutrition (MAM), defined as a child having a weight-for-height z score (WHZ) greater than -2 or weight-for height 85% of the median and no oedema has been used as an indicator of program success in many supplementary feeding interventions (Navarro- Colorado et al, 2008). The following are outcomes expected from a SFP (Navarro-Colorado et al, 2008):

Recovery: When a beneficiary reaches the programme defined discharge criteria.

Defaulter: A beneficiary that is lost to the programme before reaching discharge criteria, and whose actual status (dead, recovered, other) is not known. Typically, two weeks of absence are required before classifying the child as a defaulter, though this varies between programmes.

Death: A beneficiary lost-to-follow-up who is reported dead by the family or by home visitors.

Non-response: this category may include: patients transferred to a Therapeutic Feeding Centre due to a deterioration in their nutritional status; patients transferred to hospital due to a medical complication independent of their nutritional status; and patients who remain in the programme but do not reach discharge criteria after a given length of time (typically 16 or 24 weeks, though this varies). Occasionally, patients 'discharged' in irregular ways may be included in this group, for example, a patient admitted by error. This subgroup is assumed to be negligible in most, if not all, of the SFPs. There is some variation in the criteria used by each SFP to define recovery and defaulting.

2.6.2 MATERNAL STATUS

Women's education, food availability, a healthy environment and women's status were found to be key determinants in improving child underweight rates, with women's educa-

tion leading (ACC/SCN, 2000). Status may include economic status and empowerment of women (Bhutta et al, 2008). Women's relative status was explained as being important for care provision and food production. In analysis of background data, there are large differences by mother's education and by wealth in the proportion of children fed according to IYCF recommendations. Only 18% of mothers who had no education fed the children according to IYCF recommendations, compared to 50% of mothers who had been to secondary school. Mothers in the highest wealth quintile fed the children according to IYCF recommendations at 45.8 % compared to 26.9 % with mothers in the lowest wealth quintile (KNBS and ORC Macro, 2010). In a study conducted in Eldoret, Kenya it was found that the social risk factors for protein calorie malnutrition were single mothers, young mothers aged 15-25 years, the child's living conditions such as living in a temporary house, caretaker who was not married to the child's parent and not staying with both parents in the past six months. Others were economic risk factors, incomplete immunization and female sex of the child (Ayaya et al, 2004).

2.6.3 DIETARY INTAKE AND CARE GIVER PRACTICES

A child's appetite, care giver behaviors and characteristics of the diet are likely to influence food intake (Lutter, 2003). Child appetite is dependent on the child's state of nutrition and health, care giver behaviors and diet characteristics. Care giver behaviors include level of encouragement provided to the child to eat, frequency of feeding, quality of child - care giver interaction, and a non - distracting environment where feeding occurs, while diet characteristics include energy density, sweetness and viscosity. To prevent and treat malnutrition among vulnerable children, ready-to-use foods that are energy-dense and lipid-based, not requiring cooking or refrigeration have been used. The effectiveness

of such foods in improving child nutritional status is dependant on household use by caregivers (Ickes et al, 2010). In the preparation of corn soy porridge for malnourished children care givers practices suggests that they add excess water to the flour giving the porridge a consistency that young children can easily swallow, contrary to recommendations that gives a thick consistency (Key Informant, 2011). There is need to investigate why mothers do not adhere to the recommendations of how to prepare CSB porridge.

2.6.4 NUTRITION EDUCATION

Bhutta et al (2008) in a review of nutrition interventions concluded that education about complementary feeding increased height-for-age *Z* score for populations with sufficient food, whereas provision of food supplements with or without education, in populations with insufficient food increased the height-for-age *Z* score. In reviewing 42 efficacy trials and effectiveness studies, Dewey and Brown (2008) also found that educational messages through multiple channels had an effect in improving complementary feeding. A greater impact was seen when animal-source foods were specifically promoted in the messages or when food supplements were provided as well.

2.6.5 HEALTH ACCESS, WATER AND SANITATION

Supplemental feeding programs are one facet of an appropriate nutritional response to an emergency. However if there is insufficient general food availability either through household food production, purchase or a general food distribution; insufficient basic health services; and inadequate clean water and sanitation, then the supplemental food programme will not have any real impact on the nutritional situation of the vulnerable targeted groups (Oxfam GB et al, 2009) . Diseases like HIV and AIDS, tuberculosis, ma-

laria with anemia and diarrheal diseases, Acute Respiratory Infection (ARI)/pneumonia affect macronutrient and micronutrient status and increase nutritional needs of children. Malnutrition puts children at greater risk of such diseases. Access to health facilities permits management of such childhood diseases and routine immunization of children which enhances child nutrition and health (MOPHS, 2008).

2.6.6 FOOD SECURITY AND ECONOMIC FACTORS

In a study conducted by Navarro-Colorado et al (2008), the main factor undermining the rate of recovery was found to be defaulting from the programme. Defaulting is most often associated with seasonal and secular trends, quality of programme management and/or lack of adaptation of the SFP design to local circumstances. The study also showed that certain contextual factors may play a significant role in determining recovery rates, notably the presence of a general ration distribution, the length of time since the start of the crisis, the chronic nature of the emergency and whether beneficiaries are displaced populations (as opposed to residents). If considered together, these factors would appear to demonstrate that default is directly related to opportunity costs for carers. The current design of SFPs may be creating a dilemma for beneficiaries, forcing them to choose between attending the SFP to obtain food for a member of the family and other activities related to the economic or food security of the rest of the group. In most programmes, defaulting increases during the planting and harvesting seasons when labour is at a premium. The study also suggests the need to improve supplementary foods. (Navarro-Colorado et al, 2008).

2.7 GAPS IN KNOWLEDGE

Kenya is one of the nations in the world in need of priority action to curb children under 5 years mortality rates (Horton et al, 2008). There is need to have evidence based interventions. However few quantitative data are available to assess dietary intakes of young children in Kenya (Huffman et al, 2000). Fortified blended flours (FBF) though introduced in the 1960s to alleviate food insecurity in vulnerable regions of the world have not been evaluated rigorously in almost 40 years on their impact on the nutritional status of populations and very little research has been conducted on them. Positive effects on weight gain and recovery from moderate acute malnutrition have been observed in populations receiving FBFs as food-aid supplements. Prevention of severe micronutrient deficiencies in populations reliant on food aid through FBFs has also been reported. But direct measurements of the micronutrient status of vulnerable populations receiving FBFs have rarely been conducted. Well-designed evaluations to test the efficacy and effectiveness of FBFs on linear growth and development are, likewise, lacking. Thus, since the available scientific evidence on the efficacy and effectiveness of FBFs for improving the nutritional status of vulnerable populations is very limited and weak, it is not currently possible to reach definite conclusions (Pérez-Expósito and Klein, 2009). Study findings indicate that there is need to determine the reasons for defaulting in supplementary feeding programmes, and to explore how this information can be used to adapt and improve programmes. Studies need to determine how to improve the design of the programme and management provided at feeding centres using nutrition protocols, associated disease management and improved supplementary foods (WFP, 2007). This study intends to conduct a systematic analysis of data and information that would contribute towards filling this gap.

CHAPTER 3: STUDY SETTING AND METHODOLOGY

3.1 STUDY SETTING

3.1.1. STUDY AREA

The study was conducted at Mary Immaculate Nutrition Centre of Mukuru Promotion Centre which lies directly opposite the Mater Hospital in Nairobi and is found in Mukuru Nyayo sub location, South B division of Makadara district, Nairobi (Makadara, 2012). Mukuru Promotion Centre (PC) was established to serve the slum community Mukuru that is sited near the Mater Hospital, South B Nairobi, and industrial area. It undertakes vocational training, supports orphans and vulnerable children, street children and nutrition activities whereby it implements a wet and dry (take home rations) feeding programme. The Ministry of Health has been collaborating with the Mukuru Promotion Centre in implementing a supplementary feeding programme since October 2010. The Ministry with support from World Food Programme distributes CSB and oil to the centre.

3.1.2 ADMINISTRATIVE, LIVELIHOODS AND SOCIAL SECTORS

Mukuru slum lies in Makadara district also known as Nairobi east district and is found in Nairobi province as shown in the maps in Appendices 1 and 2. In Nairobi it is estimated that 60% of the population live in slums (UNDP, 2006) and face an alarming and growing range of vulnerabilities. Poverty is worst amongst those with low levels of education, and considerably fewer children attend the later stages of school. Many slum areas have few or no public schools (Oxfam GB, 2009) and most schools are informal and are not registered with the government. Due to a lack of recognition of informal schools by the

government most informal students do not attain secondary level education (UNDP, 2006).

Meanwhile gender inequalities remain severe, with female slum-dwellers being 5 times more likely to be unemployed than males. Slum dwellers are almost twice as likely to be infected with HIV as their rural counterparts.

Neonatal, infant and under-5 mortality rates in Nairobi's slums are all significantly higher than the national average. In some slums infant and under-5 mortality rates are double those in rural areas. Children in Nairobi's slums are among the unhealthiest in the country. Over half are likely to suffer acute respiratory infection and almost half under 5 are stunted; moreover they are less likely to be immunized than children elsewhere in Kenya and more prone to diarrhoea and fever. Population densities per hectare can be higher than 1,000 per hectare in the slums compared with 4 per hectare in Nairobi's wealthy areas. The poor commonly pay eight times as much as the rich for water, as they are forced to buy from private vendors in the slums, where almost 90% of the population have no piped water connection. Unplanned growth in the slums, lack of waste management and disposal breeds disease and contributes to poor drainage, exacerbating the risk of urban floods. The combination of climate change and has led to ever greater numbers of urban houses being severely affected by flooding. Social capital is considered to be weaker than in rural areas and people do not have the same kin and support networks as their rural counterparts. Nearly two thirds of slum residents do not feel safe inside their settlements. Impact of food price rises indicates that up to 90% of households reduced the size or frequency of meals. Dramatic price increases for basic necessities have led to neg-

ative coping strategies, including high-risk livelihoods such as sex work and crime as well as removing children from school for child labour (Oxfam GB, 2009).

3.2 METHODOLOGY

3.2.1 STUDY POPULATION AND SAMPLING FRAME

The study population comprised children aged 6 -36 months screened at Mary Immaculate Nutrition Centre as being moderately malnourished and were admitted to the feeding programme. Sampling of the children was staggered from September 2011 to April 2012. Children who had been in the programme for a duration of three weeks or more were sampled to assess progress after being introduced to CSB. These were children who also presented no disease conditions, nor chronic disease as assessed by the nutritionist at the centre.

3.2.2 STUDY DESIGN

The study design included two phases whereby the first was cross sectional and the second was retrospective – comparative. Both applied descriptive and analytical approaches. Data was collected from mothers who were interviewed within the period September 2011 – April 2012.

3.2.3 SAMPLE

3.2.3.1 Sample Size Determination

The study population for the cross sectional study consisted of children who had been admitted to the supplementary feeding programme at Mukuru Promotion Centre. To determine the desired sample size (n_f) when the population is less than 10,000, Fisher et al (1991) recommends the required sample size (n) when the population is greater than 10,000 is first

computed then adjusted depending on the actual population. The sample size was estimated using the Fisher et al (1991) formula:

$n = z^2 pq/d^2$

$n = 1.96^2 \times 0.75 \times 0.25/0.05^2 = 0.7203/0.0025 = 288.12$

Where:

n: The required sample size when population is >10,000

z: The standard normal deviate that is set at 1.96, corresponds to 95% confidence interval

p: The recommended recovery rate of children in a supplementary feeding programme = 75% (0.75)

q: 1.0 – 0.75 = 0.25

d: Degree of accuracy desired or precision = 5% (0.05)

Approximately 250 malnourished children are newly admitted to the programme annually. Based on this population the adjusted sample size was calculated as shown:

n_f: To determine desired sample size when population is <10,000

N: Number of children going through the programme per year defined as the study population in this study

$$n_f = \frac{n}{1+(n/N)}$$

$$n_f = \frac{288}{1+(288/250)}$$

n_f = 134 children

Assuming an attrition rate of 10 %

Sample = 134 + 13 = 147 children

On the basis of this calculation the sample size for the cross sectional study was 147 children.

3.2.3.2 Sampling Procedure

i. Sampling of children for the cross sectional study

The study site Mukuru Promotion Centre was purposively selected because it had been implementing a dry feeding programme since October 2010. Children participating in the supplementary feeding programme were recruited as shown in Figure 2.

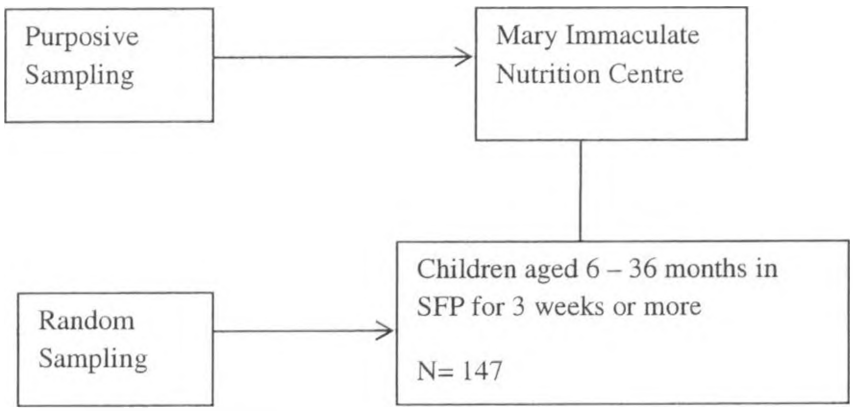

Figure 2: Schematic summary of the sampling procedure

ii. Sampling of Focus Group Discussion (FGD) Participants

Eleven mothers were sampled for a FGD from mothers whose children were in the programme. They comprised the first group of mothers that had come to attend a nutrition talk before attending the SFP session. Their children had been in the programme for 1 – 4 months, while one was to be admitted on the day of the discussion. The ages of their children varied from 11 months to 2 years.

iii. Sampling of Key Informants

Five key informants were purposively identified and interviewed namely; 2 project staff (one male and one female) working at Mary Immaculate Nutrition Centre and 3 community health workers (two female and one male).

iv. Sampling for Retrospective Data

Information was collected from data records of 153 children who were in the feeding programme and had been in the programme in the previous year upto October 10th 2011. The sampling of the children was exhaustive.

v. Inclusion and Exclusion Criteria

The children eligible for the cross sectional study were those aged 6 -36 months of age who had participated in the supplementary feeding programme for a minimum of 3 weeks. Those excluded were those under 6 months and above 36 months of age, and those who presented disease and chronic illnesses.

3.3 DATA COLLECTION

3.3.1 RESEARCH INSTRUMENTS AND EQUIPMENT

The following research instruments and equipment were used to collect data.

Research instruments: Semi structured questionnaires for mothers /care givers; List of questions for the Focus Group Discussion (FGD) with mothers and care givers; Question guide for key informant interviews – community health workers, programme implementers; Data sheets/forms for weights and heights measurements, MUAC (Appendices 3 -7) and data sheet for retrospective data (Appendix 10).

Equipment: Salter weighing scales, Length board/Stadiometer, MUAC cm tapes, food weighing scales, plates, cups, measuring jugs and cylinders

3.3.2 RECRUITMENT AND TRAINING OF FIELD ASSISTANTS

Three assistants who were undergraduates and a diploma graduate with health and nutritional knowledge were recruited to collect data. They were also fluent in spoken Kiswahili. The assistants were trained for 2 days then they pretested and administered the questionnaire in Kiswahili and occasionally in mother tongue (Refer to Appendix 8 for the training programme that was used). The assistants were also trained on their roles during the Key Informant Interviews and Focus Group Discussion.

3.3.3 DATA COLLECTION TECHNIQUES AND PROCEDURES

For the cross sectional study, a semi structured questionnaire was administered to mothers to determine socioeconomic, demographic, health and food security factors of the study households. In addition, data on utilization and compliance of the corn soy blend by mothers/caretakers, dietary intake and contribution of CSB to the dietary intake, morbidity experience of the children was collected using the semi - structured questionnaire. Key informant interview and focus group discussions were conducted. The retrospective study involved an examination of past records of all children who participated in the feeding programme at the Mukuru Promotion Centre within the previous year to 10th October 2011 to determine nutritional progress and growth of the children compared against recommended indicators for a supplementary feeding programme. Four months is the maximum period that a child can be retained in the Mukuru supplementary feeding pro-

gramme, after which they are drawn from the programme and transferred for further examination and support.

3.3.3.1 Cross sectional study

i. Characteristics of the households

Demographic factors

A pre-tested semi -structured questionnaire was administered to each mother whose child was admitted to the supplementary feeding programme. Data was collected on population characteristics on household size, age, education level, gender distribution within households, gender headship of the household and marital status of respondents. Data was also collected on respondent characteristics on age, education level, relation of respondent to the child and contribution to the households in terms of child care, labour and money.

Socio-economic factors

The pre-tested semi -structured questionnaire was used to collect data from the mothers on monthly household expenditure and type of household fuel used for cooking.

Food security and sanitation situation

Using the pre-tested semi -structured questionnaire, data was collected from the mothers on food security and nutrition education, water and sanitation and access to health facilities. Data was collected on the frequency of interaction between mother and community workers for nutrition education.

Performance

The questionnaire had questions on frequency of attendance and reasons for the mother's defaulting at the SFP, length of stay in the programme and trends in attendance from March 2011 to February 2012. Data was collected on monthly new admissions, cured,

defaulters, non respondents and transfers. Recovery rate was calculated using the formula below as given by the project nutritionist:

$$\text{Recovery rate} = \frac{\text{Total Cured}}{\text{Total Exits} - \text{Total Transfers}} \times 100$$

Total Exits = Cured + Defaulters +Non respondent + Transfers

ii. Nutritional status and morbidity of children receiving the CSB

Anthropometric measurements of the child were taken to assess their nutritional status. The weight, height and mid upper arm circumference (MUAC) of the child were measured (Appendix 9). Data was collected on age, birth date and sex of the child.

A questionnaire was used to collect information on the frequency of illness that the child had experienced in the previous 2 weeks. Questions were on the type of illnesses namely acute respiratory infection (ARI), diarrhoea, fever and vomiting. Information on the use of mosquito net and health seeking behaviour in the previous one month was also collected. Using the nutrition cards at the centre, information was obtained on whether standard treatment protocols were applied. Mothers were asked on the immunization status, measles vaccination status and Vitamin A supplementation of the child, which they responded to by recall as it was not required of them to carry the child's clinic card.

iii. Dietary intake and adequacy for energy, protein, iron, vitamin A and zinc nutrients

Mothers were interviewed on dietary diversity and intake of the child and the quantity of food consumed by the child. A questionnaire and 24 hour recall were used to determine

food consumed in the previous 24 hours so long as these were non feasting or special occasion days.

vi. Contribution of CSB to dietary intake of the children

The mothers were asked on the amount of CSB they received and the amount of CSB porridge (and flour) that the child consumed to assess whether they were adhering to recommendations. Questions included the identity of the person who normally fed the child, whether the mother or another caregiver. A 24 hr recall tool was used to capture information on the quantities of CSB consumed; whether CSB was shared with siblings or was used in other ways.

3.3.3.2 Retrospective study

i. Progress in nutritional status and morbidity of children in the feeding program

This involved recording weight, height and age of children on admission to SFP, those whose mothers were interviewed in the cross sectional survey. This also involved an examination of past records of all children who were admitted at least three weeks in the feeding programme at the Mukuru Promotion Centre in the past year upto 10th October 201, specifically December 2010 to 10th October 2011. Records were made of weekly height, weight, MUAC entries for the period the child was in the programme (Appendix 10). To determine nutritional progress and growth of the children compared against recommended indicators for a supplementary feeding programme. Data was collected from records at the centre for 153 children on weight for height/length, age, sex, number of children admitted to the programme, number of children who recovered and were dis-

charged from the programme, default rate of children who dropped out of programme, number of children that did not recover after 4 months in the programme.

ii. Contribution of CSB to dietary intake of the children

Information was collected from the health centre records on the quantity of CSB distributed to child/ family. Records were made on the date and amount of ration received at each visit. Information was collected from mothers on the quantity of ration distributed.

3.3.3.3 Focus Group Discussions Interviews

To collect indepth information, a checklist of issues was used to guide the FGD. The focus group discussion was held with the mothers whose children were in the programme to assess how they perceived the programme and how it would be improved, including sustainability of the feeding and treatment received. Focus group discussions had questions on reasons for defaulting.

3.3.3.4. Key Informant Interviews

To collect indepth information a list of questions was used for the key informant interviews. Information was collected on background information on the project, management and performance of the project and use of the CSB including quantity of ration distributed to the mothers.

3.3.4 ETHICAL CONSIDERATIONS

Permission was sought from the Board of Postgraduate Studies - University of Nairobi, Ministry of Health, Makadara, Mukuru CBO and National Council of Science and Research Technology before beginning the study (Appendices 11-12). The findings of the study will be shared with the same mentioned authorities. Information was collected from

mothers and caretakers who consented. The enumerators were trained to respect respondents. All information was treated in confidentiality, and was used only for the purposes of the research.

