ASSESSMENT OF NUTRITION STATUS AND DIETARY DIVERSITY AMONG CHILDREN 6-59 MONTHS IN MATHARE VALLEY, NAIROBI COUNTY, KENYA

LISBETH KAGENI MUTAKAA (B.ED AGHE)
REG. NO:I57/12680/05

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC HEALTH IN THE SCHOOL OF PUBLC HEALTH, KENYATTA UNIVERSITY

NOVEMBER, 2013

DECLARATION

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

Signature ---------- Date ----------

Lisbeth Kageni Mutakaa

Department of Community Health

SUPERVISORS' APPROVAL

We confirm that this thesis is submitted with our approval as university supervisors

Dr. Daniel Akunga

Signature ---------- Date----------

Department of public health

Kenyatta University

Dr. Eunice Njogu

Signature---------- Date----------

Department of Food, Nutrition and Dietetics

Kenyatta University

DEDICATION

To my Husband Jamleck Njagi, Children Michelle Makena and Osteen Muthomi, Parents Catherine Mutunga and Douglas Muhia and mother in law Lilian Kanyagia who overwhelmingly supported me both morally and financially during my study period and continue to inspire my life.

ACKNOWLEDGEMENT

I sincerely thank my supervisors Dr Daniel Akunga and Dr Eunice Njogu both of Kenyatta University for their tireless effort to assist me through their professional guidance during the course of my study. I wish to thank Bernard Muture, Antony Nyambura and Morris Gitau and all MPH graduates of Kenyatta University who have been my mentors. My appreciation goes to Dr Isaac Mwanzo the chairman of the Community Health department for moral support and especially helping me sought out my issues as they arose during the study period. I am indeed grateful to Kenyatta University for providing partial scholarship for my tuition fees. I am indebted to Carol Omufir a nutritionist at Mathare Health Centre for her assistance during my data collection and also thank the community health workers who are based within the slum for helping me collect the data. All my success would not have been without the will of God and to this I praise and thank Him for all who have impacted on me in one way or the other. May the Lord's name be glorified.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

APHRC	African Population and Health Research center
FGDS	Focus Group Discussions
FEWSNET	Famine Early Warning System Network
FAO	Food Agriculture Organization
H/A	Height for Age
HAZ	Height for Age Z score
IFPRI	International Food Policy Research Institute
IPAR	Institute of Policy and Research
CIP	International Potato Center
IRIN	Integrated Regional Information Network
KRCS	Kenya Red Cross Society
MUAC	Mid-Upper Arm Circumference
PEM	Protein Energy Malnutrition
PEV	Post Election Violence
SCUK	Save the children UK
SFP	Supplementary Feeding Programme
SPSS	Statistical Package for Social Sciences
TFP	Therapeutic Feeding Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
W/A	Weight for Age
W/H	Weight for Height
WHZ	Weight for Height Z score
WFP	World Food Programme
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Malnutrition; It refers to over or under nutrition, nutrient imbalances or deficiencies (Chen *et. al,* 2001). This study will focus on under nutrition.

Nutrition Status this is the body's status of nutrition that is expressed according to certain scientifically tested parameters including weight, height, age or a combination of them (FAO, 1998). This study will involve Anthropometry to measure the nutrition status.

Good Nutrition is a daily regime of healthy eating which includes all the food groups in their right proportions for one's activity level.

Chronic Food Shortage is the extreme and protracted shortage of food resulting in wide spread hunger and substantial increase in the death rate.

Safety nets are non-contributory transfer programs seeking to prevent the poor or those vulnerable to shocks and poverty from falling below a certain poverty level and can be provided by public or private sectors (Grosh, 2008).

Selective feeding programmes are centres for treatment of persons suffering from acute malnutrition.

Underweight it is acute and chronic malnutrition combined (WHO, 2006). This is low weight for age. It is a weight below -2SD of the reference population.

Stunting is low length/height for age. It is a length/ height below -2SD of the reference population. It is a sign of chronic nutritional disorder (WHO, 2006).

Slum, according to the United Nations agency UN-HABITAT (2005), is a run-down area of a city characterized by substandard housing and squalor and lacking in tenure security.

Wasting is low weight for length/ height. Usually, wasted children are below -2SD of the reference weight for length/ height. It is an acute nutritional disorder (WHO, 2006).

Z score is the number of standard deviation below or above the reference median value (WHO, 2006).

ABSTRACT

Under nutrition is the underlying cause of more than half of all deaths in children aged less than five years worldwide. There are 143 million children under five who are underweight in the developing world. In Kenya, severe acute malnutrition is responsible for 82,000 deaths annually with a significant percentage being from urban slums. The purpose of this study was to assess nutritional status children aged 6-59 months in Mathare valley, a low income settlement in Nairobi. A cross-sectional study design was used. Data was collected using structured and non structured questionnaires. A total of 246 children aged 6-59 months were taken the anthropometric measurements to determine their nutritional status and their caregivers interviewed. Two focus group discussions and 6 Key informant interviews were conducted. The dependent variable was nutritional status of children below five years and independent variables included socioeconomic attributes, dietary intake, and dietary diversity. Descriptive analysis was done using IBM SPSS software version 19 and anthropometry analysis by ENA for SMART. Severe malnutrition measured by MUAC was observed in 6.5% of the children. Severe stunting, wasting and underweight measured using HAZ, WHZ and WAZ.was observed in 5.7%, 4.1% and 4.5% respectively. Among the 246 children, 39.0 had fallen ill within the previous two weeks and several had fallen ill more than once within the same period. The major symptoms included diarrhea, cough and vomiting by 50%, 47.9% and 40.6% respectively. Dietary score for 104(42.1%) households was low. There is need to regularly monitor nutrition status of children below five years and to have up to date data for informed decision making.

CHAPTER ONE: INTRODUCTION

1.1 Background

Globally, every second a person dies from starvation or complications of malnutrition (Svedberg, 2010). In the course of one year, the number of children who die from lack of nutrition is over 3 million (Svedberg, 2010). Children in the poorest income brackets are malnourished at twice the rate of their counterparts in the richest ones (children malnutrition is used as a hunger indicator). Even in many countries with serious malnutrition, children from rich families are much less affected than those from lower-income households. In sub Saharan Africa, more than 10 million children die each year mainly from preventable causes. Of these, 37% die from malnutrition related causes (Cohen, 2009). In East Africa, 48% of children are stunted while 36% are underweight (WHO/WFP, 2007). In Kenya, severe acute malnutrition is responsible for 82,000 deaths annually with a significant percentage being from urban slums (ACF, Kenya, 2009). Children living in the urban slums are characterized by ill health and poor nutrition due to unhealthy slum conditions and congestion that result in frequent diarrhea which can sometimes cause death (APHRC, 2009).

Demographic and health survey data collected between 1990 and 2007 shows that serious malnutrition has been widespread in urban slums of Africa, Asia, Latin America and the Caribbean. At present, 3.3 billion people live in urban centres across the globe and this number is predicted to reach 5 billion in 2030 with 95% of this growth being in developing countries (Emmanuel *et.al*, 2010). A third of the world's urban population is living in informal settlements or slums 90% of who are located in the developing world (Matt, 2010). By 2030, the number of worldwide slum dwellers is expected to reach two

billion. Given the increasing trend in the price of food commodities, slum dwellers particularly the poorest and female headed households, are highly vulnerable to food insecurity and malnutrition (HEIN, 2008). In addition, inadequate hygiene and sanitation coupled with unhygienic environment are the major causes of concern for high rates of morbidity that lead to acute malnutrition. In Mathare valley, household income is the most important determinant to access food and a considerable share of the income (42 to 50%) is spent on food. Young child feeding practices are generally poor in Mathare valley (ACF Kenya, 2009).

As food prices gallop in urban areas, poor urban residents cannot afford to buy enough, and nutritionally good food – even in countries that produce enough to feed their entire population. Just like poverty, hunger in cities is only an outcome of an inequitable distribution of available resources (Wamani et.al, 2008).

1.2 Problem Statement

The right to adequate food is recognised in several instruments under international law (Amos, 2009). Despite this recognition, globally, half of the almost 10 million children under the age of five who die annually do so from a combination of malnutrition and easily preventable disease. In Kenya, there is increasing appreciation that it is not only the rural poor affected but also the urban poor who are not realising their right to adequate food. Attention has been drawn to the vulnerable situation of the urban poor in the light of the impacts of failed rains coupled with global rising food prices on the already precarious food security situation. The urban poor are an important caseload of vulnerable population that needs to be addressed not least because of; the proportion of the total population affected – 60% of Nairobi's population lives in informal settlements

and slums and urbanisation trends – by late 2008, globally, more people were living in urban than rural areas (UNICEF, 2009). In the Kenya National Food and Nutrition Policy 2007, the Government of Kenya stated it's commitment to reducing chronic food insecurity in the urban areas through promoting urban employment and improved access to food. Under nutrition is the underlying cause of more than half of all deaths in children aged less than five years and is associated with infectious diseases (Bryce *et al*., 2007). Underweight is the leading underlying cause of disability and illness worldwide, particularly so where sub optimal feeding practices are a major cause of underweight.

In Kenya, severe acute malnutrition is responsible for 82,000 deaths annually with a significant percentage being from urban slums (UNICEF, 2009). Children living in the urban slums are characterized by ill health and poor nutrition due to unhealthy slum conditions and congestion that result in frequent diarrhea which can sometimes cause death (APHRC, 2009). The nutritional status of children under five years in Mathare Valley is not well documented. Also there is need to continually monitor nutritional status of children in these poor settings to continuously inform the various stakeholders.

1.3 Justification

Urban food insecurity has become a growing humanitarian problem in most developing countries due to population increase, rural-urban migration, widespread poverty and increasing cost of food. The slums are particularly at high risk of vulnerability to food insecurity and child malnutrition and therefore require close monitoring of the situation (MSF-F, 2008). The prevalence of diseases reduces the appetite of young children as well as inhibits the absorption of nutrients, thus increase nutrient requirements in the body. Children in mathare valley grapple daily with malnutrition due to poverty and disease.

Malnutrition among these children can be assessed very frequently by the use of simple methods and tools such as diversity scores, i.e., the number of food groups consumed over a reference period. These are good proxies of overall dietary quality and they can be useful indicators of household food security and are also positively associated with the nutritional status of children. This study will be used to strengthen local capacities to address household food security, nutrition issues and coping mechanisms to reduce vulnerability and enhance resilience.

1.4 Research questions

i. What are the demographic and socio economic characteristics of households
ii. What is the dietary diversity of the children 6-59 months?
iii. What is the morbidity status of children aged between 6-59 months in Mathare valley?
iv. What is the nutritional status of children aged between 6-59 months in Mathare valley?