3.3.5 DATA QUALITY CONTROL

The research assistants were trained on how to correctly fill the questionnaires to minimize mistakes. The questionnaire was pretested and modified accordingly. The principal investigator and an immediate assistant to the investigator checked the filled questionnaires for completeness on a daily basis. The supervisors were consulted during proposal development to address quality of the proposal, data collection, analysis and report writing.

3.3.6 DATA MANAGEMENT AND ANALYSIS

3.3.6.1. Data entry and cleaning

Data from the questionnaires was entered using the Statistical Package for Social Scientist (SPSS), Excel, Nutrisurvey and ENA. In SPSS, data entry templates were developed whereby codes for each question were made. Coding of data was also done for questions that were open ended. Data was entered and cleaned; whereby frequencies were made to identify wrong entries, missing, illogical data and outliers. Debriefing was done for information collected from focus group discussions and key informant interview. The information was organized in themes

3.3.6.2. Data analysis

The 24 hr calorie and nutrient intake of the child was calculated using food composition tables (Lukmanji et al, 2008) and was entered in excel and nutrisurvey packages and finally into SPSS. In ENA, anthropometric indices were calculated using WHO (2006)

child growth standards for stunting, wasting and underweight to give the z scores for the same. In excel calculations were made from anthropometric measurements on change in daily weight gain, MUAC, height and z scores. Data was analyzed using SPSS whereby descriptive statistics namely means and standard deviations for z scores height, weight, MUAC, change in z scores, height and weight gain, and increase in MUAC. Proportions and frequency distributions for categorical data were done for study group characteristics including socio economic, demographic, utilization of CSB; proportions and 95% confidence intervals were also determined. Analysis was done by inferential statistics involving T test to test for significant differences in means of z scores, weight height and MUAC, analysis of variance of z scores, weight height and MUAC by length of days in the programme, correlations and Chi –square to test for associations between group characteristics at p values < 0.05. Generalized linear model regression was used to infer about effects on socio economic and demographic factors on change in HAZ, WHZ and WAZ scores. Qualitative data was grouped in major themes and key issues highlighted to add depth to results from the cross sectional.

CHAPTER 4: RESULTS

4.1DEMOGRAPHIC AND SOCIO ECONOMIC CHARACTERISTICS

4.1.1. DEMOGRAPHIC CHARACTERISTICS OF STUDY HOUSEHOLDS

The mean household size in the study population was 4.63 ± 1.87 (n= 150) with the majority of the households (59.3 %) having a household size of 2-4 persons (Table 4). Children under 5 years comprised 34 % of the population, while 52.3% were 0-14 years, 47.7 % were 15- 64 years, and 0.1% were above 65 years of age. The dependency ratio was 1.1 (Table 5).

Majority of the study population (41.9 %, n= 289) had attained primary level of education with 21.3% having secondary school level, 21 % in preschool while children below preschool were 13.5 % (Table 4). The education level of household members above 18 years was as follows: More than half had primary level (51.9%), followed by secondary level (43.8%) and others had adult education, attended a course, were disabled and illiterate (Figure 3). School enrollment for children aged 6 -17 years was 81.5% (Figure 4).

The gender distribution in the study households was as follows; females were 53% and males were 47% (Table 4). Majority of the respondents (78.7 %, n=118) came from male headed households while 21.3 % (n=32) were female headed households. Most of the respondents were from households of monogamous marriages (67.3%) followed by single parent households (28%) and lastly polygamous marriages (4.7 %) (Table 5).

Table 5: Selected demographic characteristic of the study households

Characteristic	Frequency	Percent
Household size (N=150)		
2-4	89	59.3
5-7	48	32.0
8- 11	13	8.7
Age (years) (N=687)		
0.5 - < 5	218	34
5-9	88	12.8
10-14	53	7.7
15-19	35	5.1
20-24	77	11.2
25-29	83	12.1
30-34	73	10.6
35-39	23	3.3
40-44	17	2.5
45 -49	12	1.7
50 -54	4	0.6
54 -59	2	0.3
60-64	1	0.1
Education level (N=688)		
Below preschool	99	14.3
Preschool	144	20.9
Primary	289	41.9
Secondary	144	20.9
College	5	0.7
Course	3	0.4
Adult education	1	0.1
Illiterate	2	0.3
Disabled	2	0.3
Gender distribution within households (N=693)		
Male	324	46.8
Female	369	53.2
Headship of households (n=150)		
Male headed	118	78.7
Female headed	32	21.3
Marital status of respondents (N=150)		
Monogamous	101	67.3
Single -headed	42	28
Polygamous	7	4.7

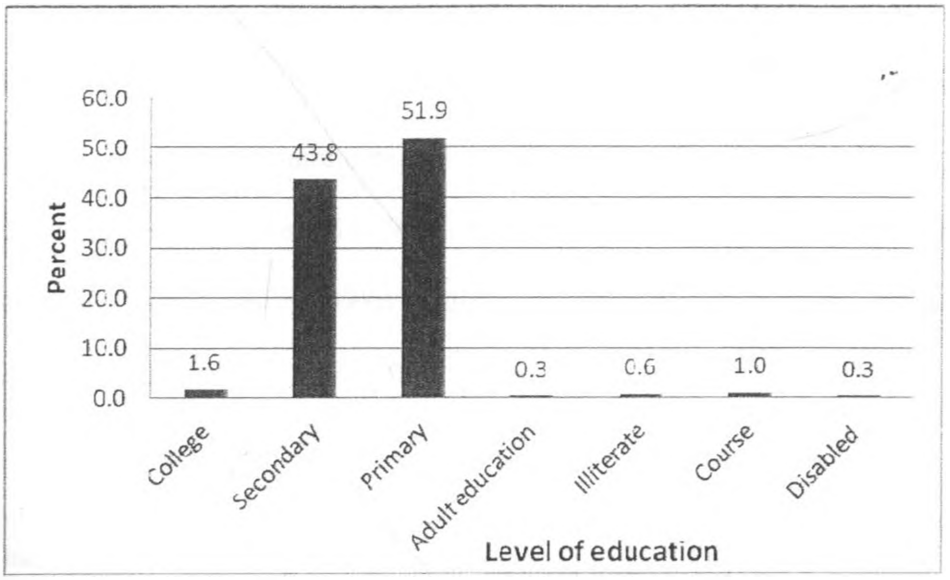

Figure 3: Distribution of household members above 18 years of age by education level

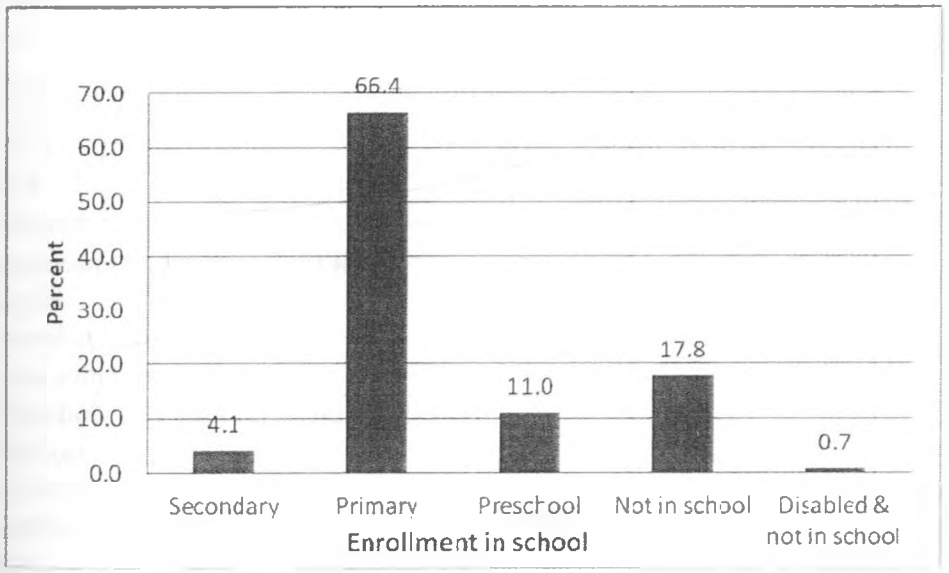

Figure 4: Distribution of children aged 6 -17 years enrolled in school

4.1.2 SOCIO ECONOMIC CHARACTERISTICS OF THE STUDY HOUSEHOLDS

The mean monthly expenditure of the study households was Kenya Shillings 6,392 ± 5506 (n= 142), with a minimum and maximum of 1,000 and 50,000 Kenya Shillings, respectively. Seventy seven (77.0%) of the respondents had a low monthly household expenditure (Kshs 1,000 to 7,000) shillings, 17.3% had average (KShs 8,000-14,000) and 5.3% had high (Kshs15,000 -50,000) (Table 6).

Table 6: Selected socio economic characteristics of the study households

Characteristic	Frequency	Percent
Household expenditure (KShs) (N=139)		
1000 -7000	107	77.0
8000 -14,000	24	17.3
15,000 – 50,000	8	5.8
Access to land for cultivation (N=150)		
Have access	132	88.6
Do not have access	17	11.4
Type of housing materials for the walls (N=149)		
Corrugated iron sheets	133	89.3
Stone	7	4.7
Polythene	4	2.7
Wood	3	2.0
Mud	1	0.7
Temporary due to fire	1	0.7
Ownership of dwelling (N=148)		
Rented	138	93.2
Owned by household	9	6.1
Lives with friends	1	0.7
Household fuel used for cooking (N=148)		
Charcoal	70	47.3
Kerosene	46	31.1
Charcoal and kerosene	24	16.2
Gas	3	2.0
Firewood	2	1.4
Gas and Charcoal/Kerosene/Electricity and charcoal	3	2.1

The majority (88.6%, n=132) of the households did not have access to land for cultivation while only 11.4 % (n= 17) of the households had access (Table 6).

Majority of the households (89%) lived in houses made of corrugated iron sheets, mainly rented (93.2%) with only 6.1% living in their own households (Table 5).

Charcoal was used for cooking by almost half of the households (47.3%), followed by kerosene (31.1 %), kerosene and charcoal (16.2 %), gas (2.0%) and firewood (1.4%) in that order (Table 6).

4.1.3 DEMOGRAPHIC AND SOCIO ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

All the respondents were the mothers of the study children (n= 147) except three who were grandmothers of the children. The mean age of the respondents was 27.5 + 6.38 whereby the minimum age was 16 years and the maximum was 55. Majority were aged 21 -30 years (61.1%), followed by 31-40 years (20.8%). More than half of the respondents (57.7 %) were of primary education level while about 39% were of secondary education and the others either college education, adult education or were illiterate (Table 7).

A greater proportion of the respondents were not involved in income generating activities (64.4 %) while 35.6% were (Table 7). Of those not employed in any income generating activity, the majority were housewives, followed by those unemployed and a few were students. Of those involved in income generating activity, the majority were casual labourers followed by self employment.

Respondents who provided child care and labour in the household comprised 63.8% while those who contributed money, labour and child care were 36.2% (Table 7). The difference between those contributing child care and labour and the group that contributed child care, labour and money was significant (χ^2= 8.640, p=0.003) (Table 7).

Table 7: Demographic and socio economic characteristics of respondents

Characteristics of respondents	Frequency	Percent
Relationship of respondent to study child (N=150)		
Mother of the child	147	98
Grandmother of the child	3	2
Age in years (N=149)		
15- 20	22	14.8
21- 30	91	61.1
31 -40	31	20.8
41- 50	4	3.7
51 -60	1	0.7
Education level (N=149)		
College	1	0.7
Secondary	58	38.9
Primary	86	57.7
Adult education	1	0.7
Course	2	1.3
Illiterate	1	0.7
Occupation		
Engaged in income generating activity		
Salaried	4	2.7
Farmer	1	0.7
Business	17	11.4
Casual labourer	31	20.8
Not engaged in income generating activity		
Student	3	2.0
Housewife	75	50.3
Unemployed	17	11.4
Other	1	0.7
Contribution of respondent to child care, labour and money in the household (N=149)		
Child care and labour	54	36.2
Child care, labour and money	95	63.8

4.2 FOOD SECURITY AND NUTRITION EDUCATION

4.2.1 FOOD SECURITY

Majority (80%) of the households indicated that they had experienced food shortage in the previous one month, while 20% did not.

Meal frequency in the previous 24 hours

The majority of the children (46%) consumed 3 meals a day or four meals (44.7%) in the previous 24 hours. The least of the children (9.4%) had less than 3 meals a day. Among the adults 57.3% consumed 3 meals, followed by 2 meals (22.7%), 4 meals and 1 meal per day in that order. One adult did not have any meal in the previous 24 hours (Table 8). There was a significant difference between the number of meals eaten a day by children (χ^2= 99.760, p=0.000) and by adults (χ^2= 151.133, p=0.000).

Table 8: Number of meals consumed in the previous 24 hours

Number of meals consumed a day	Children		Adults	
	Frequency	Percent	Frequency	Percent
0	0	0	1	0.7
1	4	2.7	9	6.0
2	10	6.7	34	22.7
3	69	46.0	86	57.3
4	67	44.7	20	13.3

Household dietary diversity

Cereals, oil and vegetables were consumed by the greatest proportion of children, 96.7%, 95.3% and 94% respectively. These were followed by sugar and honey (80%), milk and milk products (78%), root tubers (45.3%), fruit (45.3%), spices and beverages, and pulses

(38.7%). A lesser proportion of children consumed eggs (16%), fish (14%) meat and meat products (12.7%) (Figure 5).

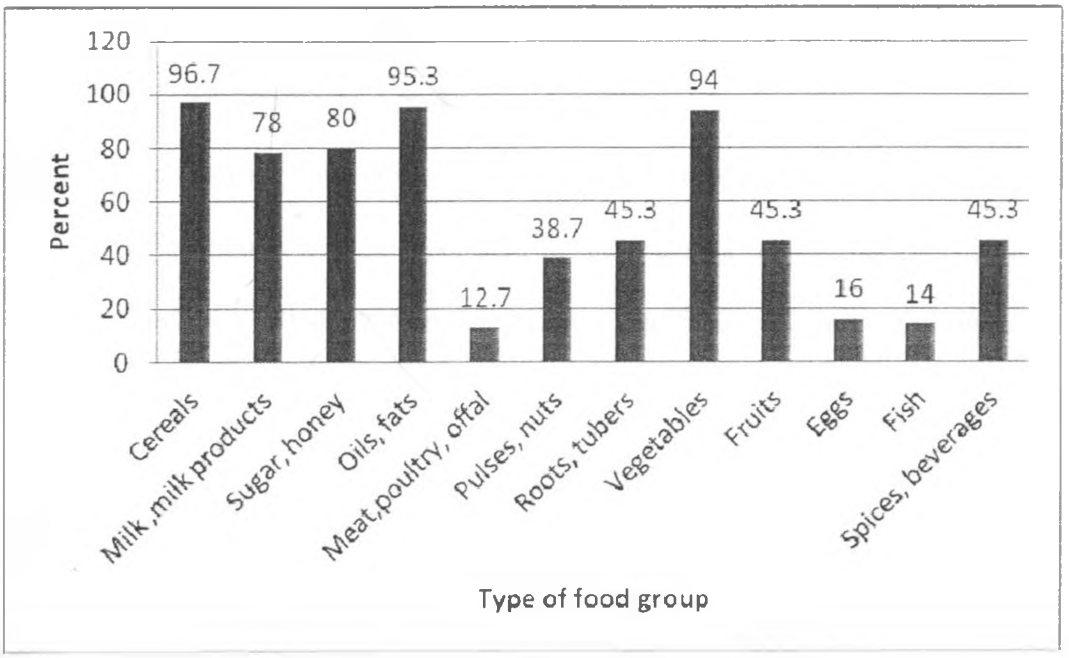

FIGURE 5: Distribution of children by food groups consumed in the previous 24 hours

Majority of the households (72.0%) had consumed a diet that had 5 to 8 food groups in the previous 24 hours to the study, followed by 9-12 (14.7%) and lastly 1- 4 (13.3%). The difference between the groups was significant (χ^2=100.960, p= 0.000) (Table 9).

Table 9: Distribution of households by household dietary diversity score

Household dietary diversity score	**Frequency**	**Percent**	**p value**
Low (1-4 food groups)	20	13.3	0.000
Average (5-8 food groups)	108	72.0	
High (9-12 food groups)	22	14.7	
Total	150	100	

4.2.2 NUTRITION EDUCATION

4.2.2.1 Attendance and recall of nutrition topics

Majority of the respondents (71.3%, n=107) attended nutrition education talks and the difference in the proportions of attendance was significant (χ^2=27.307, p=0.000) (Table 10). There was no significant difference in the number of times respondents attended the talks in the previous month (χ^2=0.642, p=0.887). Forty three percent (43%) recalled 2 topics from nutrition education talks held in the previous month; the difference in the number of topics recalled by respondents was significant (Fishers exact test=87.187, p=0.000).

Table 10: Attendance and recall of nutrition talks

Variable	Frequency	Percent	p value
Attends nutrition talks			0.000
Yes	107	71.3	
No	43	28.7	
No. of times respondent attended nutrition talks			0.887
once	25	23.6	
twice	30	28.3	
three times	25	23.6	
four times	26	24.5	
Total	106	100.0	
No. of nutrition topics recalled by mothers			0.000
Cannot remember	3	2.8	
One topic	26	24.3	
Two topics	46	43.0	
Three topics	25	23.4	
Four – Five Topics	7	6.5	
Total	107	100.0	

Most of the respondents recalled the topic on complementary feeding (43.0%) followed by balanced diet (23.4%), sanitation and hygiene (21.5%) and then preparation of CSB porridge (19.6%) (Table11). There was a positive correlation between frequency in attendance of nutrition talks and number of nutrition topics recalled (r= 0.323**, p=0.001).

Table 11: Nutrition topics mentioned by mothers

Nutrition topic n=107	Frequency	Percent
Feeding of child		
Complementary feeding	81	75.7
Content of CSB and preparation of porridge	22	20.5
Breastfeeding	11	10.3
Health and sanitation		
Child care & prevention of malnutrition	16	14.9
Sanitation and hygiene	25	23.3
Prevention of diseases	4	3.7
Management of diarrhea and vomiting	5	4.7
Immunization	3	2.8
Family issues		
Family planning – contraceptive methods	4	3.7
Economy diet planning with current inflation	2	1.9
Maintaining peace at home	2	1.9
Maternal nutrition	1	0.9

4.2.2.2 Community health workers home visits to mothers

Seventy three percent (72.7%) of the mothers were not visited by a community health worker (CHW) in the previous month while 27.3 % were visited. The difference between those visited and those not visited was significant (χ^2=30.827, p=0.000). Of those visited, 60% were visited once, 25% twice, 12.5% three times and 0.5% four times (χ^2=32.268, p=0.000) (Table 12). A CHW who was a key informant indicated that CHWs played an important role of linking the community to the centre. They followed up mothers to monitor how the CSB flour was being used and this had assisted in controlling the use of flour

for purposes other than the intended i.e for feeding the child. Home visits were not made as frequent because the client number had increased, mainly due to use of different criteria for admission which previous was a MUAC of 12.5 cm, and had been changed to 11.5 cm as advised by WFP.

Table 12: CHW home visits to the respondents

Variable	Frequency	Percent	p value
Visited by CHW at home			0.000
Yes	41	27.3	
No	109	72.7	
No. of home visits by CHW in the previous month			0.000
Homes visited once	25	61.0	
Homes visited twice	10	24.4	
Homes visited three and four times	6	14.6	
Total	41	100.0	

4.3 WATER AND SANITATION

The main source of water during the wet and dry season was tap water (142 and 137 respectively, n= 150). Majority of the households treated their water during the wet and dry season (63.3 % and 65.3 % respectively) while about a third did not treat their water during the wet (36.7%) and dry season (34.7%) (Table 13).

Table 13: Distribution of respondents by water access, treatment and sanitation facilities

Variable	Frequency	Percent
Source of water		
Wet (dry) season n=150		
Tap	142 (137)	94.7 (91.3)
Borehole	3 (1)	2.0 (0.7)
Unprotected well	1 (1)	0.7 (0.7)
Protected well	0 (3)	0 (2.7)
Rain water	3 (0)	2.0 (0)
Dam	1 (0)	0.7 (0)
Spring	0 (1)	0 (0.7)
Treatment of water		
Wet season (Dry season) n=150		
Yes	95 (98)	63.3 (65.3)
No	55 (52)	36.7 (34.7)
Treatment of water		
Wet season n=150		
Boiling	60	60.6
Traditional herbs	2	2.0
Chemicals	33	33.3
Filter/sieves	1	1.0
Solar	3	3.0
Location of water source		
Within the plot	30	20.0
Outside the plot	119	79.3
In the house	1	0.7
Amount of water used daily n=150		
0 -70	87	58
80 -150	52	34.7
160-240	11	7.3
Distance to water source in minutes		
0.5 - 5	104	69.3
6-10	28	18.7
11-20	11	7.3
21- 30	4	2.7
30 -60	2	1.3
Type of toilet facility n=150		
Flush toilet	9	6.0
Traditional pit latrine	24	16.0
Ventilated pit latrine	16	6.7
No facility (Bush, river)	5	3.3
Asian toilet (pour water)	102	68.0
Access to health care services		
Distance to nearest health facility in minutes n=150		
<10	14	9.3
11-30	95	63.3
31-60	34	22.7
>60	7	4.7
Transport means to health facility n=150		
Walking	138	92
Bicycle	2	1.3
Matatu	8	5.3
Motorcycle	2	1.3

gramme and those who did not (χ^2=0.240, p=0.624). The difference in the number of times they missed was significant (χ^2=36.535, p=0.000). The respondents mentioned 12 reasons for not attending the sessions, the main one being they had travelled upcountry (38.2%), followed by the respondent being unwell, and the child being unwell (Figure 7).

Table 14: Attendance by respondents to the feeding programme

Variable	Frequency	Percent
Missed to attend the feeding programme		
Yes	72	48
No	78	52
Total	150	100
No. of weeks respondent missed to attend		
One	32	45.1
Two	19	26.8
Three	9	12.7
Four	6	8.5
>=Five	5	7.0
Total	71	100

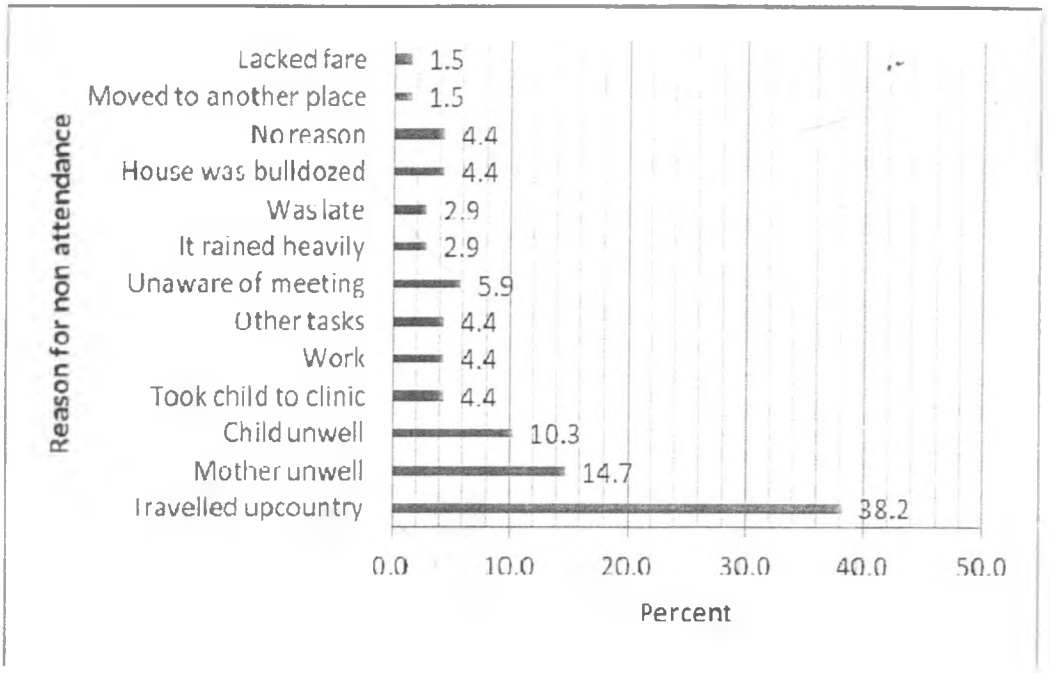

FIGURE 7: Reasons for non attendance to the feeding programme

4.4.2 LENGTH OF STAY IN THE PROGRAMME

From the cross sectional study, the mean length of stay of the children in the programme for the cross sectional study was 57.6 ± 43.0 days (1.92 months ±1.43) with a minimum of 21 days (3 weeks) and a maximum of 278 days (9.3 months). The mean length of stay for the children discharged from the programme was 84.9 ± 62.1 days (2.83 months ± 2.1) in the retrospective study using data from the records (Table 15). The maximum recommended length of stay in the SFP was 4 months.

Table 15: Distribution of children by mean length of stay in the programme*

Status in the program	Mean length of stay in days	Frequency	Percent
Still in rehabilitation in SFP	66.4 ±38.3	112	73.2
Discharged	84.9 ± 62.1	38	24.8
Relapsed	99.5 ± 2.1	2	1.3
Transferred	42.0	1	0.7
Total	71.1 + 45.5	153	100

*Retrospective study

For the cross sectional study, the trend was a decrease in the number of children with time. About a third of the children (35.1%) had stayed in the programme for one month, and a minority (5.4%) beyond 4 months (5.4 %) (n=148) (Figure 8). The differences between the groups by length of stay was significant (χ^2=40.311 p=0.000).

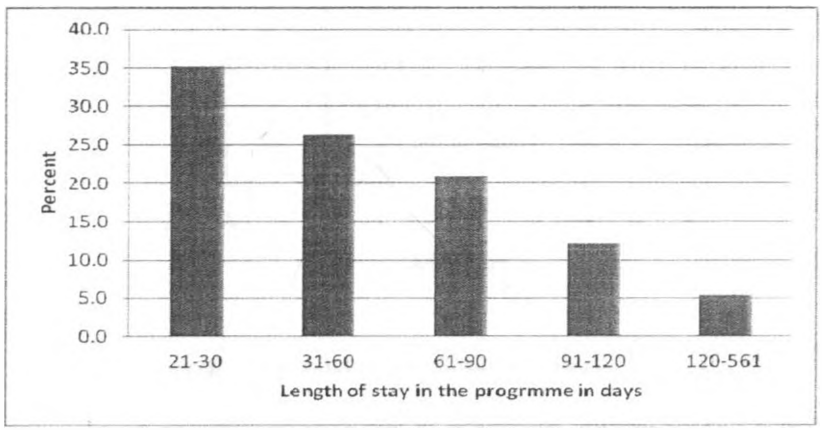

FIGURE 8: Distribution of children by length of stay in the programme in days.

4.4.3 TRENDS IN PROGRAMME PERFORMANCE DURING THE PERIOD MARCH 2011 TO FEBRUARY 2012

From retrospective data, the trends in attendance at the SFP during the period March 2011 to February 2012 for new admissions, cured, defaulter, non respondent, transfers and total exits shows that there was a peak and downward trend at the beginning of the study in September 2011 to a low in December 2011 and January 2012, where after the numbers started to increase (Figure 9). The total number of cured was 542 children during the same period of March 2011 –February 2012 (Table 16). The percentage recovery rate for the period was 72.9% calculated as shown below.

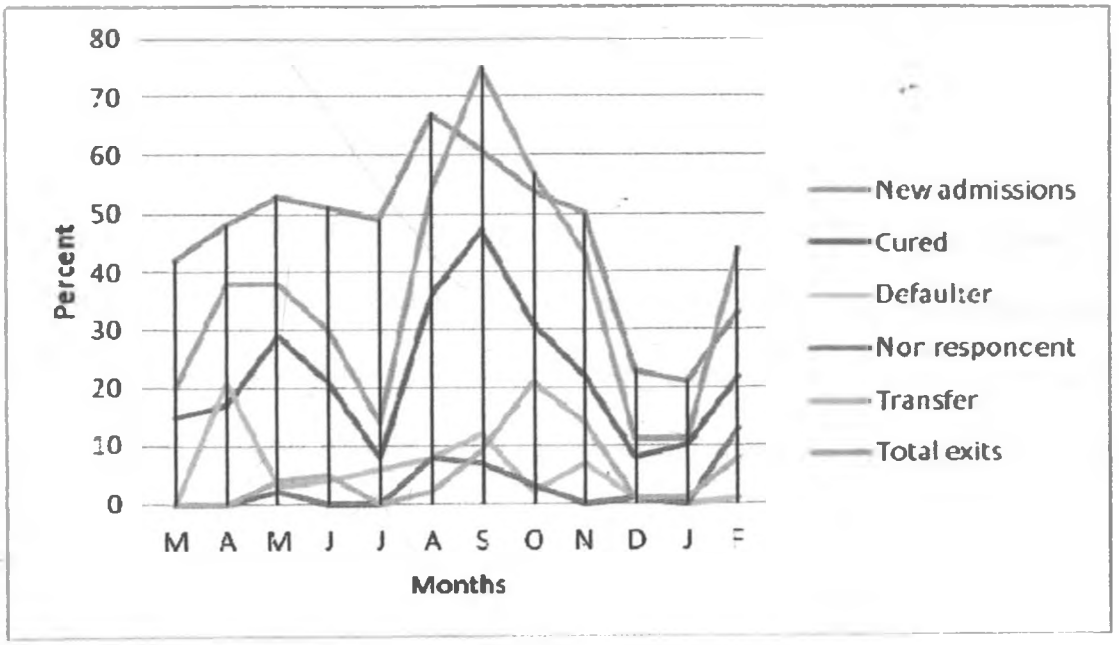

FIGURE 9: Trends in attendance of children in the SFP from March 2011- February 2012

New admissions=admitted according to admissions criteria, Cured= reaches discharge criteria within 4 months, Defaulter=absent for 3 consecutive visits, Non respondent=does not reach the discharge criteria after 4 months in OTP, Transfer= transfers to inpatient or other clinics
Source: MOMS and MOPHS, 2009; Key informant at Mary Immaculate Nutrition Centre,2012

Calculation for recovery rate

$$\text{Recovery rate} = \frac{\text{Total Cured}}{\text{Total Exits} - \text{Total Transfers}} \times 100 = 266/435\text{-}65\ \% = 266/365\% = 72.9\%$$

Total Exits = Cured + Defaulters+Non respondent + Transfers

Table 16: Number of children in SFP programme between March 2011 – February 2012

Characteristic	Number of children
New admissions	552
Cured	266
Defaulter	65
Non respondent	34
Transfer	65
Total exits	435

4.5 NUTRITIONAL AND MORBIDITY STATUS OF CHILDREN IN THE FEEDING PROGRAMME

4.5.1 PREVALENCE OF MALNUTRITION

Prevalence of malnutrition was very high in the study children at the time of admission to the programme and after at least 3 weeks stay in the programme, based on WHO categories where below -2 z scores is classified as being malnourished (Appendix 13). In this study this was moderate plus the severe categories which were 22.0%, 38.9% and 48.0% for wasting, underweight and stunting respectively after at least 3 weeks in the programme (Table 17). The change in percentage at admission and after 3 weeks was not significant for wasting (p=0.388, but was significant for underweight (p=0.000) and stunting (p=0.000).

Table 17: Prevalence of malnutrition at time of admission and after at least 3 weeks in the programme

NUTRITIONAL STATUS	ADMISSION	AFTER AT LEAST 3 WEEKS	PAIRED DIFFERENCES
	Percent	Percent	p values
WASTING (N=142)			
Normal	73.9	77.9	0.388
Moderate	21.1	17.9	
Severe	4.9	4.1	
Total	100	100	
UNDERWEIGHT (N=148)			
Normal	39.2	61.1	0.000
Moderate	33.1	24.8	
Severe	27.7	14.1	
Total	100	100	
STUNTING (N=143)			
Normal	36.4	52.1	0.000
Moderate	23.1	29.5	
Severe	40.6	18.5	
Total	100	100	

Using the admission criteria to the feeding programme of a MUAC between 11.5 and 12.5 cm and WHZ scores more than -2 z scores, 63.4 % of the children were justifiably admitted to the programme while 36.6% (n=52) of the children who had normal nutritional status were admitted from the therapeutic clinic for observation for 2 weeks having recovered from severe wasting (Table 18).

Table 18: Numbers of children based on MUAC and WHZ scores criteria at admission to the programme

Characteristic	**WHZ =< -2 z scores Normal**	**WHZ > -2 z score Malnourished**	**Total**
MUAC <12.5 cm Malnourished	53	23	76
MUAC =>12.5 cm Normal	52	14	66
Total Frequency	105	37	142

4.5.2 MORBIDITY EXPERIENCE

Seventy three percent (73.7 %, n =109) of the study children experienced an ailment within the previous two weeks while 27 % did not. There was a significant difference between the two proportions, those who had experienced an ailment and those who had not (p= 0.000). There was no association found between morbidity and nutritional status, nor weight gain. There was also no association between dietary intake and morbidity (Table 19).

Table 19: Morbidity experience of the study children within the previous 2 weeks

Category	**N**	**Observed Proportion.**	**Binomial Test Proportion.**	**Asymp. Sig. (2-tailed)**
Experienced ailment	109	0.73	0.5	.000[a]
Did not experience ailment	41	0.27		
Total	150	1		

a. Based on Z Approximation.

Acute respiratory infection (58.7%, n=88) was the most frequently experienced ailment, followed by diarrhea (n= 69) and lastly febrile related illnesses (n=37). There were two cases of children suspected to have had measles (Figure 10).

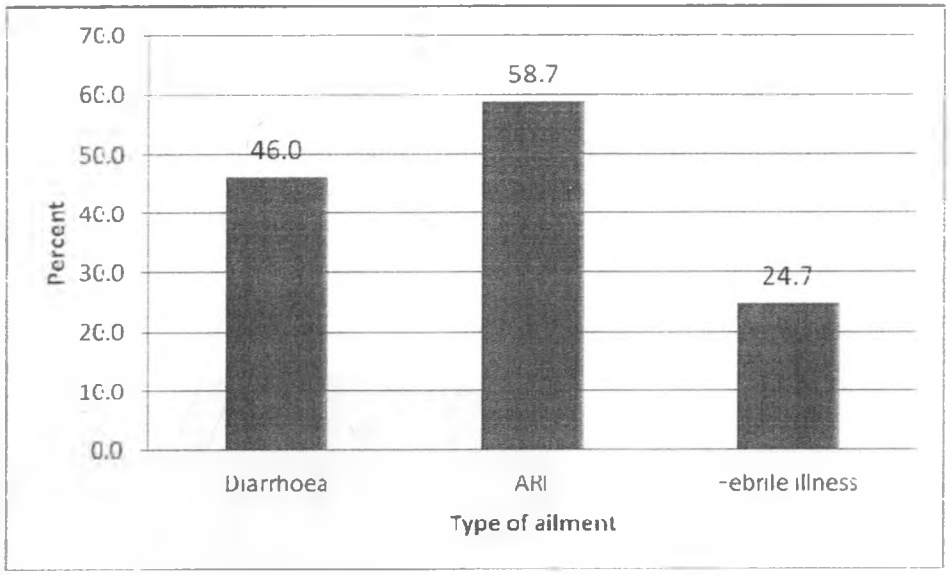

Figure 10: Distribution of children by ailments experienced

4.6 DIETARY INTAKE OF STUDY CHILDREN

4.6.1. ADEQUACY FOR ENERGY, PROTEIN, IRON, VITAMIN A AND ZINC

In the previous 24 hours, majority of the children aged 7-12 months and 12 -36 months had consumed a diet adequate in energy (61.1% and 52.9% respectively). Majority aged 7-12 months and all aged 12 – 36 months had consumed a diet adequate in protein (88.9% and 100% respectively). Most of the children aged 7-12 months and 12 -36 months had consumed a diet adequate in Vitamin A (77.8% and 82.4% respectively). However, none had consumed a diet adequate in bioavailable Iron and Zinc (Table 20).

Table 20: Dietary intake of study children

Nutrient	RDA	Mean ±SD	Proportion meeting RDA	RDA	Mean ±SD	Proportion meeting RDA	Mean contribution of Unimix to diet
	7-12 months			12 -36 months			
Energy (Kcal)	673	763.4±326	61.1%	1022	1066.6±339	52.9%	33.1 %
Protein g	10.1	26.4±11	88.9%	12	39.4 ±281	100%	37.7%
Iron (mg)*	16.4	0.81±0.67	0%	6	0.92± .645	0%	55.2%
Zinc (mg)*	2.03	0.18±0.08	0%	2.8	0.21± 0.13	0%	45.9%
Vitamin A (µg)	595	1307.7±982	77.8%	400	1730.7 ±1267	82.4%	55.9%

* Bio available Iron (5% of Dietary Iron) and Zinc (15% of Dietary Zinc) (Source: WHO and FAO, 2008)

Most of the children (67.6%) had consumed a diet whose protein was from plant sources followed by those who had consumed none, while a few consumed protein from animal sources (Figure 11).

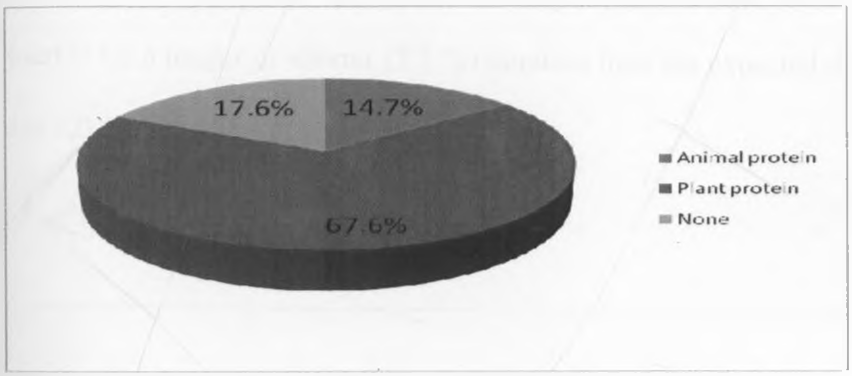

Figure 11: Distribution of children by type of protein intake in the diet

4.6.2 CONTRIBUTION OF CSB TO DIETARY INTAKE

4.6.2.1Distribution of children by use of CSB

There was a high contribution of Vitamin A and Iron from Unimix for a majority of the respondents (57.1%), and a high contribution of zinc for a majority of the respondents (37.1%). There was average contribution of protein for almost half the respondents (42.9%) and an average contribution of energy for 34.3% of the respondents. Approximately one third (34.3%) of the respondents did not use CSB in the previous 24 hours (Table 21).

Table 21: Distribution of respondents by level of contribution of Unimix to nutrients and energy nutrients and energy in the diet

	Proportions of respondents by level of contribution of Unimix* to the diet n=35 (Percent)			
Variable	**Zero**	**Low**	**Average**	**High**
Energy (Kilocalories)	34.3	14.3	34.3	17.1
Protein (g)	34.3	5.7	42.9	17.1
Vitamin A (µg)	34.4	2.9	5.7	57.1
Iron (mg)	34.3	2.9	5.7	57.1
Zinc (mg)	34.3	2.9	25.7	37.1

*Low 1-33%, Average 34-66%, High 67-100%

4.6.2.2 Utilization of CSB

More than two thirds of the mothers (70.0%) used the CSB flour in 7 days while 22.7% used it for a longer or shorter (7.3 %) duration than the expected duration of 7 days (Figure 12).

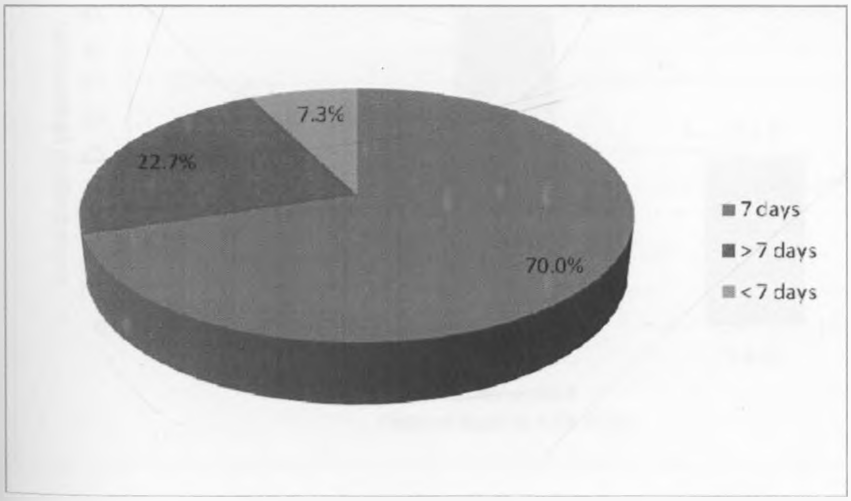

Figure 12: Distribution of respondents by duration of using the CSB ration

More than half of the children (53.7%) shared their porridge with other family members (Figure 13).

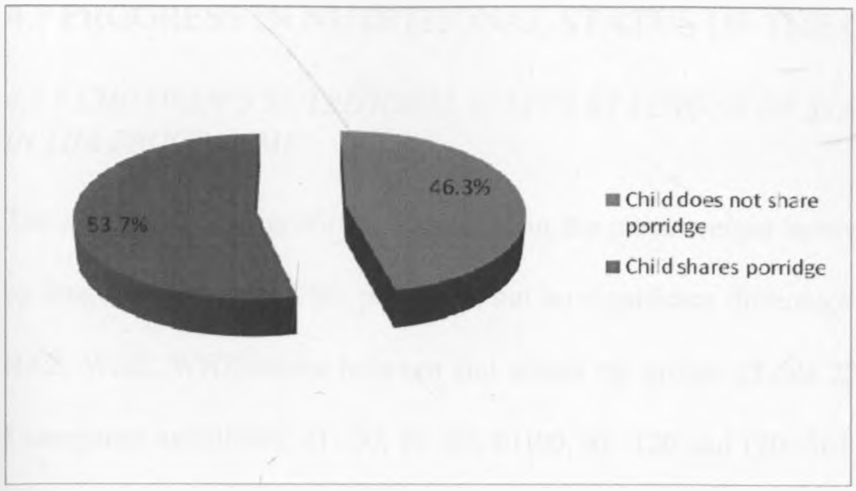

Figure 13: Distribution of children by whether or not they shared their CSB

More than half of the mothers (54.5%) did not use CSB flour as recommended. Of those who did not comply, a greater proportion of them used less fluid (water/milk) (30.3%) while 24.2% used more (Figure 14).