1.5 Objectives of the study

1.5.1Broad Objective

To assess the nutritional status and dietary diversity for children aged 6-59 months in Mathare Valley

1.5.2 Specific objectives

i) To determine demographic and socio economic factors influencing daily food intake
ii) To establish household dietary diversity for children aged 6–59 months

iii) To determine morbidity status of children aged between 6-59 months in Mathare valley

iv) To determine nutritional status of children aged between 6-59 months in Mathare valley

1.6 Null hypotheses

There is no malnutrition among children aged 6-59 months in Mathare valley.

1.7 Significance of the study

The findings will provide useful information on child nutrition in slums to aid in interventions by the Government and other stakeholders.

1.8 The Conceptual Frame Work

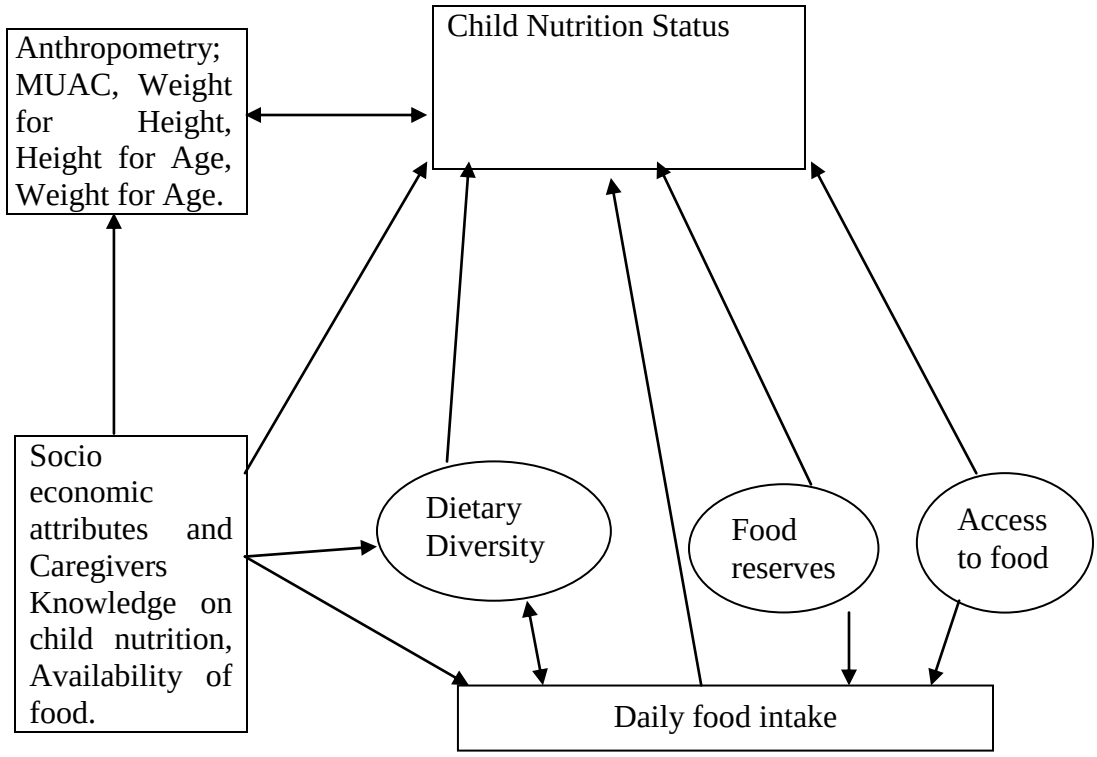


Figure 1. 1. Conceptual framework

The Nutritional status of children is dependent on several factors which include dietary intake that is in turn influenced by food variety and frequency of food intake. Food reserves and access to food and socio economic attributes determine the nutritional status. Anthropometric measurements reflect the nutritional status of children.

1.9 Limitations of the study

The security, access and availability of household heads presented limitations. This was overcomed by using community health workers in the villages.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Malnutrition is the condition that results from taking an unbalanced diet in which certain nutrients are lacking, in excess (too high an intake), or in the wrong proportions (WHO, 2010). This study mainly focused on undernutrition

2.2 Child malnutrition

About one sixth of the populations of the world's developing nations are malnourished. Over 200 million of them are children (UNICEF, 2011). Under nutrition is the underlying cause of more than half of all deaths in children aged less than five years and is associated with infectious diseases (WHO/UNICEF/WFP, 2006). Underweight is the leading underlying cause of disability and illness worldwide. In the course of one year, the number of children who die from malnutrition is over 3 million (Svedberg, 2010).

In sub Saharan Africa, more than 10 million children die each year mainly from preventable causes. Of these, 37% die from malnutrition related causes (Jessica, 2010). In East Africa, 48% of children are stunted while 36% are underweight (Moore *et al.*, 2010). In Kenya, severe acute malnutrition is responsible for 82,000 deaths annually with a significant percentage being from urban slums (Dent *et al.*, 2011). According to (APHRC, 2009), the children living in the urban slums are characterized by ill health and poor nutrition due to unhealthy slum conditions and congestion that result in frequent diarrhea which can sometimes cause death. What is clear though is that the poor and especially the children and women are disproportionately affected and this has devastating impact in the slums (UNICEF, 2010). It has become very difficult for parents and caregivers especially in slums to provide a balanced meal to their children hence a

big problem in malnutrition among infants and children (WFP, 2010).

2.3 Assessing Child Nutrition

The basic information and body measurements needed to assess acute malnutrition in children 6-59 months are: age, sex, weight, height/length, MUAC, and clinical signs of visible wasting and bilateral oedema. The nutritional indices used are WFH and MUAC (WHO, 2010). The decision to measure height or length depends on age and physical condition. Height is measured for children more than or equal to 24 months and length for children under 24 months (e.g. 23.9 months and below). If the age of the child is not known, then height should be measured for children more than or equal to 87 cm, and length measured for children under 87 cm. If a child is too sick to stand, length should be measured. WFH and MUAC are anthropometric indicators that are used independently to identify acute malnutrition. A critical challenge remains in that MUAC has been endorsed as an independent admission criterion for the treatment of SAM. However the evidence base for MUAC-only admissions in the treatment of MAM is less well developed. For this reason, many programmes admit children based on WFH or MUAC (UNICEF 2010). The Z-score is used to describe how far a measurement is from the median, or average. A WFH Z-score calculated for an individual tells exactly how many standard deviation units an individual's weight value is away from of an individual of the same height in the WHO GS. A positive WFH Z-score means that the individual's measurement is higher than the median weight value of an individual of the same height in the WHO GS, while a negative WFH Z-score means that the measurement is lower than the median weight value of an individual of the same height in the WHO GS (WHO, 2010).

The rates of child mortality can soar from 2 to 70 times higher than average and even in previously healthy populations, child morbidity and crude mortality rates can increase twenty-fold (AISC 2010). Adequate nutrition and care of children has been identified as one of the key factors to promote child health and stability and infant and young child feeding support has consequently become a major strategy in reducing child morbidity and mortality (WHO, 2011).

2.4 Factors associated with Malnutrition

The underlying causes of malnutrition can be grouped under the three broad categories; food, care and health. These three causes are interrelated and actions/interventions affecting one area may have significant consequences on the other. For instance, when adequate food is provided, the negative impact of disruptions in health and care provision can be minimized.

There are three levels of causality corresponding to immediate, underlying and basic determinants of child nutritional status (UNICEF, 2011). The immediate determinants include dietary intake and health status of a child, the underlying determinants include food security and proper health environment including access to health services and the basic determinants include available resources to a community, political and economic structure and socio-cultural environment (UNICEF, 2011). For this reason, malnutrition is inseparable from poverty among other factors like economic situations, maternal level of education, climate changes, food production, effectiveness of nutrition programs and quality of health services (WHO, 2009).

2.5 Morbidity and Malnutrition

2.5.1 Health

The combination of malnutrition and infection causes most of the preventable deaths in emergency situations, particularly among young children. During infection there is an increased need for energy and other nutrients. Malnutrition and micronutrient deficiencies also affect immunity. As a result, people who are malnourished and have compromised immunity are more likely to suffer from diseases such as respiratory infections, tuberculosis, measles and diarrhoeal diseases. Furthermore, in malnourished individuals, episodes of these diseases are more frequent, more severe and prolonged. In addition to the effect of nutrition on disease, the presence of disease leads to further malnutrition, as a result of loss of appetite, fever, diarrhea and vomiting, which affect nutrient intake and cause malabsorption of nutrients and altered metabolism. Most Prevalent Communicable Diseases in Malnourished Populations include (WHO, 2005,

2.5.1.1 Diarrheal diseases

Providing safe water and improved sanitation, and community education on food safety in the household is essential for reducing the occurrence of diarrhoeal diseases, such as the Five Keys to Safer Food (WHO 2006). In addition to prevention and prompt treatment of dehydration, the most important measure in the treatment of diarrhoeal diseases in children under five is to ensure continued feeding, including breastfeeding, during and after the diarrhoeal episode. Zinc supplementation for 10-14 days for children with acute diarrhoea (20mg daily and 10mg for infants under 6 months) can reduce the severity of the episode and prevent further occurrences in the next 2-3 months.

2.6.1.2 Tuberculosis

Although not a leading cause of mortality during the emergency phase, tuberculosis often emerges as a critical problem once measles and diarrhoeal diseases have been adequately controlled. Tuberculosis, often in combination with HIV/AIDS, is common in malnourished populations (WHO/UNHCR, 2006).The consequent immune system dysfunction can both enhance susceptibility to tuberculosis infection and the progression of disease. Malnourished populations, especially malnourished children of all ages, are considered to be at particular risk of developing severe active tuberculosis.

2.5.1.3 HIV/AIDS

People with HIV have increased energy and micronutrient requirements, and are particularly susceptible to malnutrition. With malnutrition, HIV-infected individuals have an increased risk of opportunistic infections and death. Furthermore, malnourished individuals with HIV have increased nutritional requirements and feeding programmes must take this into account. UN agencies and nongovernmental organizations have on the whole been quick to embrace HIV as a key priority issue in emergencies.

2.6 Food Security in Kenya

In Kenya, Chronic food shortages have been magnified due to high food prices, the post election violence, poverty, political and government problems; and the most affected people are those in the remote rural areas and the urban slums (IFPRI, 2011). That children and pregnant women are among the most vulnerable is borne out by recent surveys carried out by UNICEF in Kenya (UNICEF, 2010). These revealed high malnutrition rates in children and pregnant mothers (Bonham, 2010). Long-term issues in

food security affecting capacity and preparedness of the community for future crises need to be addressed. In the article by Cohen (2009), the situation in Kenya illustrates the complexity of these food security issues. Food security depends principally on three variables: availability of food, access to food and a nutritious diet, and proper use of food to ensure maximal nutrition and hygiene (UNICEF, 2010). These variables are influenced by other factors, particularly poverty. In turn, this is influenced by the infrastructure (transportation and communication), population growth, conflict, environmental and climatic factors, and by economic factors (national and international). Other factors include opportunities for appropriate training and job skills and the quality of public health and health care provision (Cohen, 2009).