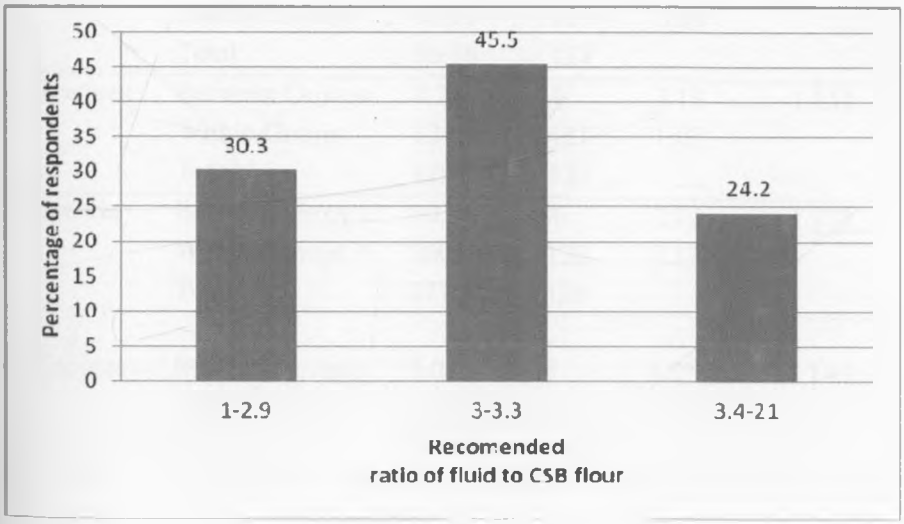

Figure 14: Distribution of respondents by the use of CSB flour to fluid ratio

4.7 PROGRESS IN NUTRITIONAL STATUS OF THE CHILDREN

4.7.1 CHILDREN'S NUTRITIONAL STATUS BY LENGTH OF STAY AFTER 3 WEEKS IN THE PROGRAMME

The study found a significant difference in the mean weight between and within groups by length of stay (F= 2.86, p=0.026), but no significant difference in the mean MUAC, HAZ, WAZ, WHZ scores between and within the groups (Table 22). Length of stay had 5 categories as follows; 21 -30, 31 -60, 61-90, 91 -120 and 120 -561 days.

Table 22: Children's nutritional status by length of stay in the programme

Variable		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
WEIGHT	Between Groups	16.12	4	4.03	2.86	0.026
	Within Groups	174.70	124	1.41		
HEIGHT	Between Groups	161.00	4	40.25	1.41	0.233
	Within Groups	3470.86	122	28.45		
MUAC	Between Groups	2.37	4	0.59	0.867	0.486
	Within Groups	83.99	123	0.68		
	Total	86.36	127			
WHZ scores	Between Groups	4.74	4	1.18	1.153	0.335
	Within Groups	124.38	121	1.03		
	Total	129.12	125			
HAZ scores	Between Groups	10.86	4	2.72	1.272	0.285
	Within Groups	260.46	122	2.13		
	Total	271.32	126			
WAZ scores	Between Groups	5.01	4	1.25	1.144	0.339
	Within Groups	135.79	124	1.10		
	Total	140.80	128			

Figure 15 shows mean WAZ, WHZ and HAZ scores of the children by length of stay in the feeding programme. The trend indicates a general decrease in Z-score with time whereby mean HAZ and WAZ scores showed fluctuation while WHZ scores were constant and greatly decreased beyond 120 days in the programme.

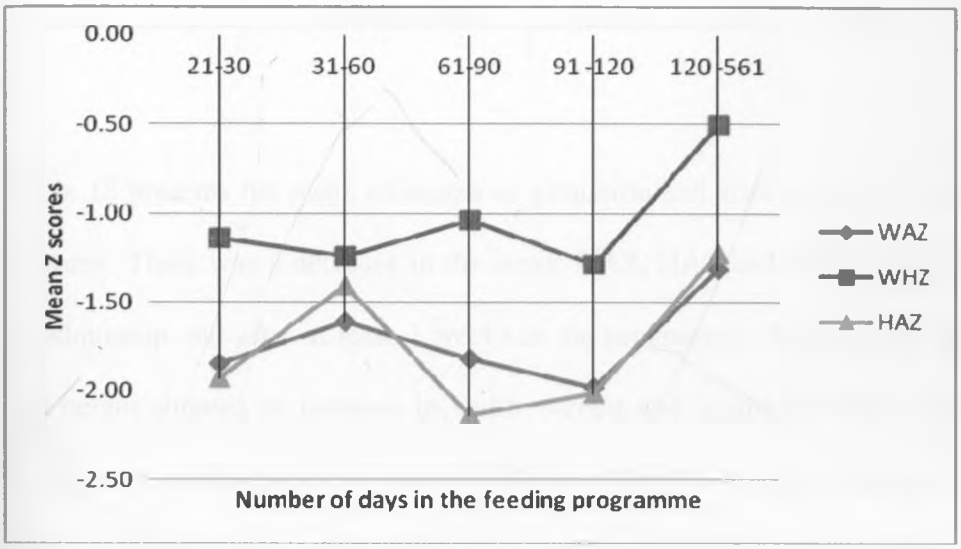

Figure 15: Mean Z score by length of stay in the feeding programme

4.7.2 CHANGE IN Z SCORES BY LENGTH OF STAY AFTER AT LEAST 3 WEEKS IN THE PROGRAMME

The study found a significant difference in the mean change in HAZ and WAZ scores between and within groups by length of stay in days (F= 11.501, p=0.000 & F=2.932, p=0.023 respectively), but no significant difference in the mean change in WHZ scores between and within the groups (Tables 23).

Table 23: Mean change in WHZ, HAZ and WAZ scores by length of stay in the programme in days

Variable		Sum of Squares	df	Mean Square	F	Signif-icance
Change in WHZ scores	Between Groups	2.512	4	.628	.697	.595
	Within Groups	128.904	143	.901		
Change in HAZ scores	Between Groups	25.711	4	6.428	11.501	.000
	Within Groups	77.685	139	.559		
Change in WAZ scores	Between Groups	7.362	4	1.841	2.932	.023
	Within Groups	89.136	142	.628		

Table 18 presents the mean measures at admission and after at least 3 weeks in the programme. There was a decrease in the mean WAZ, HAZ and WHZ scores from the time of admission and after at least 3 weeks in the programme. While mean MUAC, weight and height showed an increase in width, weight and height measures respectively. The paired t test shows that there was a significant difference between the mean WHZ, HAZ, WAZ scores, MUAC, weight and height between the time of admission to the feeding programme and at least 3 weeks in the programme (Table 24).

Table 24: Nutritional status at admission and after at least 3 weeks of admission

Variable	N	At Admission		After 3 weeks		Paired t test
		Mean	SD	Mean	SD	p value
WAZ	148	-2.36	1.12	-1.77	1.07	0.000
HAZ	141	-2.54	1.50	-1.86	1.45	0.000
WHZ	140	-1.37	1.01	-1.14	1.05	0.001
MUAC (cm)	148	12.40	0.60	12.77	0.81	0.000
WEIGHT (kg)	149	7.30	1.07	7.86	1.20	0.000
HEIGHT (cm)	141	69.33	4.90	71.25	4.78	0.000

There was a significant strong correlation for the variables at the time of admission and after 3 weeks for weight, HAZ and WAZ scores and a significant moderate correlation for WHZ scores and MUAC (Table 25).

Table 25: Paired Samples Correlations for WHZ, HAZ, WAZ score, MUAC and weight

Variable	N	Correlation	Significance
WHZ1* scores & WHZ2* scores	122	0.629	0.000
HAZ1 scores & HAZ2 scores	123	0.876	0.000
WAZ1 scores & WAZ2 scores	130	0.708	0.000
MUAC1 & MUAC2	129	0.516	0.000
WEIGHT1 & WEIGHT2	130	0.791	0.000

*1 =at admission, 2 = ≥ 3 weeks in programme

4.7.3 DAILY WEIGHT GAIN

Majority of the children (89.1%) gained less than 5 gm per kg body weight per day and only 10.9% gained more than 5 gm per kg body weight per day (Figure 16).

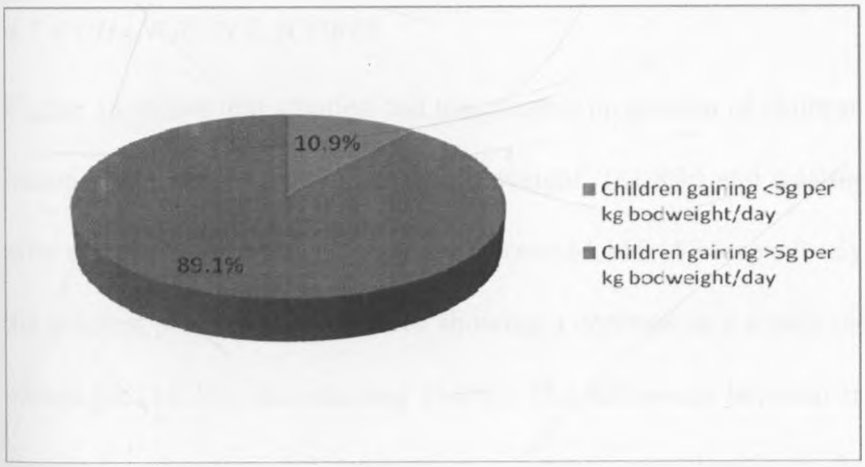

Figure 16: Distribution of children by daily weight gain per kg body weight after at least 3 weeks in the programme

Daily weight gain per kg body weight for the retrospective data was 1.56 g ± 1.69 and 1.69 g ± 2.36 for the study. In the retrospective study, majority of the children (96.4%) gained less than 5 gm per kg body weight per day (Figure 17).

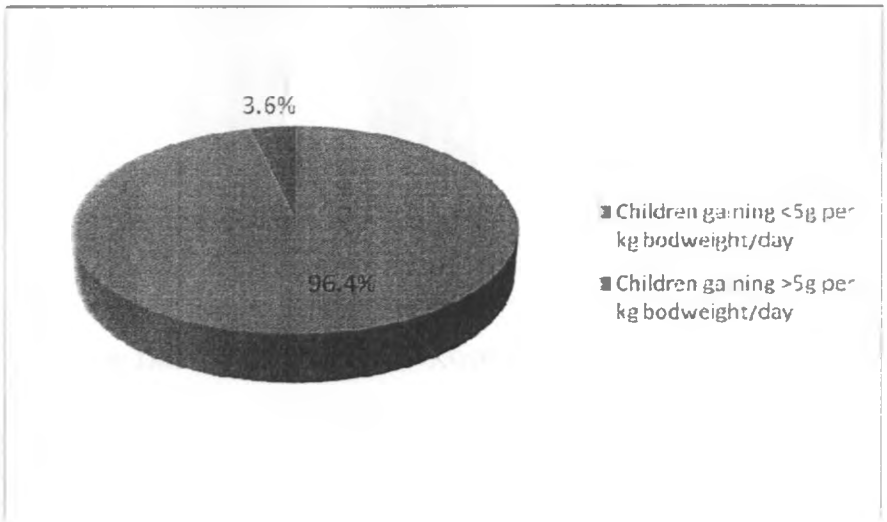

Figure 17: Distribution of children by daily weight gain per kg body weight for retrospective study

4.7.4 CHANGE IN Z SCORES

Figure 18 shows that stunting had the greatest proportion of children (92.4%) showing an increase in z scores followed by underweight (81.8%) and wasting (60%) in that order after at least 3 weeks in the programme (n=144,146,150 respectively), while wasting had the greatest proportion of children showing a decrease in z scores (40%), followed by underweight (18.2%) and stunting (7.6%). The difference between the two groups (those showing a decrease and increase in z scores) was significant for wasting (χ^2=6.000, p=0.014), stunting (χ^2=104.338, p=0.000) and underweight (χ^2=59.703, p=0.000).

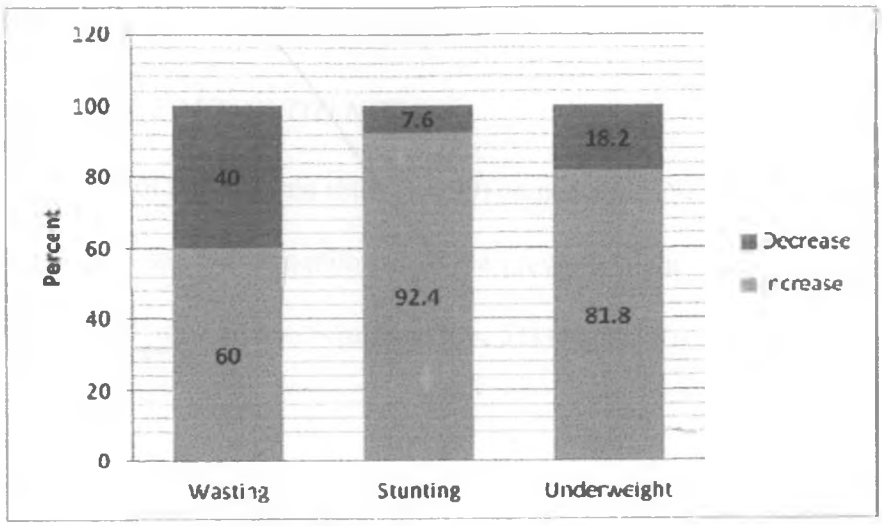

Figure 18: Distribution of children by type of change in z scores

Figure 19 below shows the distribution of the children by change in HAZ, WAZ and WHZ scores. Majority of the children increased by 1 z score for wasting (40.7%) , stunting (58.3%) and underweight (54.8%). This was followed by an increase in 2 z scores for stunting and underweight and a decrease in 1 z score for wasting (32%).

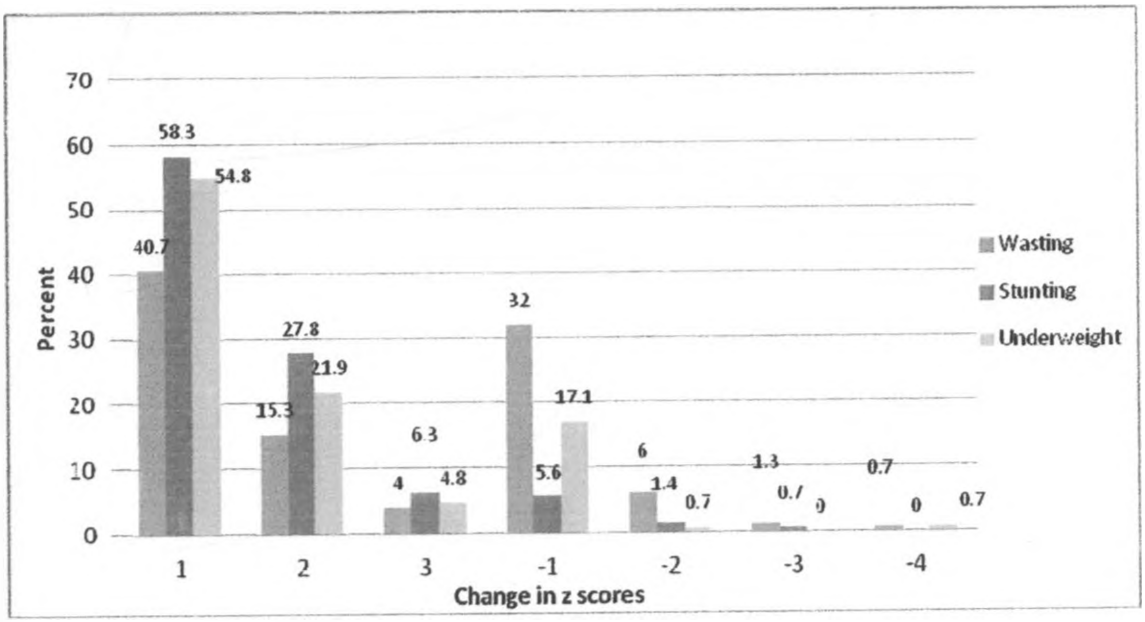

Figure 19: Distribution of children by change in z scores

4.8 HEALTH AND FEEDING PRACTICES

4.8.1 USE OF MOSQUITO NET

Two thirds of the children (66%, n= 99) owned a mosquito net and all except one (65.3%, n=98) had used the mosquito net in the previous night. Thirty four percent (34%) of the children did not own a mosquito net (n= 51) (Figure 20).

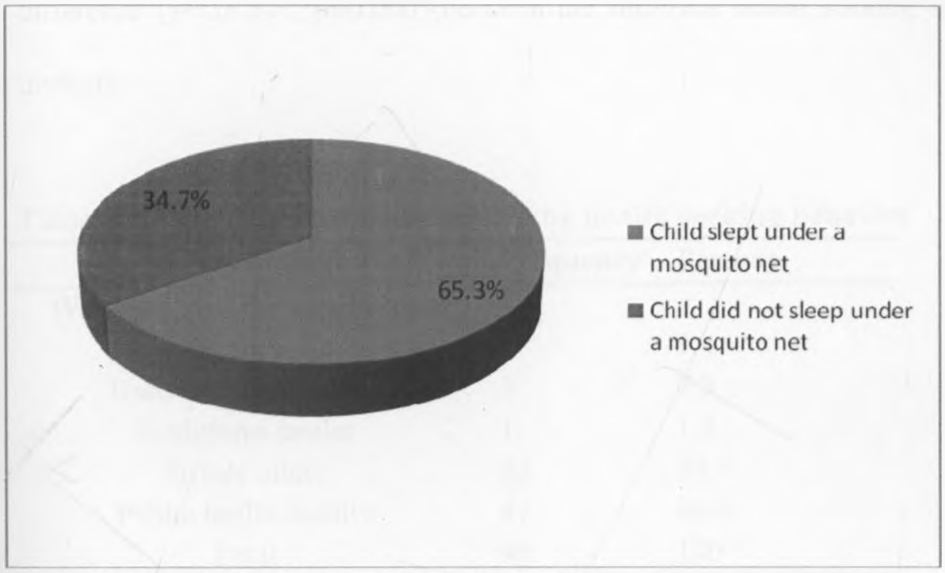

Figure 20: Use of mosquito net in the previous night

4.8.2 HEALTH SEEKING BEHAVIOR OF THE CLIENT

Majority (90.6%) of the respondents whose children experienced an ailment sought for health care for the children, while 9.4% did not seek for assistance. Most of the mothers visited a public health facility (47%), followed by private clinics (32%). Seven used their own medication and one sought a traditional healer (Table 26). There was a significant difference (χ^2=58.807, p=0.000) between the different health seeking behaviors of the mothers.

Table 26: Distribution of respondents by health seeking behavior

Characteristic	Frequency	Percent
Where to seek for health care		
No assistance sought	9	9.4
Used own medication	7	7.3
Traditional healer	1	1.0
Private clinic	32	33.3
Public health facility	47	49.0
Total	96	100

4.8.3 ADHERENCE TO STANDARD TREATMENT PROTOCOLS

Supplementary feeding covers medical protocols such as provision of anti helminths, Vitamin A, Iron and Folic acid supplementation; and immunizations at admission of the child to the programme (Appendix 14). Standard protocols that were administered to children at admission in the progamme was as follows;Vitamin A was the most administered treatment (44.7%, n=59) followed by measles vaccination (15.2%, n=20), mebendazole (12.8 %, n= 17) and Folate which was administered to two children. No iron was

administered to any child (Table 27). There was a significant association between administration of the deworming tablet (500mg of mebendazole) and wasting (χ^2=8.567, p=0.025) and underweight (χ^2=9.552, p=0.014) (Table 28).

Table 27: Distribution of children by standard treatment

Type of Treatment	Frequency	Percent
400 mg mebendazole n= 150		
Yes	11	7.3
No	139	92.7
500mg mebendazole n=150		
Yes	6	4
No	144	96
Iron n= 149		
Yes	0	0
No	149	100
Folate n=150		
Yes	2	1.3
No	148	98.7
Vitamin A n=81		
Yes	64	42.7
No	86	57.3
Measles vaccination n=81		
Yes	20	24.7
No	61	75.3

Table 28: Association between mebendazole drugs administered and nutritional status

Drug administered 500mg mebendazole n=150	Underweight/WAZ Frequencies					Chi square value	p value
	1	2	3	4	5	9.552**	0.014
Yes	0	0	3	2	1		
No	25	58	34	19	7		
	Wasting/WHZ Frequencies						
Yes	0	2	1	2	1	8.567**	0.025
No	48	46	25	4	17		

1 = v severely malnourished, 2= severely malnourished, 3= moderately malnourished, 4= at risk,

5 = normal ; **Significance at 95%

4.8.4 IMMUNIZATION, MEASLES VACCINATION AND VITAMIN A SUPPLEMENTATION STATUS

The immunization status of the study children was high with complete immunization for DPT1, for BCG (98%), DPT2 (99.3%), DPT3 (98%) and OPV1, 2 and 3 (99.3%). Half of those eligible for measles vaccination had been immunized (Table 29). Ninety one percent had received Vitamin A within the previous 3 months.

Table 29: Immunization status of study children

Type of Immunization	Frequency	Percent
BCG	147	98
DPT1	149	100
DPT2	148	99.3
DPT3	146	98
OPV1	148	99.3
OPV2	148	99.3
OPV3	148	99.3
Measles vaccination	28	50.0
Vitamin A	136	90.7

4.8.5 FEEDING OF THE CHILD

Almost half of the study children (54.2 %) were introduced to other foods other than breast milk at 6 months and above while 45.8% when they were less than 6 months (Figure 21).

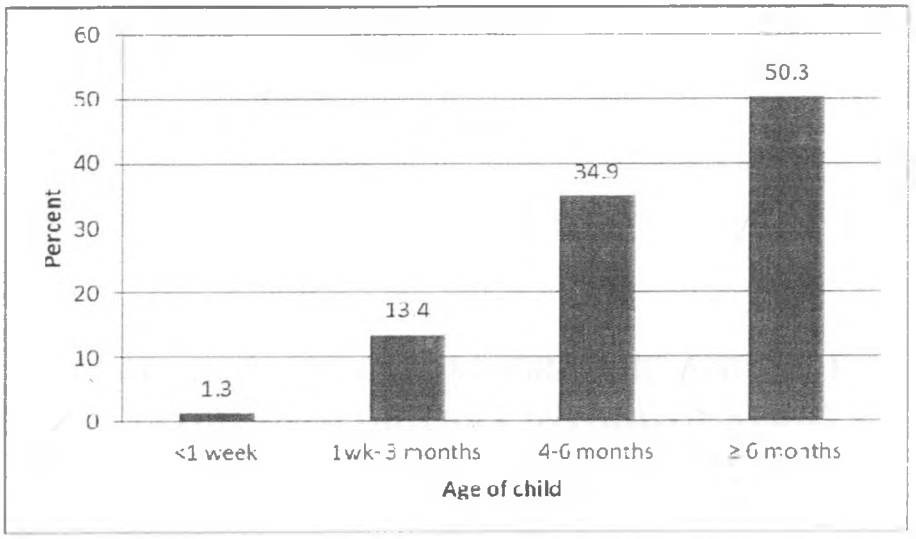

Figure 21: Age of child when other foods were introduced

In the previous two weeks the child was most frequently fed by the mother (84%) and others (26%) who were friends and relatives, house girl, father, and sibling in that order (Figure 22).

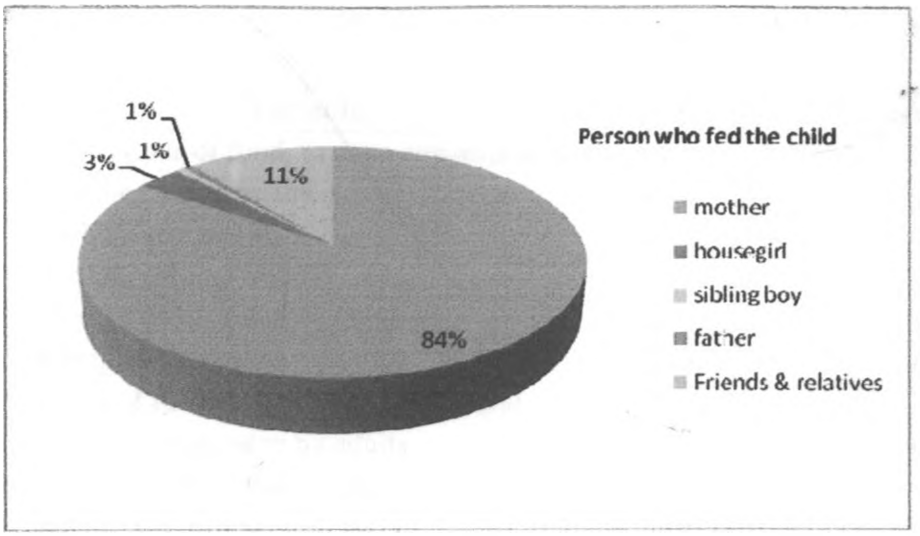

Figure 22: Person who mostly fed the child in the previous 2 weeks

4.9 SOCIO ECONOMIC, DEMOGRAPHIC AND SELECTED FACTORS ASSOCIATED WITH DIETARY INTAKE OF STUDY CHILDREN

4.9.1 SOCIO ECONOMIC AND DEMOGRAPHIC FACTORS ASSOCIATED WITH DIETARY INTAKE

The study found correlations between household size and household dietary diversity (r= - 0.234, p=0.004), household dietary diversity and the number of meals eaten by the children and adults (r=0.203, p=0.013), (r=0.376, p=0.000) respectively. There was a significant correlation between the number of meals eaten by adults and meals eaten by children (r=0.374, p=0.000). There was also a correlation between the number of CHW home visits and the frequency of feeding the child (r=0.321, p=0.040, n=41) (Table 30).

Table 30: Correlations between dietary intake and selected study group characteristics

Variable	r value	Significance
Total number of food groups consumed and		
Age of the mother n=149	-0.017	0.841
Household size n=150	-0.234***	0.004
Household income n=142	0.048	0.569
Number of meals eaten by children	0.203**	0.013
Number of meals eaten by adults	0.376***	0.000
Number of meals eaten by children and		
Number of meals eaten by adults	0.374***	0.000
Number of CHW visits and		
Frequency of feeding child n=41	0.321**	0.040

***Significant at 99%,**Significant at 95%

The study found an association between household dietary diversity for the meals consumed in the previous 24 hrs and household size (Fishers Exact Test value= 10.467, p=0.024), marital status (Fishers Exact Test value = 11.218, p=0.016) and gender of the household (Fishers Exact Test value =5.875, p=0.047) (Table 31). More smaller households consumed 5-12 food groupsas compared to larger families.

Table 31: Association between socio economic and demographic characteristics and dietary diversity score for meals consumed in the previous 24 hours

Characteristic	Categories of Dietary Diversity Score						Fishers exact test§	P value
	Low		Average		High			
	Frequency	Percent	Frequency	Percent	Frequency	Percent		
Household size n=150							10.467**	0.024
2-4	9	10.1	66	74.2	14	15.7		
5-7	5	10.4	35	72.9	8	16.7		
8-11	6	46.2	7	53.8	0	0.0		
Access to land							0.101	1.000
Have access	2	11.8	13	76.5	2	11.8		
Do not have access	18	13.6	95	72.0	19	14.4		
Household expenditure n=139							5.309	0.209
KShs 1000-7000	14	13.1	80	74.8	13	12.1		
KShs 8000- 14000	1	4.2	20	83.3	3	12.5		
KShs 15000 -50000	1	12.5	4	50	3	37.5		
CHW visits n=150							1.433	0.515
Not visited by CHW	6	14.6	27	65.9	8	19.5		
Visited by CHW	14	12.8	81	74.3	14	12.8		
Nutrition education talks n=150							2.978	0.230
Attends talks	11	10.3	80	74.8	16	15.0		
Does not attend talks	9	20.9	28	65.1	6	14.0		
Marital status of the mother n=150							11.218**	0.016
Monogamous marriage	9	8.9	80	79.2	12	11.9		
Polygamous marriage	1	14.3	3	42.9	3	42.9		
Single parent	10	23.8	25	59.5	7	16.7		
Age of mother (years) n=149							3.821	0.672
15-20	4	18.2	15	68.2	13	13.6		
21-30	9	9.9	68	74.7	14	15.4		
31 -40	6	19.4	21	67.7	4	12.9		
41-60	1	20.0	3	60.0	1	20.0		
Occupation of mother n=149							0.978	0.628
Employed	9	16.7	37	68.5	8	14.8		
Not employed	11	11.6	71	74.7	13	13.7		
Education of mother n=149							5.461	0.065
Secondary	8	13.1	39	63.9	14	23.0		
Primary	12	13.6	68	77.3	8	9.1		
Gender of household head n=150							5.875**	0.047
Female headed	8	25.0	18	56.3	16	18.8		
Male headed	12	10.2	90	76.3	16	13.6		

§2 sided; Low=1-4 food groups; Average=5-8 food groups; High = 9-12 food groups

4.9.2 CSB INTAKE AND WATER ACCESS

There was a correlation between the quantity of CSB porridge a child drank in a day and the amount of water used by the household per day (n=35, r= 0.416, p=0.013). There was a negative correlation between the quantity of porridge a child drank in a day and distance to the water source (n=147, r= -0.170, p=0.039) and (n=35, r= -0.420, p=0.012) (Table, 32, 33). There was a negative correlation between the amount of water used and the distance to the water source (n=149, r=-0.167, p=0.042) (Table 32).

Table 32: Correlation between CSB porridge intake by the children and water access

Variable	**Pearson's correlation**	
	r	**p value**
Amount of daily porridge intake by child and		
Total amount of water used daily n= 148	0.093	0.263
Total amount of water used daily n= 35	0.416*	0.013
Distance to water source n=147	-0.170*	0.039
Distance to water source n=35	-0.420*	0.012
Amount of water used and		
Distance to water source n= 149	-0.167*	0.042

*Significance at 0.05 level, 2 tailed

Table 33: Distribution of children by distance to and fro water source & corresponding mean intake of porridge and age of children

Distance to and fro water source in minutes	**Frequency**	**Percent**	**Mean intake of porridge in ml**	**Mean age of child**
≤ 5	95	72.5	721±327	13.2
6-10	24	18.3	839±352	17.1
20 -30	10	7.6	487± 241	12.7
30 -60	2	1.5	350 ± 297	12.0

4.10. FACTORS ASSOCIATED WITH NUTRITIONAL STATUS AFTER AT LEAST 3 WEEKS IN THE FEEDING PROGRAMME

4.10.1 SOCIO ECONOMIC AND DEMOGRAPHIC FACTORS ASSOCIATED WITH NUTRITIONAL STATUS OF STUDY CHILDREN

There was a significant association between access to land and wasting after at least 3 weeks in the programme (Fishers exact test =8.269, p=0.027). Households that had access to land had a higher proportion of children with normal nutritional status than those with no access to land. There was no association between access to land and stunting nor underweight. There was also no association between age, education and occupation of the mother, household size, household expenditure and nutritional status of the child (Tables 34,35,36). There was a significant correlation between household size and expenditure (r=0.285**, p=0.001).

Table 34: Association between socio economic and demographic characteristics and wasting

Variable	WASTING								Fischer's Exact Test	P value
	Normal		Mild		Moderate		Severe			
Household size n=145	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	5.353	0.575
2-4	37	43	26	30.2	17	19.8	6	7		
5-7	21	44.7	19	40.4	17	14.9	0	0.0		
8-11	7	58.3	3	25.0	2	16.7	0	0.0		
Age of mother n=145									10.413	0.529
<20	8	36.4	7	31.8	3	13.6	0	0.0		
21-30	27	30.3	31	34.8	16	18	3	3.4		
31-40	13	43.3	8	26.7	4	13.3	3	10.0		
>40	0	0	2	50	2	50	0	0		
Occupation of the mother n=145									6.309	0.172
Employed 11		21.2	18	34.6	13	25.0	3	5.8		
Not employed 36		38.7	30	32.3	13	14.0	3.2	3		
Access to land n=144									8.296**	0.027
Have access	13	81.2	2	12.5	1	6.2	0	0		
Do not have access	51	39.8	46	35.8	25	19.5	6	4.7		
Monthly Household Expenditure n=131									3.855	0.857
Low	29	28.4	37	36.3	21	20.6	5	4.9		
Average	4	18.2	7	31.8	6	27.3	2	9.1		
High	3	42.9	3	42.9	1	14.3	0	0.0		

Table 35: Association between socio economic and demographic characteristics and stunting

Variable	STUNTING Normal		Mild		Moderate		Severe		V. severe		Fisher's Exact Test	P value
Household size n=147	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent		
2-4	19	21.8	14	16.1	21	24.1	20	23.0	13	14.9	8.965	0.322
5-7	6	12.5	10	20.8	18	37.5	8	16.7	6	12.5		
8-11	4	33.3	3	25.0	4	33.3	0	0.0	1	8.3		
Age of the mother n=146												
<20	2	9.1	6	27.3	8	36.4	4	18.2	2	9.1		
21-30	23	25.6	11	12.2	21	23.3	20	22.2	15	16.7		
31-40	3	10.0	9	30.0	12	40.0	4	13.3	2	6.7		
>40	1	19.9	0	17.8	2	29.5	0	19.2	1	13.7		
Occupation of the mother n=146											0.692	0.968
Employed	9	17.3	11	21.2	15	28.8	7	19.2	10	13.5		
Not employed	20	21.3	16	17.0	28	29.8	17	18.1	13	13.8		
Access to land											1.687	0.810
Have access	4	25	4	25	5	31.3	2	12.5	1	6.25		
Do not have access	25	19.2	23	17.7	38	29.2	25	19.2	19	14.6		
Monthly household expenditure n=136											6.307	0.604
Low	21	19.8	20	18.9	29	27.4	22	20.8	14	13.2		
Average	4	18.2	2	9.1	7	31.8	3	13.6	6	27.3		
High	3	37.5	2	25	2	25	1	12.5	0	0		

Table 36: Association between socio economic and demographic characteristics and underweight

Variable	UNDERWEIGHT										Fisher's Exact Test	P value
	Normal		Mild		Moderate		Severe		V.Severe			
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent		
Household size n=149											4.133	0.853
2-4	15	16.9	32	36.0	21	23.6	15	16.9	6	6.7		
5-7	7	14.9	20	42.6	12	25.5	6	12.8	2	4.3		
8-11	3	16.8	6	38.9	4	24.8	0	14.1	0	5.4		
Age of the mother n=148	16.8	38.9	24.8	14.1	5.4						11.898	0.380
<20	2	9.1	9	40.9	8	36.4	2	9.1	1	4.5		
21-30	20	22.2	30	33.3	18	20.0	16	17.8	6	6.7		
31-40	2	6.5	17	54.8	8	25.8	3	9.7	1	3.2		
>40	1	20	2	40	2	40	0	0	0	0		
Occupation of the mother n=148											6.372	0.171
Employed	7	13.0	16	29.6	17	31.5	10	18.5	4	7.4		
Not employed	25	19.1	58	44.7	36	20.2	21	11.7	8	4.3		
Access to land n=148											3.443	0.447
Have access	5	29.4	8	47.1	3	17.6	1	5.9	0	0		
Do not have access	20	15.3	50	38.2	33	25.2	20	15.3	8	6.1		
Monthly household expenditure n=138												
Low	15	14.0	39	36.4	30	28.0	17	15.9	6	5.6	6.990	0.487
Average	6	26.1	7	30.4	5	21.7	3	13.0	2	8.7		
High	2	25	5	62.5	0	0	1	12.5	0	0		

4.10.2 SOCIO ECONOMIC AND DEMOGRAPHIC FACTORS ASSOCIATED WITH CHANGE IN WHZ, WAZ AND HAZ SCORES

There was a significant association between occupation of the mother and change in WHZ scores (χ^2=3.335, p=0.05) (Table 37), change in WAZ scores (χ^2=5.041, p=0.029) (Table 38), and no association with change in HAZ scores (Table 39). A greater proportion of the children who had an increase in the z scores were from unemployed mothers for WHZ and WAZ scores. There was a significant association between CHWs visits and change in WAZ scores whereby a greater proportion of the children who had an increase in the z scores were from those visited by CHWs (Table 35), but no association with WHZ and HAZ scores (Tables 37,39). There was a significant association between education level of the mother and change in HAZ scores (Linear by Linear Association=6.093**, p=0.000) whereby a greater proportion of children with an increase in z scores were from mothers with primary education (Table 39), but no association with WHZ and WAZ scores (Tables 37, 38). There was no association between z scores and other demographic and socio economic characteristics, namely household size, age of mother, access to land, household expenditure, attendance nutrition talks, morbidity of the child and age of the mother (Tables 37,38).

Table 37: Association between demographic and socioeconomic characteristics and change in WHZ scores

Characteristic	Wasting: change in z score				Pearsons chi square	p value
	Increase in z score		Decrease in z score			
	Frequency	Percent	Frequency	Percent		
Household size n=150					3.673[1]	0.170
2-4	59	66.3	30	33.7		
5-7	24	50.0	24	50.0		
8-11	7	53.8	6	46.2		
Occupation of mother n=149					3.335**	0.05
Employed	27	50.0	27	50.0		
Not employed	62	65.2	33	34.7		
Education of mother n=149					0.155	0.735
Secondary	38	62.3	23	37.7		
Primary	52	59.1	36	40.9		
Access to land					0.197	0.795
Have access	11	64.7	6	35.3		
Do not have access	78	59.1	54	40.9		
Household expenditure n=139					2.304	0.333
KShs 1000-7000	58	54.2	49	45.8		
KShs 8000- 14000	16	66.7	8	33.3		
KShs 15000 -50000	6	75	2	25		
CHW visits n=150					0.022	1.000
Not visited by CHW	25	61.0	16	39.0		
Visited by CHW	65	59.6	44	40.4		
Nutrition education talks n=150					0.440	0.581
Attends talks	66	61.7	41	39.3		
Does not attend talks	24	55.8	19	44.2		
Morbidity n=150					0.495	0.636
Experienced ailment	67	61.5	42	38.5		
Did not experience ailment	23	56.1	18	43.9		
Age of mother					0.026§	1.000
<20	13	59.1	9	40.9		
21-30	55	60.4	36	39.6		
31-40	19	61.3	12	38.7		
>40	3	60	2	40		

**Significant at 95% and exact one sided others are exact two sided, [1]Fishers exact test

Table 38: Association between demographic and socioeconomic characteristics and change in WAZ scores

Characteristic	Underweight: change in z score				Pearsons chi square	p value
	Increase in z score		Decrease in z score			
	Frequency	Percent	Frequency	Percent		
Household size n=148	121	81.8	27	18.2	1.988	0.346
Occupation of mother n=147					5.041**	0.025
Employed	39	72.2	15	27.8		
Not employed	81	87.1	12	12.9		
Education of mother n=147	121	82.3	26	17.7	0.282	0.663
Access to land n=147	120	81.6	27	18.4	-§	0.518
Household expenditure n=137	111	81	26	19	1.560§	0.471
CHW visits n=148					3.149*	0.076
Not visited by CHW	29	72.5	11	27.5		
Visited by CHW	92	85.2	16	14.8		
Nutrition education talks n=148					0.025	1.000
Attends talks	87	82.1	19	17.9		
Does not attend talks	34	81	8	19		
Morbidity n=148					0.495	0.436
Experienced ailment	85	80.4	21	19.6		
Did not experience ailment	35	85.4	6	14.6		

**Significant at 95%, §Fishers exact test, * Significant at 90%

Table 39: Association between demographic and socioeconomic characteristics and change in HAZ scores

Characteristic	Chisquare / Fishers Exact Test [1] Linear by Linear Association[2]	p value
Household size n=146	0.443[1]	0.897
Occupation of mother n=145	0.09[2]	1.000
Education of mother n=149	16.093**[2]	0.000
Access to land n=145	0.599[2]	0.439
Household expenditure n=135	3.375[1]	0.131
CHW visits n=150	2.269[2]	0.132
Nutrition education talks n=146	0.523[2]	0.469

**Significant at 95%

4.10.3 FEEDING PRACTICES AND PROGRESS IN NUTRITIONAL STATUS

The study found no significant association between change in WHZ, HAZ and WAZ scores and whether a child was breastfeeding or not (χ^2=2.590, p=0.108, χ^2=0.282, p=0.732 and χ^2=10.206, p=0.809 respectively). There was a significant association between who fed the child and change in WAZ scores (Fishers exact test =12.034, p=0.021) and change in WHZ scores (Fishers exact test = 15.43, p=0.008) and no association with change in HAZ scores. The proportion of children with an increase in z scores was high when fed by their mother, and while those with a decrease in z scores was high when not fed by their mother (Table 40).

Table 40: Association between change in z scores and who fed the child in the previous 2 weeks

	Mother fed the child		Mother did not feed the child		Fishers exact test	Significance
	Frequency	Percent	Frequency	Percent		
Change in WAZ scores						
1	75	58.5	8	34.8	12.034**	0.021
2	25	20.3	7	30.4		
3	5	4.1	2	8.7		
-1	21	17.1	4	17.4		
-2	0	0.0	1	4.3		
-3	0	0.0	0	0		
-4	0	0.0	1	4.3		
Change in WHZ scores					15.437**	0.008
+1	56	44.4	4	17.4		
+2	18	14.3	5	21.7		
+3	4	3.2	2	8.7		
-1	41	32.5	7	30.4		
-2	5	4.0	4	17.4		
-3	2	1.6	0	0		
-4	0	0.0	1	4.3		
Change in HAZ scores					4.375	0.473
+1	73	58.9	11	55		
+2	34	27.4	6	30		
+3	6	4.8	3	15		
-1	8	6.5	0	0		
-2	2	1.6	0	0		
-3	1	0.8	0	0		

**Significant at 95%

4.10.4 EFFECTS OF SELECTED STUDY GROUP CHARACTERISTICS ON CHANGE IN WHZ, HAZ AND WAZ SCORES

Generalized Linear Model (GLM) was used to assess the effect of factors namely demographic, socio-economic, performance, dietary diversity, who fed the child on change in WHZ, HAZ and WAZ scores. The Omnibus Model Test from GLM indicates that the overall model for change in WHZ and HAZ scores were statistically significant with Chi-square values of 28.346 (p=0.003) and 27.825 (p=0.003) respectively. The model on changes in WAZ scores was not statistically significant (Table 41).