2.7 Affordability of foods among slum dwellers

The increasing financial pressure on the urban poor has reduced their diversity and frequency of food intake drastically, which causes malnutrition among children as key reason especially in the slum areas in the different parts of the world (Karim, 2012). A study done in india indicated that majority of the caregivers who live in slums belong to lower socio-economic classes and either they have migrated to the city with the hope of better means of livelihood or forced to migrate with their partners. Majority of them having no education, skill and work experience, they have no choice in the competitive job market and pick up low paid jobs such as construction labourer, domestic servants and casual factory workers. Inadequate income, poor housing conditions, overcrowded environment, poor sanitation, occupational hazards and stressful conditions are unfavorable to residents of slums (Kumar *et.al*., 2008). Majority of the residents of sub-

Saharan Africa's cities live in informal settlements, also known as slums (UN, 2002). The population of these informal settlements is growing rapidly due to natural increase and urbanization in the context of weak economies and poor urban planning and regulation. Many Africans who grow up in urban areas or move to them are therefore unable to find secure and sufficient incomes and live in deplorable conditions in informal settlements that lack basic social amenities. Past studies have indicated that people living in slum settlements in Africa have worse health outcomes than those living elsewhere on the continent (APHRC, 2003, Taffa, 2004, Magadi, 2003).

Nairobi's slum dwellers suffer the most nutritionally compared to all Kenyans according to recent surveys by the World Food Programme, eking out an existence on typically less than a dollar a day, and with scant means of earning any better livelihood (WFP, 2009). According to Oxfam's McDonald (2010), hundreds of thousands of people in Nairobi already live in serious poverty and are just surviving. Typically in Kenya, Egypt, Mali and Tanzania, poor urban households spend up to two-thirds of their income on food, which is as much as twice that spent by rural dwellers, according to statistics from the Institute of Policy and Research (IPAR 2009).

2.8 Food reserves and sources among slum dwellers

Sources and food reserves give a quick indication of food security and subsequent nutritional status of a household at a glance. They are the first indicators of a nutrition emergency in waiting (FEWsNET, 2010). Obtaining detailed data on household food access or individual consumption can be time consuming, expensive, and requires a high level of technical skill both in data collection and analysis. The information on food reserves and sources can give an insight on the hhouseholds ability to diversify foods

given to the family members. The dietary diversity provides a more rapid, user-friendly and cost-effective approach to measure changes in dietary quality at the household and individual level (FAO, 2006). Dietary diversity is a qualitative measure of food consumption that reflects household access to a wide variety of foods, and is also a proxy of the nutrient adequacy of the diet for individuals.

The household dietary diversity score (HDDS) is meant to reflect, in a snapshot form, the economic ability of a household to consume a variety of foods. Studies have shown that an increase in dietary diversity is associated with socio-economic status and household food security (household energy availability) (UN, 2009). Malnutrition remains one of the largest problems worldwide, affecting people in both developed and developing countries (WHO, 2004). Children are particularly vulnerable to micronutrient deficiency owing to their high nutrient requirements for growth and susceptibility to infectious diseases such as diarrhoea and respiratory infections, which can inhibit nutrient absorption as well as decrease appetite2. The nutrient density of the diet given to young children is often insufficient to meet their nutrient requirements, and increasing the diversity of foods provided to young children, particularly meat, poultry, fish, eggs, fruits and vegetables, is recommended to improve micronutrient intakes (PAHO/WHO, 2008).

According to WFP (2009), Nairobi Slum Residents access the vast majority of their food and non food items through purchases. The main source of income for these households is low paying unstable jobs in the formal and informal sectors and petty trade. According to World Bank survey (2008), 49% of adult slum dwellers have regular or casual employment, 19% engage in micro enterprise and 20% are unemployed. Urban food security majorly depends on rural agricultural production but with poor infrastructure,

lack of refrigeration and less effective market chain, a characteristic of the slums, urban and peri-urban food production is on the increase (Diana, 2009). According to a research done by International potato center (CIP, 2005), the urban poor have engaged in farming and are contributing greatly to food security. The foods grown include spinach, kales, tubers, and also dairy farming including cattle and chicken. The low income earners focus on African leafy vegetables because of their short growth cycle and the high nutritive value compared to cabbage and kales (Oniang'o, 2008). Urban farming though has negative health impacts as the food is associated with heavy metals like lead especially when grown where there are industrial wastes and effluents (Diana, 2010). The raw milk market mainly in the slums provides millions of poor consumers with affordable nutrition (Amos, 2009). It addresses protein and energy deficiencies in children and is crucial for other household members (Amos, 2009). Food reservation is minimal in the slums as there are no refrigerators and people buy foods in small quantities depending on the food budget.

2.9 Mitigation Measures

Malnutrition is a major threat to child survival and for those who survive; it can also have tremendous consequences on their cognitive, social, motor skill, physical and emotional development. The best way to prevent malnutrition is to ensure optimal feeding and care for children through supporting exclusive breastfeeding, appropriate complementary foods, and a supportive care environment (WHO, 2004).

To focus on vulnerability means to focus on people and their communities, both their problems, and resources - those that are available as well as those that are lacking. Food aid and feeding interventions from outside have been vital but these need to be coupled

with a development approach (UNHCR/UNICEF/WFP/WHO, 2008). Food aid targeting should help identify the most vulnerable areas and households. This requires the use of various indicators, such as health status and food security, in addition to nutritional status (Young *et al.*, 2009).

Various vulnerable groups like the small children below five years should be addressed according to their nutritional requirements. Food relief programs should include: (1) assessment of food supplies available after the disaster, (2) determination of the nutritional needs, (3) calculation of daily food needs, and (4) surveillance of nutritional status (WHO, 2010). Recommendations from the 10-year strategic review presented to the General Assembly in 2007 call for an integrated package of basic services - including nutrition - to be made available to all.

CHAPTER THREE: STUDY METHODOLOGY

3.1 Introduction

In this chapter the various methodologies which were used to attain the study objectives will be clearly explained. The chapter looks at the study area, study design and study populations, sampling techniques, research instruments ethical considerations data collection and data analysis.

3.2 Study area

The study was conducted in Mathare Valley (Appendix 5.1), the second largest informal settlement in Nairobi County Kenya (Emmanuel *et.al.*, 2010). It is situated at the edge of northern part of Eastliegh and boarders Juja road in the south, Pangani in the west and Thika dual carriage way in the north. It falls under Kasarani District. It is situated 10 km from the city – Nairobi. It has a population of approximately 50,530 people with 13 villages (KNBS 2010). The valley is characterized by three categories of housing units. The lowest class is made of mud, waste-tin or timber and lacks basic services and infrastructure. The upgraded housing units are single rooms with relatively good infrastructure. The top class units are privately owned and include high-rise buildings comprising of one or two bedrooms. The Mathare informal settlement has administration boundaries in form of villages namely Mathare 4A, matopeni, Bondeni, Kosovo, Huruma, Kijiji cha Chewa/ Dubai, Kwale, No. 10 / Mashimoni, Beth, Ghetto, Kia Maiko, Jangwani and Madoya. Each of the villages has a village elder.

3.2 Research design

A cross sectional study design was used.

3.3 Variables

3.3.1 Dependent variable

The dependent variable for the study was the nutritional status of the children aged between 6-59 months.

3.3.2 Independent variables

The independent variables for the study included social economic, demographic, daily dietary intake, dietary diversity and morbidity.

3.4 Target population

The taget population was children children aged 6-59 months

3.5 Study population

The study population was children aged 6-59 months living in Mathare Valley.

3.6 Inclusion criteria

Residents of Mathare Valley whose households had children aged 6-59 months and those who agreed to participate in the study.

3.7 Exclusion criteria

Households which had no children aged 6-59 months, those whose household heads were unavailable were excluded from the study.

3.8 Sample size and sampling criteria

The sample size was determined using the formula by Kothari (2003) for a finite population. The prevalence (p) of malnutrion in the mathare valley among children is 20% (Concern, 2009). This prevalence was assumed for children aged 6-59 in this

study.The population of Mathare Valley was 50,530. It is assumed that 20% of this population was children aged 6-59 months.

$$n = \frac{Z^2.p'.q.N}{e^2 (N-1) + Z^2.p.q}$$

Where n= Sample size

N= 20% of 50,530=10,106.

Z = 1.96 standard variance at a given confidence level

p= 0.2, the prevalence of malnutrition for children aged 6-59 in Mathare Valley

q = 1-p=0.8

e =0.05, acceptable error (precision)

Therefore, using the equation, the minimum sample size required for the study

$$n = \frac{1.96^2 \text{ x } 0.2 \text{ x } 0.8 \text{ x} 10,106}{0.05^2 (10,106 - 1) + 1.96^2 \text{ x } 0.2 \text{ x } 0.8}$$

n= 246

3.9 Sampling Methods

Nairobi and Mathare valley were conveniently sampled. The valley has thirteen villages out of which five were randomly sampled. From the centre of each village, the direction was randomly selected from where systematic sampling of the households was done.Households with children aged 6-59 months was eligible. The number of households assigned to each village was proportional to its population.

Table3. 1: Sampling frame and households sampled per village

Village	Number of Households	% of total households	Number of households sampled
Matopeni	1145	19.0	47
Mathare 4A	1402	23.3	57
Kwale	1147	19.1	47
Beth	1160	19.3	47
Jangwani	1180	19.6	48
Total	6016	100	246

Participants in the two FGDs were purposively selected from among caregivers with children below five years where one group was composed of men only and the other female respondents only. The KIIs were done to the public and private stakeholders operating within the slum and these included the District Nutrition Officer, Nursing officer in charge of Mathare Health centre, World Concern Field officer in mathare, and WFP field officer in charge of school feeding program in mathare, two community health workers and the public health officer incharge of the district.

3.10 Research instruments

A structured interview schedule with both open and closed ended questions was used to collect data in households and was written in English and translated to Swahili. The questions focused on socio economic issues, number of family members according to age, frequency of illnesses of children bwlow five years, food variety and food frequencies.

Anthropometry Measurements involved use of MUAC tape to measure the mid upper arm circumference, salter scale to measure weight in kilograms, a length board to measure the height and the birth certificate or immunization card to get the age of the child.

Key informant and focus group discussion guides were used. They focused on caretaker's attitudes towards child nutritional status, the various food sources, the coping mechanism during disasters, number of NGOs within the division and their activities, and the number of kindergartens and health centres.

3.11 Pretesting

The questionnaires were tested on five caregivers in a location that was not included in the study. This helped the researcher to identify potential problems in the proposed study and inconsistencies in the research instruments.