Table 41: Omnibus Model Test[a] from regression analysis for change in z scores

Variable	Likelihood Ratio Chi-Square	Degrees of freedom	Significance
WHZ scores	28.346	11	.003
HAZ scores	27.825	11	.003
WAZ scores	8.870	11	.634

[a] Predictors (constant), total number of food groups consumed, length of days in program, monthly household expenditure, education, occupation of mother, number of times attended nutrition talks in a month, person who fed the child

The results from GLM regression show that length of stay in the program, occupation of the mother and household dietary diversity had significant effects on changes in WHZ scores, while length of stay in the program and the person who fed the child were significant for change in HAZ scores (Table 42).

Table 42: Main effects for change in WHZ, HAZ and WAZ

Individual parameters	WHZ			HAZ			WAZ		
	Wald Chi square	d.f	Sig.	Wald Chi square	d.f	Sig.	Wald Chi square	d.f	Sig.
(Intercept)	3.766	1	.052	3.386	1	.066	9.365	1	.002
Education level	5.435	3	.143	6.164	3	.104	4.226	3	.238
Number of times attended nutrition training	6.209	3	.102	2.548	3	.467	1.330	3	.722
Length of stay in program	4.979**	1	.026	9.182**	1	.002	1.169	1	.280
Occupation of mother	9.512**	1	.002	0.036	1	.849	1.497	1	.221
Household dietary diversity score	3.853**	1	.050	3.057	1	.080	1.197	1	.274
Expenditures	0.108	1	.743	3.669	1	.055	0.708	1	.400
Person who fed the child	2.266	1	.132	7.353**	1	.007	1.593	1	.207

** Significance at 95%

From the regression analysis, the regression coefficients for individual parameters for change of WAZ scores showed that none of the independent variables had significant effect on the changes. Attendance of nutrition talks was significant whereby households who attended twice and thrice having lower changes in WHZ scores than those who attended four times. Changes in WHZ scores were significantly higher (positive) for unemployed mothers than employed mothers. The length of stay in the program and number of food groups showed significantly positive correlation with changes in WHZ scores. Length of stay in the program showed significant positive correlation with change in HAZ scores and children who were fed by the mother had significantly lower changes (negative) in HAZ scores (Table 43).

Table 43: Strengths of coefficients of model predictors of selected study group characteristics against change in WHZ, HAZ and WAZ scores

Variable	WHZ			HAZ			WAZ		
	B	Standard Error	Sig.	B	Standard Error	Sig.	B	Standard Error	Sig.
Intercept	-5.132	3.4511	.137	1.541	.8669	.075	.485	.7356	.510
No education	8.641	4.5999	.060	-1.352	1.1544	.242	1.628	1.0206	.111
Primary level education	2.487	3.2622	.446	-.566	.8195	.490	.208	.7220	.773
Secondary level education	1.657	3.2387	.609	-.955	.8113	.239	.139	.7188	.847
Number of times attended nutrition education talks									
Once	-1.282	.9600	.182	-.244	.2425	.314	.008	.2242	.972
Twice	-2.033**	.9738	.037	-.348	.2429	.152	-.204	.2250	.365
Thrice	-2.330**	1.0599	.028	-.344	.2686	.200	-.146	.2475	.555
Length of stay in programme	.23**	.103	.026	.079***	.0259	.002	.026	.0240	.280
Not employed	2.353***	.763	.002	-.037	.1924	.849	.215	.1760	.221
Dietary diversity score	1.429**	.7279	.050	.325	.1857	.080	-0.185	.1695	.274
Monthly expenditure	-0.277	.8449	0.743	.409	.2133	.055	-0.166	.1973	.400.
Person who fed the child	-1.551	1.0301	0.132	-0.737***	.2719	.007	-0.302	.2392	.207

References for categorical variables are post-secondary for education, Four times for number of times attended nutritional training, employed for mothers occupation, mother did not feed the child

***Significance at 99%, ** Significance at 95%

Model for effects of factors on change in z scores

The following is the model for the effects of the factors on change in WHZ and HAZ scores.

$$Y^1 = -5.132 - 2.1815X_1 + 0.23X_2 + 2.353X_3 + 1.429X_4$$

$$Y^2 = 1.541 + 0.079X_2 - 0.737X_5$$

Y^1 =Change in WHZ scores, Y^2 = Change in HAZ scores, X_1=Number of times attended nutrition talks X_2 = Length of stay in the programme, X_3 = Occupation, X_4=Dietary diversity score X_5= person who fed the child

4.11 DIETARY INTAKE AND PROGRESS IN NUTRITIONAL STATUS

4.11.1 ASSOCIATION OF PROTEIN, ENERGY , VITAMIN A AND IRON INTAKE AND PROGRESS IN NUTRITIONAL STATUS

The study found a significant association between protein intake of the diet consumed in the previous 24 hours and change in HAZ scores for all the children (aged 6-12 and 13 - 36 months categories) (Linear by Linear Association = 5.152, p=0.023). The study found no association between protein intake and change in WHZ and WAZ scores, nor any association between energy and Vitamin A intake and change in HAZ, WHZ and WAZ scores (Table 44).

Table 44: Association between dietary intake of protein, energy and Vitamin A and progress in nutritional status

Variable		Type of change in measurement				Linear by Linear Asso-ciation	p value
		Decrease in HAZ scores		Increase in HAZ scores			
		Frequency	Percent	Frequency	Percent		
Protein							
7-36 mths	Inadequate	2	100	0	0	5.152*	0.023
	Adequate	8	24.2	25	75.8		
Energy							
7-12 mths	Inadequate	2	28.6	5	71.4	0.000	1.000
	Adequate	8	28.6	20	71.4		
13-36 mths	Inadequate	5	23.8	16	76.2	0.576	0.704
	Adequate	5	35.7	9	64.3		
Vitamin A							
7-36 mths	Inadequate	1	14.3	6	85.7	0.850	0.335
	Adequate	9	32.9	19	67.9		
		Decrease in WHZ scores		**Increase in WHZ scores**			
Protein							
7-36 mths	Inadequate	1	50	1	50	0.086	1.000
	Adequate	13	39.4	20	60.6		
Energy							
7-12 mths	Inadequate	10	47.6	11	52.4	1.234	0.401
	Adequate	4	21.6	10	71.4		
13-36 mths	Inadequate	4	57.1	3	42.9	1.041	0.311
	Adequate	10	35.7	18	64.3		
Vitamin A							
7-12 mths	Inadequate	1	14.3	6	85.7	0.357	0.335
	Adequate	9	32.9	19	67.9		
13-36 mths	Inadequate	2	28.6	5	71.4	0.463	0.676
	Adequate	12	42.9	16	57.1		
		Decrease in WAZ scores		**Increase in WAZ scores**			
Protein							
7-36 mths	Inadequate	1	12.5	7	87.5	0.420	0.517
	Adequate	1	3.7	26	96.3		
Energy							
7-12 mths	Inadequate	1	12.5	7	87.5	0.354	0.552
	Adequate	6	22.5	21	77.5		
13-36 mths	Inadequate	4	50	4	50		
	Adequate	17	63	10	37		
Vitamin A							
7-36 mths	Inadequate	0	0	8	100	2.519	0.166
	Adequate	7	25.5	20	74.1		

4.11.2 CSB INTAKE AND PROGRESS IN NUTRITIONAL STATUS

The study found no significant association between the contribution of CSB to dietary intake and change in z scores (Table 45). The study found no significant association between CSB flour to fluid ratio and change in z scores, nor a significant association between sharing of CSB porridge and change in z scores.

Table 45: Correlation between dietary intake and progress in nutritional status

Nutrient Intake	WHZ		HAZ		WAZ	
	Pearson Correlation	P value	Pearson Correlation	P value	Pearson Correlation	P value
Energy	-	0.668	-0.263	0.127	-0.126	0.469
Protein	0.069	0.692	-0.244	0.157	-0.213	-0.220
CSB energy	-0.224	0.195	-0.035	0.841	-0.088	0.615
CSB protein	-0.200	0.249	-0.111	0.524	-0.200	0.249

Significant correlation at 95%

4.11 SELECTED FACTORS ASSOCIATED WITH CHILD'S LENGTH OF STAY IN THE PROGRAMME

4.11.1 SOCIO ECONOMIC AND DEMOGRAPHIC FACTORS

The occupation of the mother i.e whether she was employed or was a housewife, was positively associated with the length of stay in the programme (Fisher's exact test =11.389, p= 0.020) (Tables 46, 47). A greater proportion of the children stayed for 61 - 561 days among the employed mothers (41.5%) as compared to unemployed (36.2%), while a greater proportion stayed for 21-60 days among the unemployed (63.8%) as compared to the employed (58.5%).

Table 46: Association between demographic, socio economic characteristics and length of stay of children in the program

Variables	Fishers exact test	Significance
Occupation of the mother	11.389	0.020*
Age of the mother	13.405	0.261
Household size	10.629	0.186
Education of the mother	3.830	0.436
Marital status	7.568	0.425
Gender of household head	6.250	0.154
Household expenditure	7.930	0.378

*level of significance < 0.05

There was no association found between the age of the mother, household size, household income, education level of the mother, marital status and the length of stay of the children in the programme (Table 47).

Table 47: Association between occupation of mother and length of stay of children in the program

	DAYS IN PROGRAM									
	21-30		31-60		61-90		91-120		121-561	
Occupation of mother	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Employed	24	45.3	7	13.2	15	28.3	5	9.4	2	3.8
Not employed	28	29.8	32	34	15	16	13	13.8	6	6.4

4.11.2 DAILY WEIGHT GAIN AND CHANGE IN Z SCORES

The study found a significant correlation (r=.454**, p= 0.000) between the child's daily weight gain and the child's length of stay in the programme in the retrospective study. There was a significant correlation between change in HAZ scores (r=0.420**, p=0.000), change in WAZ scores (r=0.194*, p= 0.019) and length of stay after 3 weeks in the program for the cross sectional study.

4.11.3 UTILIZATION OF CSB

The number of days that CSB lasted was associated with length of stay in the programme in days (Fishers Exact Test=13.724, p=0.002). There was a correlation between how long CSB lasted and the ratio of fluid to flour used for its preparation (r=0.187 p=0.022).

4.11.4 FEEDING PRACTICES

The study did not find a significant association between breastfeeding and behaviors in complementary feeding and length of stay of the child in the program.

CHAPTER 5: DISCUSSION

5. 1 DEMOGRAPHIC, SOCIO -ECONOMIC CHARACTERISTICS OF THE POPULATION AND RESPONDENT

The study findings for the population show that the ratio of male: female, dependency ratio and mean household size are similar to the national KDHS of 2008 -2009 indicating that the community in Mukuru is representative of a community in Kenya. Differences occur with the household headship where Mukuru has lower female household headship (21.3%) as compared to the national urban female headship (29%) and higher male headship possibly due to the slum setting which has a high migration of males to the city seeking employment. The school attendance of the population (80.8%) is lower than the national average for urban areas (96.4 %) despite a difference in the age categories used for the studies, whereby Mukuru had 6-18 years, compared to 6-15 years for the KDHS survey. This may be due to lack of amenities in slum settings including schools, which contributes to a low school attendance. The use of charcoal and kerosene for cooking (47.3%, 31.1% respectively) is higher than the national average for urban areas (41.1%, 26.9%) possibly due to their affordability as compared to other cooking fuels like gas or electricity. The proportion of respondents having a secondary level of education (40.9%) is higher than the national average for rural areas (26.3%) but lower than the average for urban areas (57.9%). The employment status of the respondents is high as compared to the national status whereby 61.7% are employed in some income generating activity compared to 41% nationally. The latter considered employment status within the previous year while the study examined for the previous month possibly contributing to the differ-

ences (KNBS and ORC Macro, 2011). The respondents have diverse education level, age, socioeconomic background and are from varied household size and marital characteristic. This means that the problem of having a malnourished child is a problem of the community and is not limited to specified respondent or household characteristics

5.2 FOOD SECURITY AND NUTRITION EDUCATION

Majority of the respondents experience food shortage possibly due to low purchasing power and escalating food prices that make food unaffordable. Although a large proportion of the households have an average dietary diversity score, the diet consists mainly of carbohydrates and minimally of protein thus contributing to child malnourishment.

The study found no association between nutrition education and change in nutritional status of the child, contrary to other studies that indicate the importance of nutrition education in improving child nutritional status when undertaken with food supplementation for food insecure populations (Black et al, 2008). The lack of association may be attributed to a large proportion of the mothers (48%) failing to attend sessions hence missing the talks and only a minority (27.3%) are visited at home by CHWs. Some of the households are affected by fire break outs and therefore default at the SFP.

Nutrition education remains important and a nutritionist at the centre, a key informant in the study indicates that mothers receive individual counseling on nutrition to prepare them when exiting the programme 2-3 weeks in advance. Once discharged they are given a grace period of 3 months when the child receives free treatment at the clinic and incase of relapse the child is attended to promptly. Nutrition education should be specific to the

situation; for example, when mothers in a FGD were asked on their feeding plans for the children once they exit, they mention a variety of foods like fish and beans and none mention using porridge, implying the need to assist mother with alternatives to CSB when the children leave the SFP. Also a CHW mentioned that women especially from Kamba and Luo communities believe in witchcraft as being the cause of malnourishment in the children. Therefore counseling on the underlying causes of malnutrition needs to be done.

CHWs have an important role of linking the community to the centre. They mobilize the community, make door to door visits to screen and refer malnourished children. CHWs receive a token of 300/= per SFP session. They have been trained on nutrition, how to take MUAC measurements, counseling before referrals, premixing of flour with oil, IYCF, breastfeeding and management of malnutrition. A key informant who is a vice chair of a CHW village committee mentioned that the committee oversees the work of the CHWs independent of the nutrition centre. The vice chair oversees 170 CHWs of whom 50 are active. One CHW is meant to be in charge of 50 households; however some households do not have a CHW allocated to them. The large number of households per CHW may explain why majority of the mothers were not visited. In addition the project staff mentioned that they were under staffed and need to have more CHWs to support the work at the nutrition centre.

5.3 WATER AND SANITATION

The study found that majority of the households have access to safe and clean water which is consistent with a study on Mukuru indicating that Nairobi City Water and Sewerage Company in collaboration with other agencies have increased household access to safe water (Peal and Evans, 2010). Majority of the households (98.7%) are able to access water within 30 minutes, which is higher than the national average for urban areas of 94% (KNBS and ORC Macro, 2010).

5.4 PERFORMANCE OF THE PROGRAMME

The average length of stay of the children (12 weeks) in the Mukuru programme is much longer than in similar studies whereby in Gambia it was 3.5 weeks (minimum 1 week and maximum was 9) (Papart and Abimbola, 2012) and 8 weeks in Malawi (Matilsky et al, 2009). In Gambia there was high compliance to recommendations of how to use corn soy blend leading to shorter lengths of stay. In this study (Mukuru), correlation between mean weight and the length of stay implies that children who stay longer in the programme have a better nutritional status, due to the cumulative benefits of using corn soy blend. The recovery rate of the children of 72.9% is slightly below the recommended rate of 75% for a SFP (MOMS and MOPHS, 2009).

5.5 NUTRITIONAL AND MORBIDITY STATUS OF THE STUDY CHILDREN

5.5.1 PREVALENCE OF MALNUTRITION

The study found a high malnutrition status of the study children, which is consistent with similar research conducted on children admitted to a supplementary feeding program (Thuita, 2010). The fact that about a third of the children had a normal status arises from children admitted from the outpatient therapeutic care clinic who recover from severe acute malnutrition and require observation for a period of two weeks before discharge. The high levels of stunting reflect the national problem of stunting where prevalence nationally is 33% for children under five (KNBS and ORC Macro, 2010). Analysis by various age groups shows that stunting is highest (43 percent) in children aged between 12-23 months and lowest (7 percent) in children age less than 6 months. Severe stunting shows a similar trend, where children aged 12-23 months have the highest proportion of severely stunted children (16 percent) and those less than 6 months have the lowest proportion (1 percent) (KNBS and ORC Macro, 2010). The study supports other findings that show high stunting levels alongside zinc deficiency (Black et al, 2008).

5.5.3 MORBIDITY

The proportion of children having ARI and diarrhea in the previous 2 weeks to the study iss high (58.7 and 46 per cent respectively) as compared to national figures in the KDHS 2008-2009 survey, where prevalence of ARI and diarrhea was found to be 8% and 16.6% respectively. Diarrhea prevalence peaked nationally to 30 percent for ages 6 -11 months. The proportion of children having febrile related illnesses (24 percent) iss similar to national figures in the KDHS 2008 -2009 survey (KNBS and ORC Macro, 2010). Al-

derman and Garcia (1983) found that there was an interdependence between morbidity and poor nutritional status. Through modeling, they found that diarrhea reduces weight-for-height in children, and other illnesses curtail long run growth of children. However though a majority of the children in this study experienced an ailment within two weeks to the study, no association was found between this and dietary intake neither was an association found between morbidity and nutritional status. This may be due to the design of the study that assessed dietary intake of the child in the previous 24 hours. It is possible that an assessment of dietary intake for the previous 2 weeks may have yielded a more accurate picture in relation to morbidity.

5.6 DIETARY INTAKE

5.6.1 ADEQUACY FOR ENERGY, PROTEIN, IRON, VITAMIN A AND ZINC

The high adequacy in protein and Vitamin A is partly due to high dietary intake of pulses and green vegetables respectively and the high content of Vitamin A and protein in the CSB consumed by the children. The diet is inadequate in Iron and Zinc which is attributed to low intake of protein from animal sources. The household dietary diversity score indicates that vegetable and milk consumption is high thus contributing to a high intake and adequacy for Vitamin A while protein from animal sources is low, resulting in the low zinc and iron intake. Protein from animal sources costs more, making it unaffordable for slum dwellers who characteristically have low income earnings.

5.6.2 CSB CONTRIBUTION INTAKE TO DIETARY INTAKE

A nutritionist at the centre who is a key informant indicates that each mother received 2000 gram of CSB weekly but ideally were supposed to receive 3800grams fortnightly.

Another key informant, a CHW also indicates that a CSB ration that lasted for a week is preferable to one that lasts for 2 weeks because this facilitates weekly monitoring of the child and increases interaction between CHWs and mothers. From a FGD with mothers of the study children, they indicate that the CSB flour ration given by the centre is sufficient. The nutritionist advices that the recommended daily requirement of CSB is 250grams, and cooking instructions is 1 cup of flour to 3 cups of cold water with a cooking time of 10 minutes after which it can be stored in a flask for use for the whole day. Two types of flour are used; a sweetened type that was white in colour and an unsweetened one that was brown. The mothers are sometimes advised to add sugar to the unsweetened type and milk may also be added. The mothers criticize the quality of flour previously used which the children did not like and may have led to reduced intake of the porridge. The flour had large sized particles, was rough in texture, not smooth and not tasty according to the mothers.

The nutritionist indicates that CHWs follow up mothers to monitor how they used the CSB flour to prevent the use of flour for purposes other than the intended i.e for feeding the child. However home visits are not made as frequently because the client number had increased, mainly due to use of a different criteria for admission which had been a MUAC of 12.5 cm, and was changed to 11.5 cm as advised by WFP.

CSB is meant to provide about 50 percent of the child's daily dietary requirement. A study in Malawi found that CSB provided 44 percent of the dietary requirement (Maleta et al, 2004). The study's findings for Mukuru are fairly consistent with this whereby, CSB provides about 50 percent of the child's daily dietary requirement for Vitamin A, iron and zinc but for energy and protein it provides 33 and 37 percent respectively. The

lower intake of energy and zinc may be due to sharing of CSB porridge in the family and over dilution with fluid. The energy and protein provided by CSB is low hence does not translate to a greater proportion of children increasing weight at the recommended standards of more than 5 gm per kg body weight daily.

5.7 PROGRESS IN NUTRITIONAL STATUS

5.7.1 DAILY WEIGHT GAIN

A nutritionist' a key informant at Mary Immaculate Nutrition Centre indicates that children are supposed to have gained their weight within 4 months. Others are cured within a month depending on the admission criteria e.g. MUAC, weight-for-height or height-for-weight z-scores. For example a child with a MUAC of 13 with a weight for height of –2 z score would be eligible for admission in the program. The nutritionist states that at admission new cases should be screened for weight-for-height, height-for -weight z scores and MUAC but the centre mostly uses weight –for-height z scores and MUAC.

The mean daily weight gain in this study (1.56 and 1.69 g) is below the recommended weight gain of 5 g kg^{-1} body wt/ day for children and is almost similar to weight gains in a study conducted in Malawi (0.6 - 2 g kg^{-1} body wt/ day) (Matilsky et al, 2009). The mean daily weight gain is also low as compared to a study conducted in Niger which had 3.5 g (Nackers et al, 2012) and in Gambia 7.7 g (Papart and Abimbola, 2012). In the study in Niger, the family of the malnourished child was provided with a food ration for the family comprising cooking oil, cereals and beans in addition to the CSB.

5.7.2 CHANGE IN Z SCORES

The significant difference in z scores, MUAC, weight and height at admission compared to at the time of study and the change in z scores suggests an improvement in the nutritional status of children. Stunting shows the highest proportion of children with an increase in z scores (92.4%) implying that the feeding progamme has greatest impact on stunting followed by underweight and lastly wasting. This may be attributed to intake of CSB which is fortified with zinc and other micro nutrient that are beneficial for linear growth and the high level of stunting thus showing greater change than if the level were low.

5.7.1 DEMOGRAPHIC AND SOCIO ECONOMIC FACTORS ASSOCIATED WITH NUTRITIONAL STATUS

The findings of the study concur with studies on access to land being associated with nutritional status of the study children, which in this study, is associated with underweight. Alderman and Garcia (1983) found that the incidence of underweight children tended to be much higher among the landless than those with access to land. Even among those who own land, the smallholders in the bottom terciles had about twice the proportion of underweight children as those in the top terciles. This study finds no association between income levels and nutritional status in contrast to other studies which have indicated that malnutrition in children tends to be more severe in households with lower average incomes per capita (Alderman and Garcia, 1983).

The significant association between occupation of the mother and nutritional status of the children is consistent with other studies. Ukwuani and Suchindran (2003) found that maternal occupation had been linked to lower height and weight for age measures as well as

an earlier termination of breastfeeding compared to mothers who did not work outside the home (Ekanem, 1993). In this study (Mukuru) the unemployed mothers are mainly married and have a mean higher household expenditure than the employed mothers, who are mainly were single. The finding that the nutritional status and average daily weight gain of children from the unemployed mothers is higher than the employed mothers, may mean that the unemployed mothers are better provided for by their husbands and use the higher incomes to prepare a more diversifed diet. It also implies that they are available to personally feed and care for their children, leading to a better status of the children as compared to the employed mothers.

The lack of association between age/ education level / household size and nutritional status of the children is possibly because the study children came from diverse socio economic and demographic backgrounds. The lack of association with the education level of the mother except for change in stunting that was associated with is contrary to other studies. Alderman and Garcia (1983) found that the education of mothers to at least the primary level, reduced the prevalence of wasting in children by almost one-half. Other studies indicate that education of the mother has a positive effect on children's growth, developmental and nutritional status (KNBS and ORC Macro, 2010), because mothers typically allocate more family resources to increase children's nutrition than fathers (Pfeiffer et al, 2001). However, Burchi (2010) pinpoints the importance of the mother's practical nutritional knowledge for choosing diversified diets for their children, above the mothers schooling whose direct effect though large declines as the mothers educational level rises. This is similar to earlier findings by Appoh and Krekling (2005) that mother's practical knowledge about nutrition may be more important than formal maternal educa-

tion for child nutrition outcome. In this study the implication is that mothers with primary and secondary level of education are similarly constrained in having employment opportunities, and the higher education level does not translate into better earnings. In addition, respondents of both primary and secondary level bring malnourished children to the supplementary feeding programme implying that they are both deficient in nutritional knowledge and care of the children

5.7.2 DEMOGRAPHIC AND SOCIO ECONOMIC FACTORS ASSOCIATED WITH PROGRESS IN NUTRITIONAL STATUS

The finding that a greater proportion of children increased in z scores among unemployed mothers and when their mothers receive visits from CHWs implies that unemployed mothers have more time to care for their children and encourage them to feed thus increasing dietary intake, and that CHWs encourage the mothers in child care and feeding practices. A CHW who is a key informant mentions that many single mothers are found in the surrounding community who being the breadwinners experience the burden of providing for school fees and being working mothers are unable to care for their children They face even more challenges because they may be suffering from HIV infection.

More children whose mothers have primary level of education have an increase in HAZ scores possibly due to these mothers not being in employment as compared to their counterparts that have secondary level education. The finding that when mothers feed their children, a greater proportion of the children have an increase in WAZ and WHZ scores may mean that mothers give more care and attention to the child's feeding as compared to other care givers, thus positively impacting the child's nutritional progress.

5.8 FACTORS ASSOCIATED WITH DIETARY INTAKE

5.8.3 DEMOGRAPHIC AND SOCIO ECONOMIC FACTORS ASSOCIATED WITH DIETARY INTAKE

The association between family size and household dietary diversity score means that larger families consume fewer food groups, possibly due to less per capita income in the larger families. The study found that ninety percent of smaller families consume 5-12 food groups as compared to 54% from large families.

The association of marital status with household dietary diversity is possibly due to more disposable income for polygamous and monogamous than single parent households leading to consumption of a higher dietary diversity score. More monogamous homes consume 5-12 food groups, followed by the polygamous and then the single parent homes.

Female headed households also consume fewer food groups and this may be attributed to a lower disposable income compared to male headed households. Ninety percent of the male headed households consume 5-12 food groups as compared to 75% for female headed. In this study more males are salaried and contribute an income as compared to the women.

The study found no association between household dietary diversity score and access to land, household expenditure, CHW visits, attendance at nutrition education talks, age, education and occupation of the mother

Correlations between the amount of porridge the child drinks and the distance to the water source implies that mothers further away from the water source use their water sparingly to prolong it and prepare less porridge leading to lower intake by the child. While

correlation between the amount of porridge the child drinks and quantity of water the household uses per day implies that mothers living nearer the water source may be freed to have more time to prepare porridge, food and feed the child more frequently, thus increasing intake. This is a benefit also mentioned by Bergeron and Esrey (1993) that by reducing the time spent obtaining water, women spend much of that time in food-related activities, such as preparing food and feeding young children.

5.8.2 HEALTH AND FEEDING PRACTICES

The finding that almost half of the children are introduced to foods other than breastmilk before 6 months of age implies that 45.8% of the children are not exclusively breastfed for 6 months. This proportion is higher than the national average of 36% possibly due to a third of the mothers in the study being in employment. Early introduction of other foods negatively impacts on child health and nutrition (KNBS and ORC Macro, 2010). It is expected that a majority of the children will show increased weights and increase in z scores because they were largely fed by their mothers.

5.9 ASSOCIATION BETWEEN DIETARY INTAKE AND NUTRITIONAL STATUS OF THE CHILDREN

The lack of association between dietary intake and weight, dietary intake and nutritional status, dietary intake and progress in nutritional status and may be due to the insufficiency of the diet, low weight gain and small change in z scores. Protein intake however is significantly associated with change in HAZ scores A CHW cites economic constraints faced by mothers that affects provision of adequate diets for the children and further explains that children do not gain sufficient weight because some mothers fail to supplement the diet and solely depend on corn soy blend supplement. Protein intake the study

children is high and may positively impact linear growth despite it being mainly from plant sources. The study children do not gain sufficient weight using corn soy blend, which they may have done if put on a more nutrient rich and dense supplement like the Plumpy nut which is a Ready To Use Therapeutic Food (RUTF). This would have led to increased weight gains and a decrease in the length of stay. Nackers et al (2010) conducted a study on the treatment of childhood MAM in Niger where the use of RUTF resulted in a higher weight gain, a higher recovery rate, a shorter length of stay and a lower transfer rate to the Inpatient therapeutic feeding centre as compared to a CSB pre-mix. The Niger study found that this may have important implications on the efficacy and the quality of SFPs. In a study conducted in Malawi, when the child stayed for 8 weeks and remained wasted the child was enrolled in the standard therapy for severe malnutrition, home based therapy with RUTF, and was referred for medical evaluation (Matilsky et al 2009).

5.7.5 FACTORS ASSOCIATED WITH LENGTH OF STAY

The finding that a greater proportion of children stay for shorter periods when the mother is unemployed may be attributed to personalized care by mother for the child. This contributes to better health and dietary intake leading to a faster progress of the child in the programme.

5.8 PREDICTORS OF CHANGE IN WHZ, HAZ AND WAZ SCORES

The finding that a child whose mother is unemployed mothers has higher changes in WHZ scores implies that the availability of the mother to care for and feed the malnourished child is important. The employed mother may be absent from home and unavailable

to assist her child more personally. Length of stay in the program has larger effects on change in WHZ and HAZ scores whereby children progress well due to beneficial effects of intake of an overall improved diet due to corn soy blend for an extended time. Household dietary diversity has larger effects on change in WHZ scores which indicates the role of improved dietary intake in improving child nutritional status. When the mother feeds the child negative effects were found on progress of HAZ scores. This finding is contrary to what is expected and a larger sample size may be required to depict the situation.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The study concludes that employment status (whether a mother is employed or not), education level of the mother and household dietary diversity are important for progress of a child's nutritional status, specifically wasting in a SFP. In addition the duration of a child in a SFP is important for the child's progress with respect to stunting and wasting, due to benefits of intake of an overall improved diet enhanced by the CSB supplement.

Family size, gender of household head and whether a home has a single parent, both parents or is polygamous have important implications on household dietary diversity, whereby smaller, male headed and monogamous homes associate with a higher dietary diversity.

Overall dietary intake is important for a child's progress in a SFP. However considering that households in informal settings are normally constrained in affording animal protein foods, if dietary intake of plant proteins is high and this includes CSB, it significantly impacts stunting when prevalence is high in a SFP, but not wasting nor underweight. Conversely a diet low to average in energy, vitamin A, iron and zinc, despite the contribution of CSB supplement will have no significant effect on progress of a child in a SFP.

6.2 RECOMMENDATIONS

In a SFP, Community Health Worker home visits and nutrition education should emphasise on the importance of household dietary diversity for the child's nutritional progress and the importance of the mother's presence to care for and feed the child. Community

Health Worker home visits and nutrition education should also focus on single parent, female headed households, households having employed mothers and large families where children are likely to have low household dietary diversity, making them more vulnerable to malnutrition. Efforts should be made to improve mother's attendance at nutrition education sessions through introducing support groups, mother peer educators and other means. The delivery of health talks should be improved in terms of timeliness, because mothers evade health talks to avoid waiting for long to attend the services at the SFP.

Along with this CHW home visits need to be enhanced to complement nutrition education that is conducted at the centre. The use of clinic cards to chart growth of the children during the sessions should be used to reinforce learning by the mothers.

There is need to provide a family food ration or more CSB flour to cater for sharing of CSB within the family. Mothers need to be trained on income generating activities because of their low economic status so that they contribute to providing adequate diet for their children. Mothers should also be trained on how to mix, mill and supply enriched flour by themselves so that when they exit the programme they can continue to provide their children with a healthy porridge drink.

The performance of the program would be enhanced if supporting services like maternity wing were provided at the main clinic at Mukuru Promotion Centre. This would enhance timely delivering of some messages e.g. breastfeeding the baby immediately after delivery. Mothers deliver their babies in other clinics like Makadara, South B, Langata and other private facilities.

Further research is required to determine the cost effectiveness of RUTF as compared to CSB for the rehabilitation of moderately malnourished children. Research should be conducted in a community to determine factors associated with child nutritional status and dietary intake of children using a control group, thus having a group that receives CSB and those who do not.

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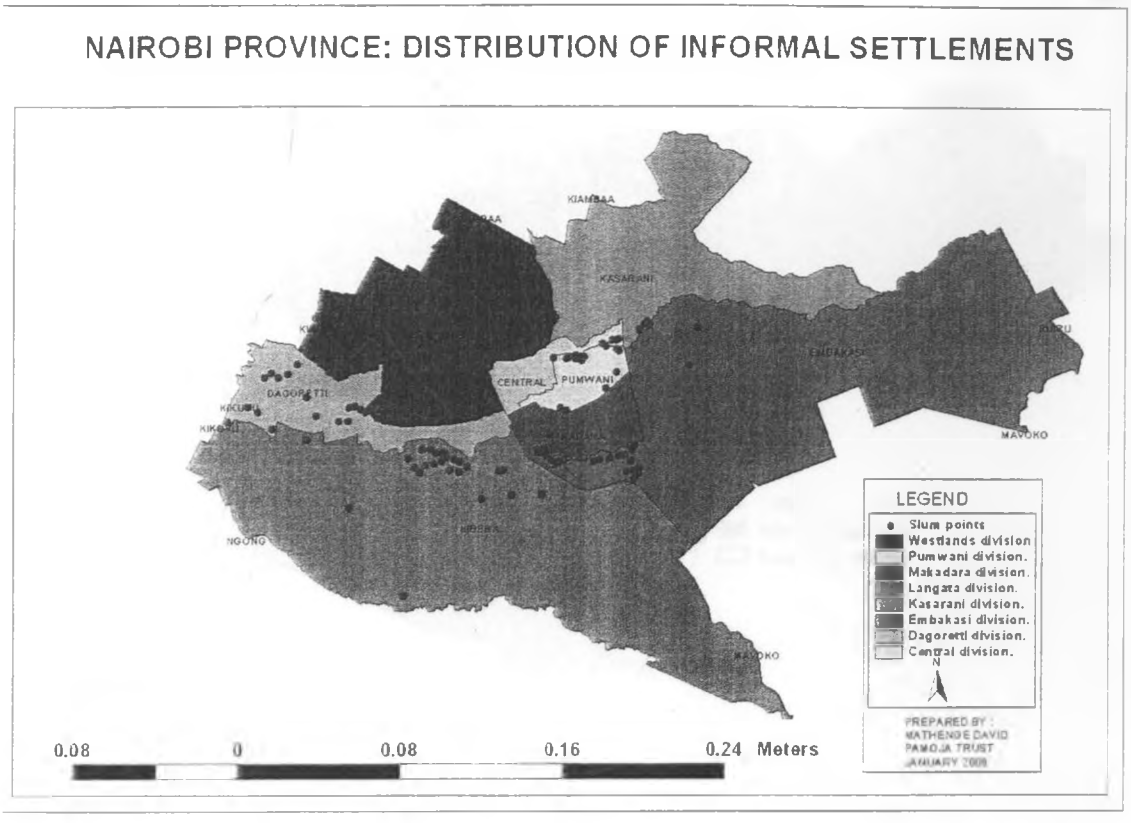
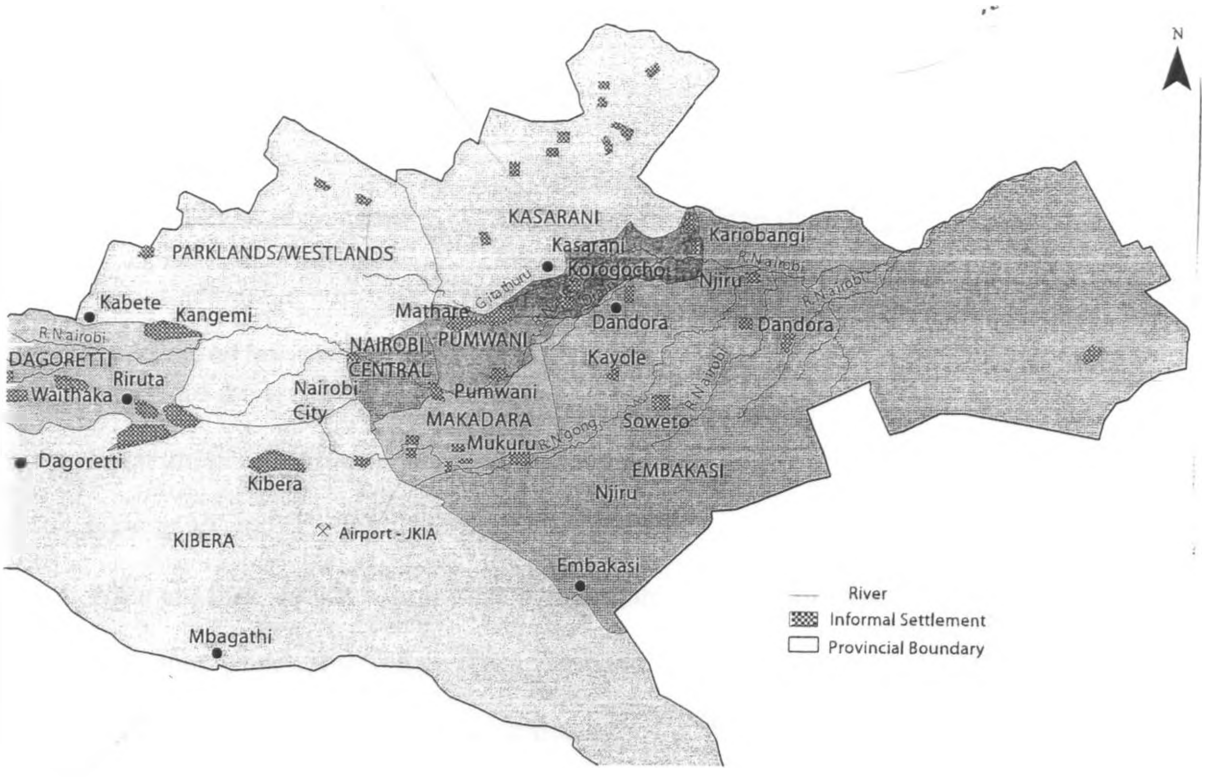
APPENDICES

APPENDIX 1: MAP OF NAIROBI PROVINCE



Source: IRIN, 2008

APPENDIX 2: LOCATION OF MUKURU



Source: UNEP, 2009

APPENDIX 3: KEY INFORMANT INTERVIEW GUIDE FOR PROGRAMME STAFF

Date _____	Interviewer _____
Name of respondent _____	Person taking notes_____
Job title_____	Person observing _____
Sex of respondent_____Age_____	Time started _____ Time ended_____

Background information on the project

When did the feeding programme start at Mukuru?

What are the activities at the feeding programme?

How many staff are involved in this programme?

What are their qualifications? Probe on number of years of experience

Have they been trained? Specify the training.

Who are your partners in this programme?
In what areas do you collaborate?
Describe the families that come for the programme : where they come, from their age and other characteristics- economic status and nutritional knowledge

Counseling

How many staff counsel mothers on nutrition?

Have staff been trained in nutrition?

When are nutrition talks held?

Where do you get information for the nutrition messages?

What are key messages to mothers on nutrition?

Are the talks beneficial to mothers? Probe how

Use of ration

What is the composition of the ration

How much ration do you give to mothers every 2 weeks?

Describe the ration in terms of nutrient composition.

How much does each mother receive?

How do the mothers use this ration? Is it used for the intended purpose? Probe if it is given to other family members, do they sell it or share with others?

What is the preparation method of the porridge?. Is milk or sugar added?

Do mother use ration solely for feeding child?

Is this ration sufficient?

How do you ensure that the ration is used only to feed the child?

Feeding programme performance

What is the catchment population and area of the project?

How is the SF program performing? (impact on children and service delivery).

Probe on challenges and weaknesses and strengths

Do clients default? Why is this so?

Do you experience defaults and relapses from moderate to severe malnourished category? Probe how this is handled

What sicknesses do children in the programme experience?

How do mothers meet the nutritional needs of children who were in the programme once they exit from the program?

Are mothers prepared for exit from the programme?

How can the programme be improved?

What is the plan for sustaining improved feeding for children when they are out of the programme?

APPENDIX 4: KEY INFORMANT INTERVIEW GUIDE

Date _____	Interviewer _____
Name of respondent _____	Person taking notes_____
Job title_____	Person observing _____
Sex of respondent_____Age_____	Time started _____ Time ended_____

PEFORMANCE INDICATORS FOR PROGRAMME

	Month				
	1	2	3	4	
Key indicator					Target Levels
Mortality rate					< 3% of individuals in the programme have died
Recovery rate					>75% of those admitted have recovered and successfully been discharged
Defaulter rate					<15 % defaulted in the programme
Mean gain weight					5 and 10 gm per kg of body weight

APPENDIX 5: FOCUS GROUP DISCUSSION GUIDE

For mothers and their children who have been recruited in the feeding programme

Date _____	Interviewer _____
Number of members in group discussion ____	Person taking notes_____
Record name, number and age of males ____	Person observing _____
Record name, number and age of females ___	Time started ___ Time ended___

How long have you been in the programme?

How much ration do you receive?

What information did you receive before you received the supplement?

What do you use the ration for?

How do you use the ration?

Is this ration adequate?

Is the food supplement beneficial

What will happen if you cannot get the ration?

When the program ends how do you plan to meet the nutritional needs of the children as individuals and as a group ?

Do you attend nutrition talks? Number saying YES ..... NO.....

Are they beneficial, probe why?

What are some weaknesses of the program?

What are some strengths of the program?

How can the programme be improved?

APPENDIX 6: INFORMED CONSENT

Effectiveness and Factors Influencing the Nutrition Rehabilitation Programme for Children Aged 6 -36 Months on Corn-soy blend (CSB) at Mukuru Promotion Centre

Informed Consent

Habari yako. My name is _____.