3.12 Methods of data collection

Research assistants were trained on the various methods of data collection so as to ensure quality work. Anthropometric measurement was done on children below five years to determine their nutritional status. This included age, sex, weight, length and Mid Upper Arm Circumference (MUAC) where measurements were taken with paediatric MUAC tape from children who did not present with grade II or III edema. Structured interviews were administered to parents/caregivers at household level and unstructured interviews were applied to key informants who included community elders, workers from health centres and pre schools and stakeholders working within the slum. The purpose of the KIIs and the FGDs was be to add more information to the research topic and possibly to tackle issues that might not be well addressed by the individual parents or caregivers.

3.13 Ethical consideration

Permission to carry out the study was given by the relevant authorization bodies: Kenyatta University graduate school and ethical committee and the Ministry of Education, Science and Technology. Informed verbal consent was sought from all the study participants and confidentiality assured.

3.14 Data analysis

Data was coded and entered into an MS excel data base and imported to IBM SPSS software version 19 for analysis. Descriptive statistics were used to get the frequencies

Ena for SMART package, 2008 was used to analyze the data on anthropometric measurements of the children where WHO (2006) cut offs was used to interprete the nutritional status. A Z-score of ±2 SD for stunting (HA), underweight (W/A) and wasting (W/H) without edema was used to indicate nutritional status. A Z-score of between -2 SD and -3SD categorised the child as moderately malnourished while <-3 SD reflected severely malnourished child. MUAC cut –off ≥13.5 cm reflected a well nourished child, between 12.5 cm and 13.5 cm reflected mild malnutrition while a child with MUAC of between 12.5 and 11.5 shows moderate malnutrition and that with less than 11.5 was severely malnourished. Data was presented in tables and charts.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

Here the findings will be disseminated according to the objectives and the relevant discussions made after which the conclusions and recommendations will be drawn basing on the findings.

4.2: Demographic and Socioeconomic characteristics of caregivers

Table4. 1**:** Demographic Socioeconomic Characteristics

Factor		**Frequency**	**Percent**
Gender	Male	3	1.2
	Female	243	98.8
Age (Years)	Mean (min-Max)	25.9 (15-98)	
Relationship	Parent	237	96.4
	Others[α]	9	3.6
Highest Education	Non-formal	151	61.4
	Formal	95	38.6
Marital Status	Single	197	80.1
	Married	38	15.5
	Widowed/Divorced	11	4.5
Cooking fuel	Charcoal	17	6.9
	Kerosene	229	93.1
Income (KShs)	Mean (range)	3227.50 (500-10000)	
Source of income	Husband	115	46.5
	Casual wages	57	23.2
	Own business	52	21.1
	Salary	11	4.5
	Others[β]	11	4.5
House ownership	Rented	242	98.4
	Own	4	1.6
Family owned	Television/Radio	180	73.2
	Others[μ]	12	4.8
	None	54	22

[α] Aunt, Grandparent, sibling; β Prostitution, Donor aid, Help from children and relatives; μ Bicycle, land, plot, car, motorcycle.

Table 4.2 shows the socio economic and social demographic characteristics of the study population. The majority 243 (98.8%) of interviewed were female with a mean age of 25.9 years (range 15-98). Majority were parents 237 (96.4%) while majority had non-formal education 151(61.4%). About 4.5% of the total respondents were employed and 23.2% were casual waged laborers working mainly in industries or companies. It was found that at least 46.5% of the total respondents had some source of income. The total income from various sources of the respondents ranged from Kshs 500 to Kshs10,000 (USD 6 -120) with a mean of Kshs 3227.50. Of these respondents, 98.4% resided in rented houses and 1.6% in their own houses. Kerosene and charcoal were the most popular sources of cooking fuel used by 93.1% and 6.9% of the respondents respectively. Most respondents afforded a radio, a cell phone and some a television though 54 people had none of the possessions. At least two people had some land outside their residential area and one person had a plot within Nairobi. No respondent had a vehicle and only one had a motorcycle and eight a bicycle.

4.2.1: Demographic and Anthropometric characteristics of children

Table 4. 2: Demographic and Anthropometric characteristics of children under study

Factor	Frequency
Gender (N = 246) **Male** Female	**141 (57.3%)** 105 (42.3%)
Age in Months **Mean (range)**	**25.6 (6-59)**
Height in Cms **Mean (range)**	**86.5 (59-118)**
Weight in Kgs **Mean (range)**	**12.5 (5.6-23 kgs)**
Middle Upper arm Circumference (MUAC)	**13.5(9.9-16.9)**

A total of 246 children children aged 6-59 months were studied among which 141 (57.3%) were male and 105 (42.7%) female. The mean age was 25.6 months, height 86.5cms, weight 12.5Kg and MUAC 13.5cm

4.3: Dietary diversity

Table4. 3: Dietary diversity

Food group	Last 24 hrs
Cereals	204(82.9)
Vitamin A rich vegetables and tubers	172(69.9)
Dark green leafy vegetables	146(59.4)
Other vegetables	141(57.3)
Vitamin A rich fruits	107(43.5)
Other fruits	107(43.5)
Organ meat	19(7.7)
flesh meats	13(5.3)
Eggs	22(8.9)
Fish	72(29.3)
Legumes, nuts, seeds	101(41.1)
Milk and milk products	172(69.9)
Oils and fats	146(59.4)
Sweets	141(57.3)
Spices, beverages	151(61.4)

The population-level statistics of interest for dietary diversity are the mean dietary diversity score and a measure of distribution of the scores, such as terciles. The percent of households consuming each food group is another analytical strategy. Dietary diversity scores and percent of households consuming each food group may be used as a one-time measure or for on-going monitoring. For children below five years, nine food groups are considered nutritionally as sweets, spices and beverages are not of any nutritional value to children. Table 4.2 above shows how the families were able to diversify the foods given to the children over a period of one week. For cereals, 82.9% had consumed within 24 hour period. Vitamin A rich vegetables and tubers was consumed by a good number accounting to 69.9% within the last 24 hours while vitamin A rich fruits had been consumed by 43.5% within the last 24 hours. Protein rich foods had been consumed generally well especially in the last four days where eggs, fish, nuts, fresh meat, milk and

milk products had been consumed by 44.7%, 54.4%, 77.2%, 15% and 73.2% respectively.

4.3.1 Household Dietary Diversity Score (HDDS)

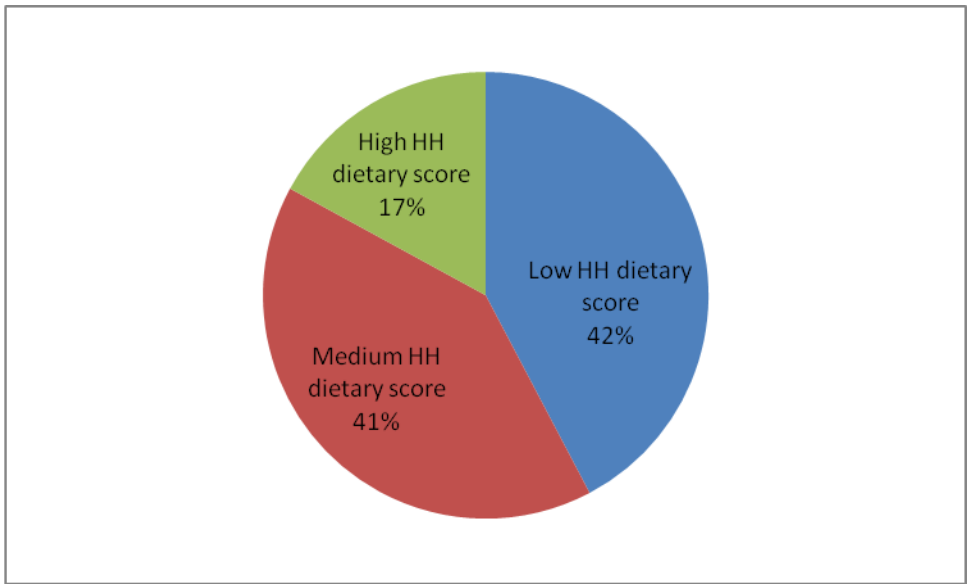


Figure 4. 1: Household Dietary Diversity Score

To better reflect a quality diet, the number of different food groups consumed is calculated, rather than the number of different foods consumed. While the individual dietary diversity score (IDDS) is used as a proxy measure of the nutritional quality of an individual's diet, the HDDS is used as a proxy measure of the socio-economic level of the household. Low 104 (42.1%), and medium 100(40.5%) and high 42(17%). The score is usually compared to the baseline survey and in cases where the data for baseline is not available the score is usually compared to the best performers within the same setting. Basing on the results in figure 4.1 above 42 (17%) households had a desirable diversification, 100 (40.5%) had a satisfactory one and 104 (42.1%) had a very poor diversification**.**

4.4 Food Sources

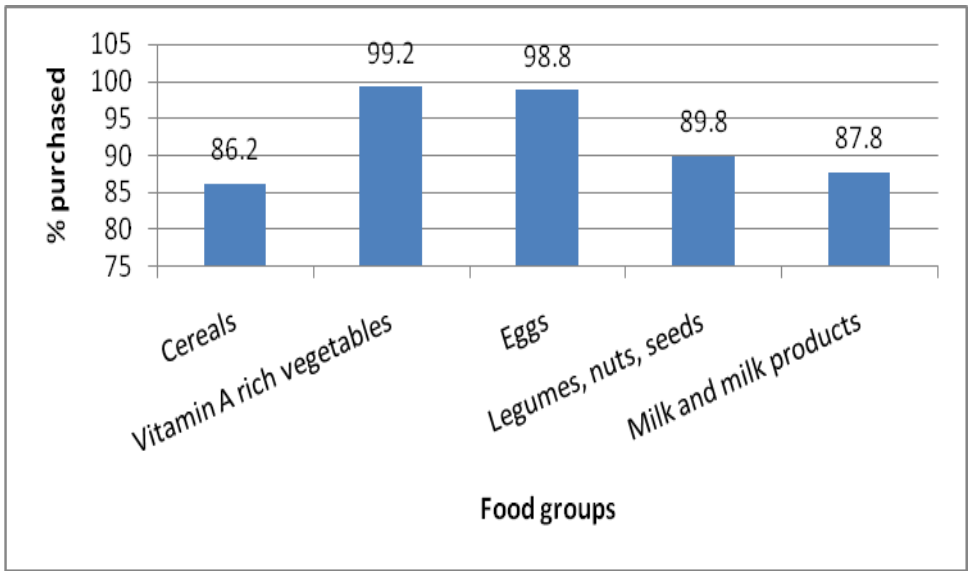


Figure 4. 2: Food sources

In assessing malnutrition, it is of utmost importance to evaluate the various food sources, the variety of foods in the stores or households and also the food preservation methods that are used for various excess foods. These will give an indication of food security/insecurity and subsequent emergency or non-emergency indications. This however is also influenced by the existing food security and distribution policies and the involvement of other stakeholders.

Basing on the findings on figure 4.2 above, cereals are purchased by 86.2% of the respondents while 11.8% rely on food donation/relief food. Dark green leafy vegetables are purchased by 90.2% while 8.9 % produced their own using sacks or on nearby farms whereas legumes, nuts and seeds are purchased by around 90% and 9% rely on food aid. Those who traded with milk and milk products were 5.3% while those who depended on aid were 6.9 and 87.8% purchased. Generally, most of the foods were being purchased and a very small percentage relied on food aid.

4.5 Food Storage

According to the *findings* very few people had extra food (21) and of these, maize was the most abundant followed by vegetables and then beans, green grams and potatoes. Arrow roots and potatoes were found in only one household. The main method of food storage/ preservation among the few who have extra food is smoking and drying

4.6 Morbidity Status

Table 4. 5: Morbidity status (Frequency of infections)

	Number of children	Percent
Ill in last two weeks - Yes	98	39.0
- No	148	61.0
Symptoms		
Cough	46	47.9
Diarrhea	48	50.0
Vomiting	39	40.6
Cold	25	26.0
Skin infection	15	15.6
Lack of appetite	17	17.7
Others	18	18.8
Consultations made N=98		
Yes	84	87.5
No	14	12.5
Reason no consultation N=12		
Lack of money	11	91.7
Illness mild	3	8.3
Consultations to N=84)		
Hospital	76	90.5
Pharmacy	11	10.7
Frequency of illness		
1	23	21.9
2	25	24.5
3	13	13.5
4	8	8.3
99	29	30.2

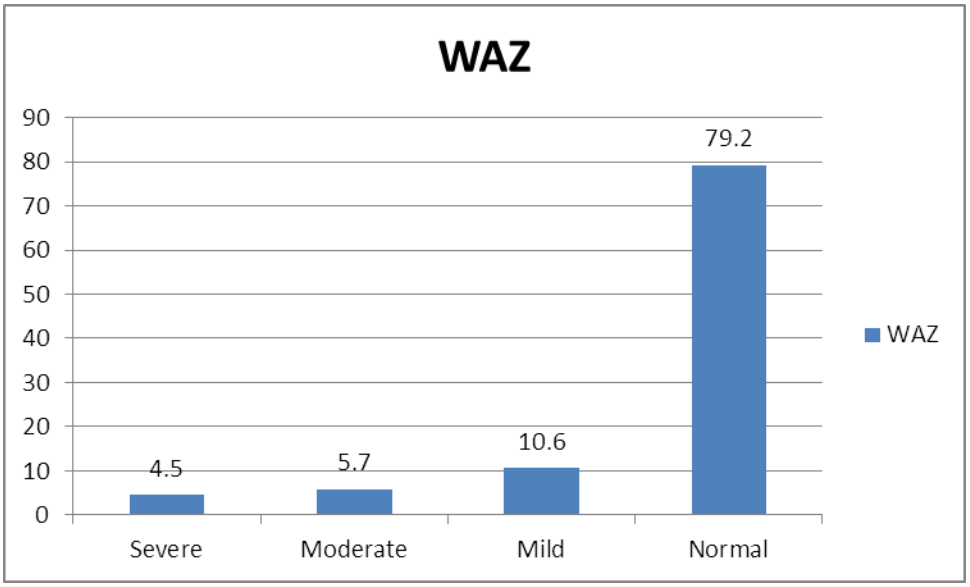
*99 = sick throughout

Child morbidity and malnutrition have similar determinants which include poor maternal health during pregnancy, poorly-resourced health systems, food insecurity, inadequate and inappropriate feeding practices, lack of hygiene, and poor access to safe water.

Table 4.5 shows that 98 (39.0%) children had fallen ill within the previous two weeks and several had fallen ill throughout the two weeks. The major symptoms included diarrhea, cough and vomiting by 50%, 47.9% and 40.6% respectively. Among the sick children, 12.5% were not given any treatment because of lack of money (91.7%). Of those who sought medication, 90.5% went to the hospital and 10.7% went to a chemist or over the counter. Of those who had fallen ill more than once within the period, 25 children (56.3%) had fallen ill twice, 13 children had fallen ill thrice and 8 had fallen ill 4 times. About 29 children had been ill throughout.

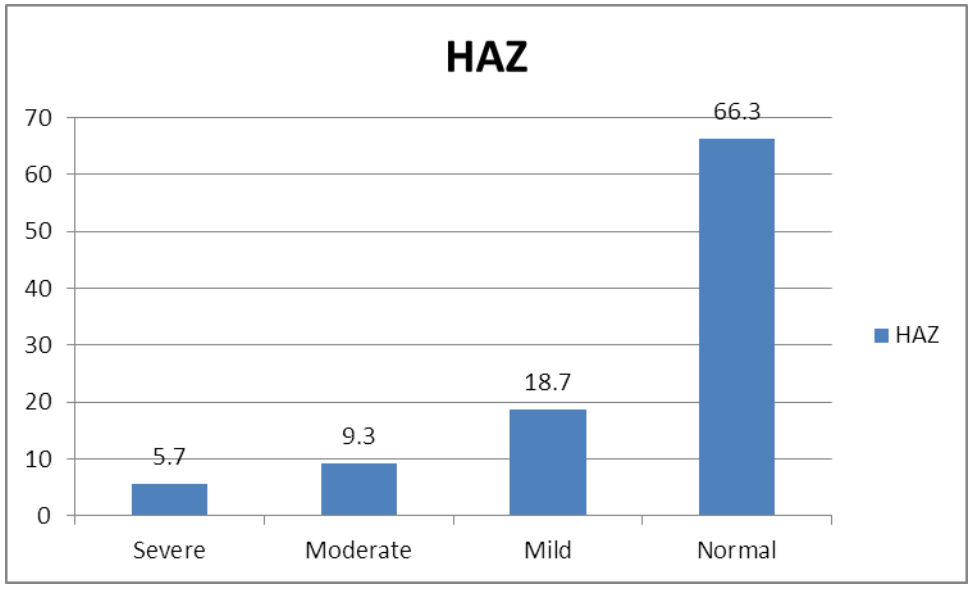
4.7: Nutritional status of study children

4.6.1: Underweight



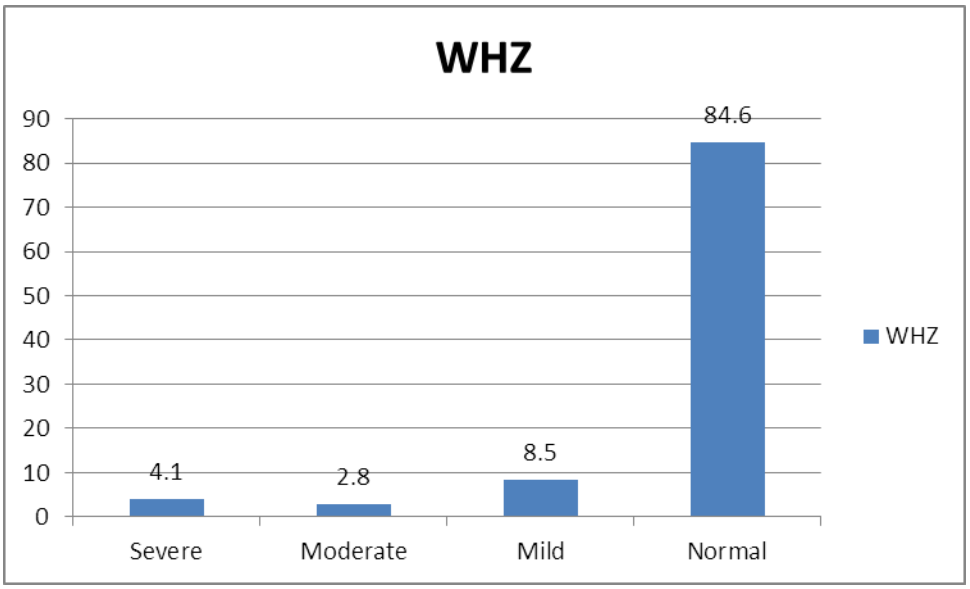
Underweight is acute and chronic malnutrition combined (WHO, 2006). It is indicated by low weight for age. An underweight child has weight for age Z-Score below -2SD of the reference population. Weight for Age mean was 0.8. Among the children under study, 11 (4.5%) had WFA Z scores less than -3 indicating severe underweight, 14(5.7%) and 26 (10.6) were moderately and mild underweight respectively.

4.6.2: Stunting



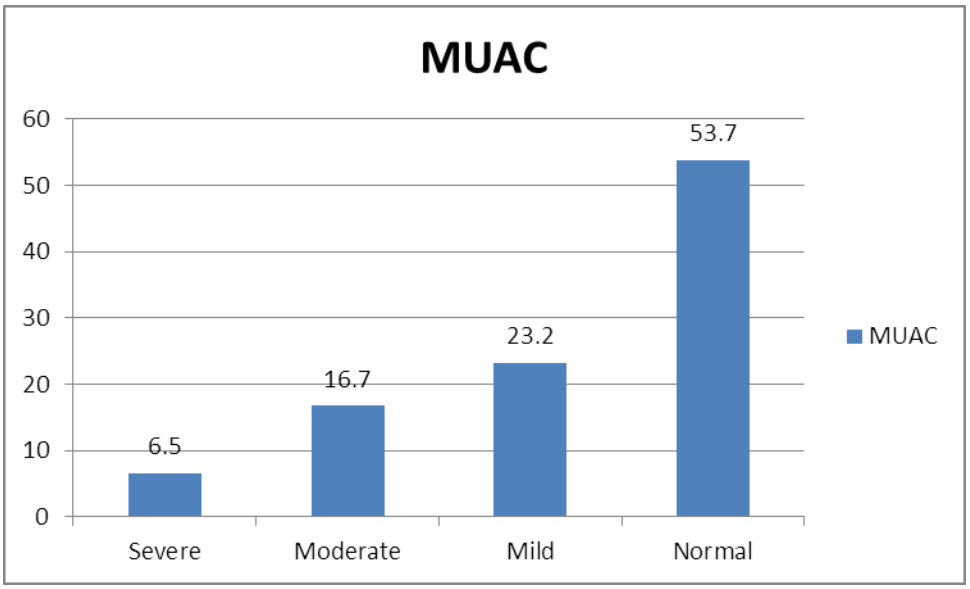
Stunting is low length/height for age and is determined by use of Height for Age Z-Score (HAZ) Height for Age Z-Scores below -2SD of the reference population are indicative of stunting. It is a sign of chronic nutritional disorder (WHO, 2006). The Height for Age Z Scores were determined using the ENA nutritional software programme. Mean Height for Age was 5.9 (range 0.3-94.3). As indicated in Table 4.3, 14 (5.7%) had HFA z scores less than -3 SD indicative of severe stunting. Moderate and mild stunting was observed in 23 (9.3%) and 46 (18.7%) of the children respectively

4.6.3: Wasting



WFH can be used as part of the assessment of acute malnutrition in infants less than 6 months. Visible wasting and bilateral oedema are clinical signs of acute malnutrition in this age group. Wasting is low weight for length/ height (WFH). Usually, wasted children are below -2SD of the reference weight for length/ height. It is an acute nutritional disorder (WHO, 2006). Thirty eight (15.4%) of the children were wasted as indicated by their Weight for height Z scores below -2 SD. Severe acute malnutrition (SAM), indicated by WFH<-3 standard deviations 10(4.1%)

4.6.4: Malnutrition



The mid upper arm circumference (MUAC) is used to measure malnutrition. MUAC cut-off ≥13.5 cm reflected a well nourished child, between 12.5 cm and 13.5 cm reflected mild malnutrition while a child with MUAC of between 12.5 and 11.5 shows moderate malnutrition and that with less than 11.5cm severely malnourished. Mean MUAC was 13.6 (range 9.9-17.5). Of the children, 114 (46.4%) were malnourished with 16 (6.5%) severely malnourished, 41 (16.7%) with moderate malnutrition and 57 (23.2%) with mild malnutrition.