A research is being conducted by Juliet Omolo who is student of Applied Human Nutrition at University of Nairobi. It is a requirement at the university that as a student of Applied Human Nutrition she conducts this research. I am part of the team collecting information for this research. The research is on the effectiveness of the feeding programme and the health and growth of the children who participate in the feeding programme here at Mary Immaculate Nutrition Centre, Mukuru.

I would like to ask you some questions related to the life and health of your household and also specifically on your child who is in the feeding programme. The questions are on different aspects; your household, housing, income, assets, your attendance in the feeding programme, food consumption, how you cope with food shortages, sanitation, water, use of corn soy blend flour, feeding of the child, breastfeeding, immunization, weight and height measurements of the child, sicknesses experienced by the child.

The information you provide will be useful to find out how the feeding programme is progressing and will be given to this programme to see how to improve it and other similar programmes elsewhere for the benefit of the children.

Participation in the research is voluntary and you can choose not to take part.

All the information you give will be confidential. The information will be used to prepare a general report and this report will not include any specific names. There will be no way to identify that you are the one who gave this information.

Permission has been obtained to conduct this research from staff at this centre.

You are requested to participate and indicate your willingness to participate by signing below.

At this point, do you have any questions about this research study?

Name and signature of interviewer _____

Date _____

Respondent

I am willing to participate in the research. Signature

_____

APPENDIX 7: FIELD QUESTIONNAIRE

IDENTIFICATION

Location .....Village .....Household No. ..... Questionnaire No.....

Name of interviewer ..... Date of interview _____/___/2011_____

Respondents name ..... Sex: Male ☐ Female ☐

Household profile: Monogamous ☐ Polygamous ☐ Single Parent ☐

SECTION A: DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

Q1. Household[1] Characteristics

S/No	Name	Relationship to HH head	Sex M=1 F=2	Age (years)	Marital status	Religion	Education	Occupation	Contribution to HH
1									
2									
3									
4									
5									
6.									

RHHH	Marital Status	Religion	Education	Occupation	Contribution to HH
1=HHH 2=spouse or wife 3=son 4=daughter 5=grandson 6=granddaughter 7=relative 8=parent 9= others (specify)	1=married 2=separated 3=widowed 4=single 5=divorced 6=not applicable	1=Christian 2=Muslim 3=Traditionalist 4=others (specify	1=college/university 2=completed secondary 3=completed primary 4=Dropped from primary 5=in primary 6=in secondary 7=literate e.g. adult education 8=illiterate 9=preschool 10=others (specify)	1=salaried employee 2=farmer 3=self employment/business 4=casual labourer 5=student 6=housewife 7 = unemployed2 8 =others (specify) 9= n/a3	1= nothing 2= money 3=labour 4=childcare 5=Less than 15yrs 6= savings 7= pension

[1] All the people you share the same pot with everyday
[2] Anyone above 18 years and not in college or employed
[3] For preschoolers elderly and aged 5 to 17.9 years neither in school nor employed

Q 2. What is the household's main source of income (Livelihood)?

1= Animal and animal product sales 2. = Casual labour 3. = Salaried or waged

4. = Begging 5. = Gifts 6. = Trade

7. = Crop sales 8. = Remittances 9. = Other (specify)

.....

Q 3. What was your household's total expenditure in the last month?.....

Q 4. Do you have access to land for cultivation? 1= Yes 2 = No

Q 5. What is the land ownership type?

1. Owned 2. Rented 3. Other (please specify)

.....

Q 6. What assets do you have? (Use Card 1 on Assets to list the assets)

.....

.....

Q 8. What type of housing do you live in?

Q 9. What is the housing ownership type

Q 10. What type of toilets do you use?

Q 11. What are your main sources of energy for cooking?

Q 12. What type of housing do you live in?

SECTION B: NUTRITION EDUCATION

Q1. Do you attend nutrition talks? 1= Yes 2 = No

Q2. In the last month, how many times have you attended nutrition talks?

.....

Q3. List topics were covered

.....

.....

.....

Q4. Are you visited by community health worker at home? 1 = Yes 2 = No

Q5. How many times do they visit you in a month? .....

ATTENDANCE IN THE FEEDING PROGRAMME

Q6.How long has your child been in the programme ? .....

Q7. Is there a time you have not attended the programme? 1= Yes 2= No

Q8.For how long did you not attend? .....

Q9. Why did you not attend ?.....

SECTION C: FOOD SECURITY

PART A: FOOD CONSUMPTION AND DIETARY DIVERSITY*

Twenty four-hour recall for food consumption in the households: The interviewer should establish whether the previous day and night was usual or normal for the households. If unusual-feasts, funerals or most members absent, then another day should be selected.

Q9.	**24 hr Household Dietary Diversity**	
	Food group consumed: What foods groups did members of the household consume in the past 24 hours (from this time yesterday to now)? Include any snacks consumed.	Did a member of your household consume food from any these food groups in the last 24 hours? 1=Yes 2 = No
	Type of food	
A1	Cereals and cereal products (e.g.maize, spaghetti, rice, bread)?	
A2	Milk and milk products (e.g. goat/cow fermented milk, milk powder)?	
A3	Sugar and honey?	
A4	Oils/fats (e.g. cooking fat or oil, coconut milk ,butter, ghee, margarine)?	
A5	Meat, poultry, offal (e.g. goat, beef; chicken or their products)?	
A6	Pulses/legumes, nuts (e.g. beans, lentils, green grams, cowpeas; peanut,)?	
A7	Roots and tubers (e.g. sweet potatoes, , cassava, arrowroot Irish potatoes)?	
A8	Vegetables (e.g. green or leafy vegetables, tomatoes, carrots, onions)?	
A9	Fruits (e.g. water melons, mangoes, grapes, bananas, lemon)?	
A10	Eggs?	
A11	Fish and sea foods (e.g. fried/boiled/roasted fish, lobsters)?	
A12	Miscellaneous (e.g. spices, chocolates, sweets, beverages, etc)?	

Q10. Total number of food groups consumed in the household _____

Q11. How many meals[1] did the adults in the household eat in the last 24 hours (from this time yesterday to now)? 1 = one 2= two 3 = three 4 = four

Q12. How many meals did the children in the household eat in the last 24 hours (from this time yesterday to now)? 1 = one 2= two 3 = three 4 = four

Q13. What is your main source of food for the entire household? _____

1 = purchase 2 = produce from the farm 3 = purchase and farm produce
4 = Food aid 5 = others (specify) _____

[1] Meal refers to food eaten at one time (excluding snacks) and includes one of the three commonly known – breakfast, lunch, supper

PART B: COPING AND COPING STRATEGIES* *FSNAU (2011) Food and Security Analysis Post Deyr 2010/11 Pp 68

Q14. Have you experienced food shortages in the last month? 1=Yes 2 = No

Q15. During the past month have there been times when you did not have enough food or money to buy food? 1= Yes 2 = No (if no skip to Q 17)

Q16. How often did your household have to:

	Coping and coping strategies	Relative frequency 1= Never 2= Hardly at all (> =1 time a week) 3= Once in a while (1-2 times a week) 4= Pretty often (3-6 times a week) 5= All the time (Every day)
B1	Rely on less preferred and less expensive food	
B2	Borrow food or rely on help from friends or relatives	
B3	Purchase food on credit, incur debts	
B4	Limit meal portion size at meals	
B5	Restrict consumption by adults in order for small children to eat	
B6	Reduce number of meals eaten a day	
B7	Skip entire meals without eating	
B8	Purchase food on credit	
B9	Consume seed stocks held for the next season	
B10	Decrease expenditures for fertilizer, pesticide, fodder, animal feed	
B11	Sell domestic assets (radio, furniture, TV, mobile phone, fridge)	
B12	Sell productive assets (farm implements, sewing machine, motorbike, land)	
B13	Decrease expenditures for health care	
B14	Take children out of school	
B15	Seek alternative or additional jobs	
B16	Increase the number of members out migrating for work and/or food	
B17	Increase in the amount of remittances received	

SECTION D: WATER, SANITATION AND HEALTH FACILITIES

Q17a What is your main source of drinking water during the wet season? _____

1 =Tap 2 =Borehole 3=River 4= Well (not protected) 5= Well (protected)

6 = spring 7 =rain water

Q17b Do you treat your drinking water? _____ 1=Yes 2=No If no go to

Q17c If Yes in Q17b how do you treat your water? _____

1=boiling, 2=use traditional herbs, 3=use chemicals (water guard), 4=filters/sieves

Q18a What is your main source of drinking water during the dry season? _____

1=Tap 2=Borehole 3=River 4= Well (not protected) 5= Well (protected) 6= spring 7=rain season 8 = Purchase

Q18b Do you treat your drinking water? _____ 1=Yes 2=No If no go to

Q18c If Yes in Q18b how do you treat your water? _____

1=boiling, 2=use traditional herbs, 3=use chemicals (water guard), 4=filters/sieves

Q19 How much water do you use in litres per day. _____

Q20 How far is the water source to and fro _____ Km _____minutes

Q21 What kind of toilet facility does your household have? _____

1= Flush toilet 2=Traditional pit latrine 3 = Ventilated improved latrine

4 = No facility/Bush/Field 5 = Digging a hole 6 = Flying toilet

Q22 Do you have access to health facilities/ health care services? 1= Yes 2=No

Q23a How far is the nearest health facility, where you get your services? _____Km_____mins

Q23b Which means of transport do you use to get there? _____

1. =Walking 2. =Bicycle ride 3. = Matatu ride 4= Motorcycle 5: Cart

4. = Others (specify) _____

Q24: SECTION E: UTILIZATION OF CORN SOY BLEND UNIMIX

IDENTIFICATION

Location .....Village .....Household No. ..... Questionnaire No.....

Respondents name ..... Sex: Male☐ Female ☐

Household profile: ☐ Monogamous ☐ Polygamous

A1	How much corn soy ration did you receive? (grams)	
A2	Date when corn soy blend was received	
A3	How much corn soy ration is left ?	
	How long did the last corn soy ration last?	
A4	**Preparation of porridge** How much corn soy flour do you use (grams)	
A5	Amount of water added(ml)	
A6	Amount of milk added (ml)	
A7	Amount of sugar added (grams)	
A7	How much porridge did this make? (ml)	
A8	How much porridge did the child take each day? (ml)	
A9	How many times did the child take the porridge in a day? 1= one time 2= 2 times 3= 3 times 4 =other specify	
A10	Did the child finish the porridge? Yes = 1 No=2	
A11	Did the child share the porridge with other children? Yes = 1 No=2	
A12	In the last 2 weeks who normally fed the child most often? 1= Mother 2= House girl 3 = Sibling girl 4 = Sibling boy 5 = Father 6= Other specify	
A13	Interviewer	
A14	Interview date	

SECTION F: DIETARY INTAKE OF THE CHILD: 24 HOUR RECALL

Q.25 24 - HOUR RECALL FOOD INTAKE RECORD SHEET

Time	Dish	Name of ingredient used in Preparation	House-hold meas-ure used	Amount in HH measure	Amount of ingre-dient in the dish	Volume of complete dish pre-pared	Volume of food served to the child	Amount of left over	Food con-sumed by the child

[Take household measures: tea spoon (tsps), table spoon (tbsps), cups, mugs, measuring jugs and sufurias and the food ingredients used in the household to show the exact amounts, sizes and units used in food preparation. Request to see the measures, sizes, foods and ingredients in order to practically measure and weigh the used levels] 1 = teas spoon (tsp), 2 = (tbsp), 3 = cup1 4 = cup 2, 5 = cup3, 6 = cup 4, 7 = mug, 8 = measuring jugs, 9 = sufurias, 10 = bowl, 11 = plate, 12 = pot

HH – household

SECTION G: CHILD FEEDING, HEALTH AND NUTRITION STATUS FOR CHILDREN AGED 6 -36 MONTHS

Q26: BREAST FEEDING AND FEEDING

A 1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Name of child	Date of birth	Weight at birth	Age in months	Are you breastfeeding the child? 1= Yes 2= No	How many times a day you breast fed the child? 1 = Once 2 = twice 3 = 3 times 4 = on demand	At what age was the child given foods other than breast milk?	How many times do you feed the child in a day , besides breast milk	How many times do you feed the child with milk in the last 24 hours? 0= None 1= 1 time 2 = 2 times 3 = 3 times 4 = 4 times 5 = 5times or more	Was the child bottle fed in the last 24 hours?

Q27: IMMUNIZATION, VITAMIN A SUPPLEMENTATION, DEWORMING

B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
Name of child	Date of birth	BCG Yes No	DPT 1 Yes No	DPT 2 Yes No	DPT 3 Yes No	OPV 1 Yes No	OPV 2 Yes No	OPV 3 Yes No	Have you had Measles ?	Vitamin A in last 6 months	Dewormed in last 3 months?

APPENDIX 8: TRAINING PROGRAMME FOR RESEARCH ASSISTANTS

Aim

The aim of the training is to equip the research assistants with knowledge and skills on how to collect data using interview methods, and how to entre data.

Objectives

By the end of the training the research assistants will be to:

Describe purpose and objectives of the study

Describe how sampling will be done

Know the process of conducting an interview

Explain the role of the guides; the community workers

Know the different sections of the questionnaire and the translations into Kiswahili

Take and record measurements of weight, height of children

Apply the 24 hour recall tool

Know their role in participant observation

Explain the different the roles in a focus group discussion - observation, interviewer, taking notes

Know the ethics and code of conduct when conducting interviews

PROGRAMME

DAY /TIME	TOPIC	TEACHING METHOD	TEACHING AIDS	FACILI-TATOR
DAY ONE 8.30 -10.30	Workshop norms Introduction Aim of study, objectives Activity matrix for data collection Role of partners involved Code of ethics and conduct Sampling frame and sampling The Do's and Don'ts when conducting interviews	Discuss Brainstorm Lecture Discussion Discussion	Flip chart Markers	Principal investiga-tor
10.30 -11.00	Break			
11.00 -12.30	Go through tools - FGD guide Key informant guide Questionnaire Translations in Kiswahili	Discussion	Flip chart Markers Questionnaires Pencils, Erasers Questionnaire Pencil Clip boards Kitchen scales, Cyl-inders, jugs	
1 – 2	Break			
2 - 3.30	Go through tools Ques-tionnaire - Translations in Kiswahili	Discussion	Flip chart Markers Questionnaires Pencils, Erasers Questionnaire Pencil Clip boards Kitchen scales, Cyl-inders, jugs	Principal investiga-tor

	Taking child measurements Height Weight	Demonstration Handout	Stadiometer Weighing scale, Salter scale	
	Go through tools - Questionnaire Observation guide 24 hr recall	Discussion Demonstration	Flip chart Markers Questionnaires Pencils,Erasers Questionnaire Pencil Clip boards Kitchen scales, Cylinders, jugs	Principal investigator
DAY TWO 10.30 -12.30	Pretest questionnaire	Field exercise at Mary Immaculate Clinic	Questionnaire Pencils Erasers Weighing scale, Stadiometer Salter scale , kitchen scales, measuring cylinders, jugs, cups	Principal investigator
	Meet with filled questionnaires Debriefing Discuss how to improve questionnaire		Questionnaires Flip chart Markers	Principal investigator

APPENDIX 9: ANTHROPOMETRIC MEASUREMENT PROCEDURES

Source: Adapted from United Nations Department of Technical Co-operation for Development and Statistical Office. 1986.

Taking a child's Mid Upper Arm Circumference

MUAC is an alternative way to measure 'thinness, weight for height

MUAC is always taken on the left arm.

Ask mother to remove clothing covering the child's left arm.

Measure the length of the child's upper arm, between the bone at the top of the shoulder, and the elbow (the child's arm should be bent).

Mark the middle of the child's upper arm with a pen.

The child's arms should be relaxed, falling alongside its body.

Wrap the MUAC tape around the child's arm, such that all if it is in contact with the child's skin. It should be neither too tight, nor too loose.

Read the MUAC using a mm tape.

Taking a child's weight

Before weighing the child take off all the clothes to remain with minimum clothing

Zero the weighing scales, ensure the arrow is at zero with the weighing pants

Place the child in the weighing pants ensuring that the child is touching nothing

Read the child's weight. The arrow must be steady and the weight scale should be read at eye level.

Do not hold the scale when reading the weight

Record the weight in kg to the nearest 100g i.e 6.4 kg

Weigh twice and record twice

Measurer reads and assistant records

Clean the pant with disinfectant if it gets soiled

Taking a child's height

Taking length and height measurements of children under 5 years of age requires two persons.

If a child is more than 85 cm he/she should be measured standing up.

When standing up:

The child's heels, back legs, buttocks, shoulders and head should all touch the back of the board

Heels should be flat on the floor and the feet close together

Knees, back and neck should be straight

Childs arm's should be straight down by his/her sides, the child should not grasp the back of the board.

Child's head should be straight and looking ahead. A line between his ears and eyes should be parallel to the floor.

One person should hold the legs and feet, while the other holds the head , the board and reads the measurement.

Taking a child's length

To measure children less than 85 cm or 24 months old

The measuring board is placed on the ground

The child is placed lying down along the middle of the board

One person holds the sides of the child's head until it firmly touches the fixed headboard.The child's eyes should be looking straight up.

The other person holds down the child's knees, pressing the sliding wood piece against the child's heels and soles of the feet.

Align the child with the board

Child's arms should be lying alongside its body and if necessary the mother can hold the arms down

Person holding the feed reads the measurement.

Oedema

Gently press both feet for 3 seconds (say 101, 102,103) with your thumb. Remove your thumb for the feet. If a shallow pit /depression remains for several seconds the child has nutritional oedema.

APPENDIX 10: RETROSPECTIVE STUDY

Q30. ANTHROPOMETRY

Record weekly entries of child for the period the child has been in the progamme. These should be children who have been in the programme for at least 3 weeks

Name of child	Village	Date	Sex of child	Age of child (months)	Height (cm)	Weight (kg)	MUAC (cm)	Status in programme*
Child 1								
Child 2								
Child 3								

*Status in programme- Active/Still attending SFP, Discharged, Transferred, Defaulted

APPENDIX 11: PERMISSION TO CONDUCT RESEARCH

Juliet Onyuma Omolo,
c/o AATF,
P. O. Box 30709- 00100,
Nairobi.

The District Medical Officer,
Makadara Health Centre,
Nairobi.

4th July 2010

Dear Sir,

RE: REQUEST TO CONDUCT RESEARCH

Greetings.

My name is Juliet Onyuma Omolo and currently a student at the Applied Human Nutrition Programme, University of Nairobi.

I would like to request to conduct research at Mukuru Promotion Centre, Mukuru on the topic, "Factors influencing effectiveness of nutrition rehabilitation programme using corn soy blend for children aged 6 -36 months."

I will greatly appreciate your assistance in this.

Please find attached a letter of recommendation from the Department of Applied Human Nutrition Programme, University of Nairobi.

Thank you.

Yours sincerely,

Onyuma.

Juliet Onyuma Omolo

Noted 13/7/11
- Recommended
- Please furnish the office with research findings after completion

139

MEDICAL OFFICER OF HEALTH
MAKADARA DISTRICT

APPENDIX 12: PERMISSION TO CONDUCT RESEARCH

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: NCST/RRI/12/1/MED-011/153/4

Date: 22nd September, 2011

Juliet Onyuma Omolo
University of Nairobi
P. O. Box 29053 - 00625
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Factors influencing effectiveness of the nutrition rehabilitation programme for children aged 6 – 36 months on corn soy blend at Mukuru, Nairobi*" I am pleased to inform you that you have been authorized to undertake research **in Makadara district** for a period ending *31st December 2011.*

You are advised to report to **the District Commissioner, the District Nutritionist & the District Education Officer, Makadara District** before embarking on the research project.

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

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:
The District Commissioner
Makadara District

The District Nutritionist
Makadara District

APPENDIX 13: CLASSIFICATION FOR ASSESSING SEVERITY OF MAL-NUTRITION

Classification for assessing severity of malnutrition by prevalence ranges among children under 5 years of age

Indicator	Severity of malnutrition by prevalence ranges (%)			
	Low	Medium	High	Very high
Stunting	<20	20-29	30-39	>=40
Underweight	<10	10-19	20-29	>=30
Wasting	< 5	5-9	10-14	>=15

Source: WHO Global Database on Child Growth and Malnutrition

APPENDIX 14: SUMMARY OF ROUTINE TREATMENT FOR CHILDREN UNDER FIVE

Name of Product	When	Age	Prescription	Dose
Vitamin A*	At admission	< 6 months	50,000 IU	Single dose on admission
		6- <1 yr	100 000 IU	
		>1yr of age	200 000 IU	
Abendazole	At admission	< 1yr	Do not give	
		1 yr and above	400 mg	1 tab on admission
Mebendazole**	At admission	< 1yr	Do not give	
		1 yr and above	500 mg	Single dose on admission
Iron/Folate***	At admission	6 -24 mths Low birth weight and infants	12.5 mg iron/50µg folic acid	Daily dose from 6 to 12 months of age
		2-5 yrs	20 -30mg	Daily dose
Measles vaccination	At admission	> 9mths	-	Once

*Do not repeat the dosage of Vitamin A if the child has already received a supplement of Vitamin A during the previous 30 days

** Dose can be given again after 3 months if signs of re infection appear

*** Give one dose of 6 mg/kg of iron daily for 14 days

Source: MOPHS, 2009