Table 4. 3: Food frequency

	Every day	3-6 times a week	1-2 times a week	Once a month	Long time /Never
Starchy Cereals	139(56.5)	50(20.3)	46(18.7)	9(3.7)	2(0.8)
Starchy non cereal	39(15.9)	61(24.8)	96(39.0)	37(15.0)	13(5.3)
Legumes fresh	23(9.4)	59(24.0)	100(40.7)	31(12.6)	33(13.4)
Legumes dry	39(15.9)	65(26.4)	89(36.2)	38(15.5)	15(6.1)
Vegetables	124(50.4)	42(17.1)	60(24.4)	15(6.1)	5(2.0)
Fruits	94(38.2)	25(10.2)	69(28.1)	39(15.9)	19(7.7)
Eggs	1(0.4)	17(6.9)	60(24.4)	55(22.4)	113(45.9)
Meat/Fish	7(2.9)	9(3.7)	43(17.5)	65(26.4)	122(49.6)
Milk	133(54.1)	37(15.1)	52(21.1)	14(5.7)	10(4.1)

Lack of material resources can affect children's health directly through under nutrition as well as through poverty elicited longstanding stress for both parents and children. Food frequency data for sampled population is shown in Table 4.3. 139 (56%) of the caregivers were able to give energy giving foods (starchy cereals) every day, 15.9% gave dry legumes daily,50.4% gave vegetables and about 2.9% gave meats. 24.4 % ate eggs1-2 times in a week. A good number 49.6% were not able to give meat at all or ate after a long time. Starchy foods, vegetables and milk are very common and mainly consumed almost on a daily basis by about 57% of the respondents. According to the findings, eggs, meat and fish are consumed very rarely.

4.7: DISCUSSION

4.7.1 Demographic and socio-economic Characteristics of households.

In Mathare slum the main occupation and source of income for the majority of households is casual labour followed by own business and salaried employment. About two-thirds of the household heads are employed as daily or casual laborers, one-quarter self-employed (own business) and about one-tenth salary employed. The two most important sources of income therefore, are casual labour and self employment**.** According to a World Bank study, 73% of Nairobi's slum dwellers live below the official poverty line, defined as Ksh 3,174 (US$42) per month. The mean per capita monthly income for poor slum dwellers is Ksh 2,776 (US$37), while monthly expenses average: food Ksh 1050 (US$75), transportation Ksh 180 (US$2.50), Water Ksh 90 (US$1.20), electricity Ksh 295 (US$4), rent Ksh 753 (US$10), (Gulyani, 2008). In this study, the findings of average earnings per day were very similar at Kshs 3227.50 ranging from Kshs 500 to Kshs 10000. Malnutrition is inseparable from poverty among other factors like economic situations, maternal level of education, climate changes, food production, effectiveness of nutrition programs and quality of health services (WHO, 2009).

According to FGDs and KII findings, poverty has greatly influenced the nutritional status of the children in the valley as some are used to feeding one type of a meal which is readily available and less expensive especially porridge. Also, lack of parental skills resulting from lower maternal education better explains disparities in children's health than lack of material resources resulting from low family income. A study by Senbanjo *et.al. (2008)* on the influence of socio economic factors on nutritional status of children in Nigeria indicated that in households where the income was limiting, the children were

more vulnerable to malnutrition than in those where income was higher. The slum dwellers are also associated with poor housing and overcrowding. The consequence of overcrowding is the spread of diseases like acute respiratory infection (ARI) and diarrhoea which are known causes of malnutrition. This calls the impact of the various intervention programmes used in the past to question and demands a reverberated approach. Women empowerment promises improved family finances, better food security and better childhealth (Concern, 2010)

4. 7.2: Dietary Diversity

As evidenced by the findings and the information from the KIIs and FGDs, a good number of households are not able to give a variety of foods. Most of them as seen in the household dietary diversity score (HDDS) are not able to give a variety of foods. Majority cannot afford meats at all or consume proteins very rarely hence the poor nutritional status. This is because of the poor purchasing power due to the low unsustained income which is a characteristic of the population here. The dietary diversity scores facilitate the assessment of changes in diet before and after an intervention (improvement expected) or after a disaster such as failed crops (decline expected) **(**UNHCR/UNICEF/WFP/WHO, 2008). The mean dietary diversity score allows comparison of sub-populations; for example, communities undergoing a nutrition intervention compared to control communities, or HIV-affected households compared to others (WFP, 2009). The dietary diversity score does not indicate the quantity of food consumed and diet varies across seasons and some foods can be available in large quantities and at low cost for short periods (WFP,2009). In this study, many households only afforded three food types and this is ranked as poor because the diet is not sufficient

to meet the dietary requirements or could be rich in macro nutrients and limiting in micro or viceversa. There may be differentials in dietary diversity depending on accessibility and purchasing power. A more diversified diet is highly correlated with such factors as caloric and protein adequacy, percentage of protein from animal sources (high quality protein), and household income (UNICEF 2010). Even in very poor households, increased food expenditure resulting from additional income is associated with increased quantity and quality of the diet. The diversity of foods taken among the target group is not varied because of so many factors. The Vitamins and protein rich foods are not very cheap and not widely consumed as evidenced.

4.7.3: Morbidity

A synergistic relationship between malnutrition and common childhood illnesses has been well established. In the findings, quite a good number of children fell sick within the previous month and most of them had symptoms of diarrhea, vomiting, coughing and lack of appetite among others. Under nutrition and childhood morbidity have a synergistic relationship but most studies have focused on either malnutrition or morbidity separately, and relatively very few have looked at the relationship between the two (Pelletier *et.al* 2010). The interrelationship of the two is in such a way that on one hand, nutritional deficiencies increase the susceptibility of the child to infectious diseases such as diarrhea, fevers, and malaria, and on the other hand, illness can suppress a child's appetite leading to undernutrition. The consequences of this pattern are poor physical and mental development, and possibly death (FAO ,2009).These ailments compromise the nutritional health of a child and subsequent immunity hence causing repeated bouts of infection especially gastro intestinal, Cholera, pneumonia, malaria and many others.

Nutritional deficiencies increase the risk of the child suffering and these illnesses in turn contribute to worsened nutritional status through loss of appetite or a lack of essential nutrients, among others (Black *et.al,* 2008). Acute malnutrition is of greater concern as it's associated with increased risk of morbidity and mortality. It is defined as very low weight for height and in young children it is often done through measuring the mid-upper arm circumference, known as the MUAC measurement. Acute malnutrition is a serious health problem that can lead to permanent metabolism issues, kidney and immune system breakdown, and even death by starvation. Acute malnutrition is a leading illness in some parts of the world, brought on by lack of food or a sudden illness that prevents food intake (UNICEF, 2010). This finding is similar to a study that was done by APHRC in 2006 where they found out that despite the attention paid by the government through poverty reduction strategies, the number of deaths in Nairobi slums due to malnutrition still remained disturbingly high.

In this study, some of the children were suffering from diarrheal disease and this is highly associated with Vitamin A deficiency and poor sanitization. Lack of Vitamin A increases the duration, severity and complications of diarrheal disease in young children (UNICEF 2010). Although our study shows that dark green vegetables and other Vitamin A rich foods were consumed by a greater population, a significant number of them still suffered diarrhea several times within the previous two weeks. This could be because of the deficiency of this vitamin or lack of clean water and the poor sanitization which is a characteristic of the valley. Infrastructure especially access to safe drinking water and proper health care and electricity could improve nutritional status by improving hygiene,

cooking and health practices Black, *et.al* (2008). The better nutritional profile of under-fives of educated mothers indicates that right to have education and to achieve 100% literacy will help in promoting the nutritional status of children as educated mothers are more aware of the health services available and also the acceptance to utilize the same is better among them (Sarr, 2010). The presence of more frequent health problems among poor children underscores the fact that the same children often present several health problems.

4.7.4: Assessment of Nutritional Status

Three forms of growth failure were assessed in children: Wasting (acute malnutrition), Stunting (chronic under nutrition) and underweight (acute malnutrition and/or chronic under nutrition) as each form reflects a different condition. According to the findings, a high percentage of children are malnourished and need immediate attention. The cause of malnutrition is primarily due to poor dietary intake as majority of children according to the caregivers, especially those involved in focus group discussions, ate mashed bananas and potatoes and others ugali with kales. Agood number takes porridge on a daily basis without any other meal. Key informants agreed that a high number of the children within the valley require immediate attention due to their poor nutritional status. According to them, many are on supplements because they are fed on poor diet with most of them consuming ugali and sukuma wiki throughout. They said that poverty, ignorance and food taboos especially on protein rich foods are some of the factors that contribute to the poor nutritional status adding that birth spacing is compromised within the valley as many women seldom access family planning services. When asked about the cheapest meal that the children are fed with they said porridge and ugali with kales.

> *chakula tunapata rahisi sana ni kama uji kwa sababu unga unaweza pata hata ya kupima ya sh 15/= ya quarter au walu ya sh10 unachanganya na ndizi ya sh5/=. (The most readily available meal is maize meal porridge and potatoes and green bananas)*

This shows that the meal is mainly composed of energy giving foods without the body building foods or the protective foods hence the high rate of malnutrition. The recommended daily dietary intake is never achieved because of low income. Both women and men confessed that they know of the poor status of their children but due to poverty, very little could be done to change the situation. Education levels of caregivers also influences the nutritional status of children in that the children of the educated caregivers tend to be well nourished compared to those of caregivers not educated (Mittal A. *et.al* (2007)). These findings are also similar to a study done in Korogocho by Abuya *et.al,* (2010) that maternal education greatly influences the health seeking behavior which also impacts on nutritional health of children. A study done in india indicated that half of the children below 5 years were found to be underweight or stunted due to many socioeconomic factors (Heinn, *et.al,* 2008 & mittal A *et.al,* 2004*).* However, according to Mittal and his group, empowerment of caregivers should take into accout other factors of child care such that if one is employed though with a better source of income the child can still be malnourished because of poor attention.

The respondents also agreed that due to the poor sanitization most of their children are always sickly and some with symtoms of cholera and very poor appetite and this too is a major cause of malnutrition. Inadequate water supply, sewage and refuse disposal cause diarrhea and intestinal parasites among other illenesses to the children living in these areas and this directly affects their nutritional status (Keraka *et.al,* 2003). Several other

factors could be associated with poor nutritional status among these children and these include poor child health services, changing climatic conditions, environmental factors, food distribution channels and other infrastructure.

The food supplements available in Mathare Health centre are donated by the government in conjuction with other development agencies but it is only available to those children who are identified and reffered by community health workers (CHWs). According to the District Nutrition Officer, the health centre is relying heavily on these CHWs and those who come voluntary for other health care clinics and they are given nutrition education.

The 1st millennium goal is to eradicate extreme poverty and hunger. Household food security exists when the house hold has at all times physical and economic access to sufficient, safe and nutritious food for a healthy and active life. The diet is adequate in both quality and quantity providing the required amounts of energy, carbohydrates, proteins, fats (macro nutrients) and vitamins and minerals (Micro nutrients). Poverty and hunger are perpetuated by economic and food security all of which increase the vulnerability of populations to food and nutrition needs.There was a very small proportion of the respondents who were employed and of these, majority were working as casual labourers in the neighbouring industries.

4.7.6 Conclusion

According to the findings in this study, malnutrition is highly prevalent in the valley. There are many reasons as to why the prevalence is evident and will continue in that some factors such as poverty and low levels of maternal education influence a lot on food choices for child feeding. There is little surveillance and the trained personnel are less

motivated due to poor facilitation and issues of early warning systems are not well addressed. It is however important to note that the caregivers were seen to own their problem and were willing to be part of those solving the malnutrition related issues because they knew what was affecting the health of their children but had no capacity to solve the issues. The issues of gender in child rearing were very well brought out during the male FGDs who were noted to be very well versed with nutrition issues of their children including what the donors are giving and where they felt was not being done well. Atleast, those who were in the same setting during the post election violence could tell the difference in feeding programmes very well.

4.7.7 Recommendations

In mathare valley, food crisis is one of access rather than availability and so food subsidies e.g. food stamps to offset the high food prices should be prioritized. Also there should be advocacy, including support for the implementation of current policies to address effects of unprecedented and sustained rise in food prices. There should be decentralisation and improved quality for integrated management of acute malnutrition (IMAM) at the key health facilities serving mathare slums. Secure pipeline of therapeutic nutrition commodities to provide above intervention for all severely malnourished children, regardless of HIV status and ensure system for moderately malnourished children to help reduce numbers requiring therapeutic services e.g. CSB, UNIMIX, food by prescription.

Ensuring quality products for all nutrition interventions and better understanding of high defaulter rate of OTPs in order to address the problems and increase cost effectiveness of

the strategy. Continuation of sentinel site surveillance to monitor the nutrition and food security situation together with stronger data collection, consolidation and analysis across all informal settlements.

Longer term planning should address food security, the strengthening of livelihoods and provision of essential services which should also include social safety net mechanisms for providing extended support to the most vulnerable and destitute.

REFERENCES

ACF Kenya Mission, Mathare Sentinel Surveillance Report, July 2009

Abuya, B.A., Onsomu E.O., Kimani J.K., & Moore D. (2010), Infuence of education on child immunization & stunting in kenya. Maternal and child health journal 1007/s 10995-010-0670-z

Amos O, (2009), The Urban and peri-urban dairy industry: Research and Policy; *International Livestock Research Institute (ILRI)*, Kenya

Black, R. E., Morris, S. S., Bryce, J. (2009). Where and why are 10 million children dying every year?" *Lancet*. Jun 28;361(9376):2226-34.

Black R.E., Allen, L.H., Bhutta,Z.A, Caulfield, L.E., de Onis, M. et.al (2008). Maternal and child undernutrition: Global and regional under exposures & health consequences. Lancet 19, 371:243-260

Bonham, C. R. (2006). Survey reveals high malnutrition rates among pregnant women in Kenya. *UNICEF, info by country*. Retrieved June 2, 2006

Cohen, D. (2009). Achieving food security in vulnerable populations. *British Medical Journal*, 331, 775-777 (1 October). Retrieved June 5, 2009

Dwyer, J. (2008). Teaching global bioethics. *Bioethics*, 17 (5-6), 432-446.

Emmanuel, M.Masaru, Y, (2010), Understanding the grass roots dynamics of slums in Nairobi. International Transaction Journal of Engineering Management and Applied Science and Technologies. University of Tokyo, Japan.

FAO (2008). Food and Agriculture Organization Economic and Social Development Department. The State of Food Insecurity in the World, 2008 : High food prices and food security - threats and opportunities.

FAO, (2010). Food distribution in emergencies. RRN Good practice reveiw

George, A., Gilbert, K., Diana, L-S., Mary, N., Rachael, R. (2005). Policy Prospects for urban and Peri-urban agriculture in Kenya. Urban Harvest-international potato centre, Lima Peru

Golden, N. (2008) Promotion And Protection Of All Human Rights, Civil, Political, Economic, Social And Cultural Rights, Including The Right To Development: Report of the Special Rapporteur on the right to food. UN

Grosh, M., Del Ninno, C. & Tesliuc, E. (2008) 'For Protection and Promotion: The Design and Implementation of Effective Safety Nets'. Washington DC: The World Bank

Hein, N.N., & Kam, S.(2008) Nutritional status and the characteristics related to malnutrition in children under five years of age in Ngean, Vietnam: *journal of preventive medicine and Public Health* 41(4,)232-40

IASC Nutrition Cluster,(2008), 'A Toolkit for Addressing Nutrition in Emergency Situations' . www.humanitarianreform.org/ humanitarianreform/Default.aspx?tabid=74

IASC Nutrition Cluster,(2008), 'Harmonized Training Package for Nutrition in Emergencies', .www.humanitarianreform.org/ humanitarianreform/Default.aspx?tabid=74

IFE Core Group,(2008), 'Infant and Young Child Feeding in Emergencies: Operational guidance for emergency relief staff and programme managers', version 2.1., Emergency Nutrition Network, Oxford, 2007, .www.ennonline.net/ife/

IRIN (2009). The humanitarian news and analysis service of the UN Office for the Coordination of Humanitarian Affairs" Kenyan Slum Dwellers Priced into Hunger."

Kilinde K, (2010), Minimizing Health Risks in Urban and Peri – Urban Agriculture; Public Health and Food Safety, Policy Brief, Nairobi, Kenya

Kothari, C.R. (2003). Research Methodology - Methods and Techniques. Second Edition. Wishwa Prakashan, New Delhi. Menon, V. (2003) A Field Guide to Indian Mammals.

WHO, (2009). Humanitarian charter and minimum standards in disaster response. Geneva

WHO, (2008). Mortality and Burden of Disease Estimates for WHO Member States . Geneva

WHO, (2010). Guideline and principles for feeding infants and young children in emergencies. WHO in press.

O'Connor, M. E., Burkle, F. M., and Olness, K. (2009). Infant feeding practices in complex emergencies: A case study approach. *Prehospital and Disaster Medicine*, 16, 231-238. Retrieved August 11, 2009

Oniang'o R, (2010), The role of urban and peri urban agriculture in improving household nutrition; African Journal of Food, Nutrition, Agriculture and Development (AJFAND) Nairobi, Kenya.

Pelletier, D. L., Fongilo, E. A., Schroeder, D. G. and Habicht, J. P. (2010). Epidemeiological evidence for a potentiating effect of malnutrition on child mortality. American Journal of public health 83: 1130-1133 U.S.A

Pelletier, D. L., Fongilo, E. A., Schroeder, D. G. and Habicht, J. P. (2010). The effects of malnutrition on child mortality in developing countries. Bulleting of WHO Geneva

Sarr, A. (2010), Mortality, a determinant and consequence of poverty and hunger in west Africa. In; Mortality as both a determinant and a consequence of poverty and hunger p1-21 Thruvananthapuram India

Senbanjo I.O, Adeodu O.O, Adejuyigbe E.A, (2008), Influence of socio-economic factors on nutritional status of children in a rural community of osun state, Nigeria

Smith, C.L., Haddad, L., (2010), Explaining child malnutrition in developing countries. A cross country analysis. International Food Policy Research Institute. Washington D.C.

Svedberg, P. (2010). An End to World Hunger "Poverty and Under nutrition" p. 298. American Journal of public health. USA

Tomkins, M. A., Dunn, T. D., Hayes, J. R. and Bradley, K. A. (2010), Seasonal variations in the nutritional status of Urban Gambian children. British Journal of nutrition 56: 533-543 U.K

UNICEF, (2011), Child nutrition crisis in areas of disaster and Emergencies. A case study in Pakistan; Retrieved January 31, 2011

UNICEF,(2010), Infant and young feeding in emergencies; Operational guideline for emergency relief staff; Interagency working group on infant and young child feeding in emergencies, USA

UNICEF New York, NY, (2008), Global nutrition cluster. A tool kit for addressing nutrition in emergency situations. IASC Global Nutrition cluster.

United Nations (2009). World mortality report. Department of economic and social affairs, population division New York.

United Nations, (2004) World urbanization prospects: The 2003 revision. New York: United Nations department of economic and social affairs population division.

UNHCR/UNICEF/WFP/WHO (2008). Food and nutrition needs in emergencies. Emergency Needs assessment Guide.

USAID (2008). Famine Early Warning System.

Victoria C.G., *et.al* (2008) Maternal and Child under nutrition: Consequences for adult health and human capital. Lancet 371,9609: p.340-357

Wamani H., Tyllesker,T., Astrom, A.N., Tumwine J.K., & Peterson, S. (2004) Mothers education but not fathers education, household assets or land ownership is the best predictor of child health inequalities in rural Uganda. International journal for equity in health. 13,3(1):9

Walkers, S. P., Chang, S. M. and Powell, C. A. (2010). The association between early childhood stunting and weight status in adolescence. International Journal of obesity S.A

WHO/UNICEF/WFP,(2006), Joint Statement: Preventing and controlling micronutrient deficiencies in populations affected by an emergency', World Health Organization, Geneva. .www.who.int/nutrition/publications/ WHO_WFP_UNICEFstatement.pdf

WHO, WFP,(2007), Standing Committee on Nutrition and UNICEF, 'Community-based Management of Severe Acute Malnutrition: A joint statement by WHO, WFP, SCN and UNICEF', New York.

World Health Organization (2010). Disasters and emergencies. Definitions Training Package. WHO/EHA PanAfrican Emergency Training Centre, Addis Ababa. Retrieved August 10, 2010.

World Food Programme (2008). *Strategic Plan 2004-2007*.

World Health Organization (2008). The management of nutrition in major emergencies. Geneva: WHO.

Young, H., Borrel, A., Holland, D. and Salama, P. (2007). Public nutrition in complex emergencies. *Lancet*, 365, 1899-1909.

Ziegler, J. (2008). Human Rights Council of the United Nations, January 10, 2008.

6.0 APPENDIX

6.1 Map of Mathare Slum

6.1 Photo of Mathare Slum

6.2 Household Questionnaire

SECTION A: DEMOGRAPHIC INFORMATION

I would like to ask you questions on the composition of your household (HH) starting with the household head (HHH). Please tell me the number of persons you are living with in the same HH, including their age, sex, relationship to HHH. (Ningependa kukuliza maswali kuhusu nyumba yako. Uko na watu wangapi wa kiume ama kike wale unalisha na kukaa nao ukitaja miaka yao na niambie wewe ni nani kwao ?)

Age of respondent(miaka ya anayejibu maswali)----------

v. Sex (Male, Female) (mwana mke au mwana mme)-------

vi. Relationship type of respondents to children below five years(parent,sibling, grandparent, auncle, aunt, friend or no relation/any other)(wewe ni nani kwa hawa watoto chini ya miaka tano?)----------

vii. Highest education attained(Kiwango ya juu ya watoto)----------

viii. Main Occupation(kazi kuu)----------

ix. Marital Status(Hali ya ndoa)-----

x. Demographic Information of children below five

Sex	Date of Birth(tarehe ya kuzaliwa)	Age in Months (Umri kwa Miezi)	Age of those above five(Umri ya wale juu ya miaka tano)
M			
F			

SECTION B: SOCIOECONOMIC STATUS

1. What are your sources of income?(mapato yako hutoka wapi?)

A) Salaried job (Kazi ya mwezi) ( )

B) Shop Owner (Mwenye duka) ( )

C) Help from children(Usaidizi na watoto) ( )

D) Casual waged labour(Vibarua) ( )

E) Small own business/petty trade (Biashara rejareja) ( )

F) Others specify (kitu Ingine)----------

2. How much Kshs. Do you earn per month from all sources (Kwa mwezi unapata pesa ngapi)----------

3. Do you live in a rented house or own house? (Nyumba yenye unaishi ni yako ama ni ya kukondesha)?------

4. What is the main type of cooking fuel? (unatumia nini kupika?)

1. Kerosene ( )

2. Electricity ( )

3. Firewood ( )

4. Charcoal ( )

5. Gas ( )

6. Others Specify----------

5. Which of the following are owned by your family?(Kwako kuna vitu gani kwa numba?)

1. Television ( )
2. Radio ( )
3. Cellphone ( )
4. DVD Player ( )
5. Bicycle ( )
6. Land ( )
7. Plot ( )
8. Car ( )
9. Motorcycle ( )
10. None ( )

SECTION C: MORBIDITY STATUS FOR CHILDREN BELOW 5 YEARS

1. During the past 2 weeks, did (name each child below 5 years) suffer from any illness/injury? (Kwa mwezi mmoja umepita, huyu motto wako (chini ya miaka mitano) ameugua kwa maradhi yoyote?)

    1. Yes,

    2. No

2. If Yes, how many days did the child suffer?(Kama ameugua ni siku ngapi?)_____

3. Can you describe the symptoms? (Ameonyesha dalili gani)

    1. Cough, (kukohoa) ( )

    2. Diarrhoea, (Kuhara) ( )

    3. Vomitting, (kutapika) ( )

    4. Cold, (homa) ( )

    5. Skin Infection,(ngozi) ( )

    6. Lack of appetite, (kukosa hamu ya chakula) ( )

    7. Others Specify) (zingine) ( )

4. Was any one consulted for that illness?(Alipelekwa hospitali?)

    1. Yes

    2. No

5. If No, what is the reason?(Kama hakupelekwa ni kwa nini)

    1. Lack of Money (kukosa pesa) ( )

    2. No health facility nearby(hakuna hospitali hapa karibu) ( )

    3. Mild illness (hakuwa mgonjwa sana) ( )

    4. Other Specify ( ) --------

5. If yes, where did you go for consultation?(kama ulimpeleka mlienda wapi?

1. Health Facility (hospitali) ( )
2. Traditional Healer (mganga) ( )

3. Pharmacy (duka la dawa) ( )

4. Ordinary shop (duka la kawaida) ( )

5. Other Specify ( )

7.In the past one month, how many times did the named child show any symptoms of illness? (Kwa mwezi mmoja umepita aligonjeka siku ngapi?)

SECTION D: FOOD FREQUENCY

Food Group	**Specific food**	**Frequencies**				
		Everyday 5	3-6 times per wk 4	Once or twice per wk 3	Once per month 2	After a long time or never 1
Starchy (cereals)	Maize, rice, millet, wheat, sorghum					
Starchy (non-cereals)	Potatoes, sweet potatoes, cassava yams, green bananas sugarcane					
Legumes and nuts (fresh)	Frenchbeans, green peas, all types of fresh beans					
Legumes and nuts (dry)	All beans, peas, green grams, groundnuts					
Vegetables	All green leafy vegetables NB. Specify, carrots					
Fruits	Oranges, pawpaw avocadoes, tomatoes, passion					
Eggs	Chicken eggs, duck eggs					
Meat & Fish	Beef, chicken, fish, rabbit, pork, goat meat					
Milk						

DIETARY DIVERSITY

sno.	food group	example	last 24 hours	last 4 days	main source of food
1.	cereals	bread, biscuits, weetabix, cornflakes	1. y 2. n	1. y 2. n	
2.	vitamin a rich vegetables & tubers	pumpkin, carrots, sweet potatoes	1.y 2.n	1.y 2.n	
3.	dark green leafy vegetables	sukuma wiki, spinach, lettuce,	1.y 2.n	1.y 2.n	
4.	other vegetables	tomatoes, onions, egg plant	1.y 2.n	1.y 2.n	
5.	vitamin a rich fruits	ripe mangoes, pawpaws	1.y 2.n	1.y 2.n	
6.	other fruits	passion, bananas, pineapples,	1.y 2.n	1.y 2.n	
7.	organ meat	liver, kidney ,heart	1.y 2.n	1.y 2.n	
8.	flesh meats	beef, mutton , pork, lamb	1.y 2.n	1.y 2.n	
9.	eggs	Eggs	1.y 2.n	1.y 2.n	
10.	fish	nile prech, tilapia, fillet	1.y 2.n	1.y 2.n	
11.	legumes, nuts, seeds	beans, peanuts, ndengu,	1.y 2.n	1.y 2.n	
12.	milk and milk products	milk, cheese, yorghut, butter	1.y 2.n	1.y 2.n	
13.	oils and fats	oil, fats, butter added to food	1.y 2.n	1.y 2.n	
14.	sweets	sugar, honey,	1.y 2.n	1.y 2.n	
	spices, beverages	coffee, tea,roiko, curry	1.y 2.n	1.y 2.n	

CODE;
Main source of food

1.Own production 2. Purchases 3. Gift 4. food aid 5. Traded 6. Buttered 7. Borrowed 8. Gathering 9. otheArs (explain)

SECTION E: OBSERVATION CHECK LIST

1. Is there a variety of food groups in this household? (kuna aina tofauti ya chakula huku?)1. Yes 2. No.

2. How do you store excess foods?(unaweka chakula ikiwa nyingi vipi ndio kisiaribike)

    1. Drying (kukausha) ( )
    2. Refrigeration(barafu) ( )
    3. Smoking (kuchoma) ( )
    4. Others Specify--------

3. List the variety of foods available in the HH . (Ni aina ngapi za chakula ziko kwa hii nyumba?)

    1. Maize ( )
    2. Beans ( )
    3. Fish ( )
    4. Potatoes ( )
    5. Vegetables ( )
    6. Green grams ( )
    7. Arrowroots ( )
    8. sweetpotatoes ( )
    9. Others Specify ----------

4. Are the various foods fresh? (Zimetoka kwa shamba muda huo?)1. Yes 2. No.

5. What is the source of these foods? (Huwa chakula kinatoka wapi?)

    1. Nearby market ( )
    2. Rural homes ( )
    3. Farming nearby ( )

4. Donation/Relief ( )

SECTION D: ANTHROPOMETRIC ASSESSMENT

Measurement	First Reading	Second Reading	Average
Height			
Weight			
MUAC			

Focus Group Discussion Guide

1. What are major sources of food in this locality? (mara mingi chakula hapa hutolewa wapi?)

2. What are the foods that are mainly fed to children around here (Watoto mara mingi hupewa chakula kipi na walezi wa kijiji hiki?)

3. What is the cheapest and most common dish that is mainly consumed by children?(Ni chakula kipi rahisi kununua hapa ambacho watoto hula kwa wingi?)

4. Do people around here practice farming? If yes where?(wenyeji hapa hulima? Kama wanalima ni wapi?)

5. What are the major nutritional challenges affecting children below 5 years in this locality?(Ni changamoto gani za lishe bora kwa watoto wadogo chini ya miaka tano huwadhuru sana?)

6. How many NGOs are Providing food within this area? List them. (NI NGO ngapi kwa hii kijiji hupeana chakula kwa hawa watoto? Hebu zitajeni)

7. How has the School feeding program changed since post election violence?(Tangu ule mwaka wa vita za kikabila wa 2007 baada ya kuchagua rais shule za watoto zimeadhiriwa ale kwa malazi?)

8. How many health centres are giving services to the residents of this place and what role are they playing in assisting young children nutritionally?(Ni hospitali ngapi zinapeana huduma hapa na je, zinasaidia aje watoto kwa lishe bora?)

9. Which other bodies/people assist mothers in nutrition intervention? (Ni watu/vyama vingine gani husaidia na lishe bora kwa wazazi?)

10. In your own view, what should be done to improve child nutrition? (Kwa maoni yako, lishe bora kwa watoto linaweza patikana vipi?)

KII Guide

1. What is your general view of child nutrition in mathare Valley?
2. What is food types are readily available to feed young children in this slum?
3. Is there farming done around here? How is it important as a source of food?
4. Do you have any data for the last 3 months on children regarding nutritional status?
5. What supplements do you have for malnourished children?
6. What qualifies a child to be put under food supplements?
7. Do you conduct sessions to educate mothers on good nutrition?
8. In your own view, what hinders caregivers from feeding their children with proper balanced meals
9. What is the GoK doing to improve the nutritional status of young children?
10. How can other stakeholders assist in improving the nutritional status of young children?