DIARRHOEA MORBIDITY AND NUTRITIONAL STATUS AMONG PRE-SCHOOL CHILDREN OF HAWKING MOTHERS IN NAIROBI CITY MARKETS, NAIROBI COUNTY, KENYA.

KARANI LIZBETH KAGENI

I57/CE/12143/04

DEPARTMENT OF PUBLIC HEALTH

A Thesis submitted in partial fulfillment of the requirements for the award of the Degree of Masters in Public Health in the School of Health Sciences, Kenyatta University.

NOVEMBER 2011
DECLARATION

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

Signature________________________________________________________

Karani Lizbeth Kageni
Department of Public Health
Kenyatta University

SUPERVISORS

This Thesis has been submitted for Examination with our approval as University supervisors.

Signature________________________________________________________Date___________________________

Prof. Judith Waudo
Dean School of Graduate Studies.
Kenyatta University

Signature________________________________________________________Date___________________________

Dr Margaret N. Keraka, PhD
Department of Public Health
Kenyatta University
DEDICATION

This work is dedicated to my beloved husband, Benn Karani and our children, Muthomi and Kendi.
ACKNOWLEDGEMENT

I wish to express my sincere gratitude to all those who contributed towards the completion of this work. My supervisors, Prof. Judith Waudo and Dr Margaret Keraka for their tireless encouragement, availability, and overall supervision of this thesis. To the chairman and the staff of Department of Public Health, I owe my gratitude for their contribution towards the successful completion of my studies. The criticism, comments and advice from other members of staff in the department and classmates at different stages of the thesis are also highly appreciated.

The National Council for Science and Technology for granting me permission to undertake the study.

The respondents who provided valuable information through their response to the interviews administered: without you, the study would not have taken place. The Almighty God for the sufficient grace that saw me through during my entire study period.

Finally I wish to thank my husband Benn Karani and our children Muthomi and Kendi for their patience, encouragement and understanding during my course of study.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE PAGE</td>
<td>i</td>
</tr>
<tr>
<td>DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>iv</td>
</tr>
<tr>
<td>TABLE OF CONTENT</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF FIGURE</td>
<td>ix</td>
</tr>
<tr>
<td>ABBREVIATIONS AND ACRONYMS</td>
<td>x</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>xi</td>
</tr>
</tbody>
</table>

## 1.1 CHAPTER 1: INTRODUCTION

1.1 Background to the study | 1
1.2 Problem statement | 3
1.3 Purpose of the study | 4
1.4 Objectives | 4
1.4.1 General objective | 4
1.4.2 Specific objectives. | 4
1.5 Research questions | 4
1.6 Hypotheses | 5
1.7 Justification of the study | 5
1.8 Significance of the study | 6
1.9 Limitation of study | 7
1.10 Conceptual frame work | 7
1.11 Operational definition of terms | 8

## 2.0 CHAPTER TWO: LITERATURE REVIEW | 9

2.1 Introduction | 9
2.2 Malnutrition and child health | 9
2.3 Diarrhea related diseases | 10
2.4 Nutritional status and diarrhea morbidity | 11
2.5 Factors influencing diarrhea morbidity and nutritional status | 13
CHAPTER THREE: METHODOLOGY

3.1 Introduction

3.2 Research design

3.3 Variables

3.3.1 Dependent variables

3.3.2 Independent variables

3.4 Location of study

3.5 Target population

3.5.1 Inclusion criteria and exclusion criteria

3.6 Sampling techniques and sample size

3.6.1 Sampling techniques

3.6.2 Sample size

3.7 Research instruments

3.8 Pre testing

3.8.1 Validity

3.8.1 Reliability

3.9 Data collection procedures

3.10 Data analysis

3.11 Logical and ethical considerations
CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.0

4.1 Introduction

4.2 Socio demographic characteristics of the study population

4.2.1 Socio demographic information of the mother/caretaker

4.2.2 Household size of the mother/caretaker in the two markets

4.2.3 Number of children between 6-59 months in the household

4.2.4 The main source of income for the mothers/caretakers households

4.2.5 Food availability for the household

4.2.6 Gender of youngest child

4.2.7 Main source of fuel for household

4.3 Food consumption patterns of pre-school children

4.3.1 Food consumed by the child on the night preceding the interview

4.3.2 Number of meals taken by children age 6-59 months during food shortage

4.3.3 Household members going without food

4.3.4 How household survives during periods of food shortage

4.3.5 Mothers currently breastfeeding the index child

4.3.6 Frequency of breastfeeding among the mothers in a day

4.3.7 Age when the mother stopped breastfeeding the child

4.3.8 Number of times the child is fed on other foods other than breast milk

4.3.9 Cultural practices associated with food consumption in relation to children

4.3.10 Age when complementary feeding was initiated
4.3.11 Foods withheld from the child and reasons for withholding the foods

4.4 Nutritional status of the study children

4.4.1 Height for Age of index child (stunting)

4.4.2 Weight for Age of index child (underweight)

4.4.3 Weight for Height of index child (wasting)

4.4.4 How often the child is taken for growth monitoring

4.4.5 Where mothers/caretakers seek medication when the child is sick

4.5 Diarrhoea morbidity of the study children

4.5.1 When mothers/caretakers considered children to have diarrhea

4.5.2 Children age 6-59 months who had diarrhea two weeks preceding the survey

4.5.3 Texture of the stool displayed by children who had episodes of diarrhea

4.5.4 Mothers/caretakers opinion on what caused diarrhea in their children

4.5.5 Source of drinking water

4.5.6 How water for drinking is stored

4.5.7 Observation checklist

4.6 Factors influencing diarrhea morbidity

4.6.1 Association between diarrhea morbidity and categorical variables

4.7 Factors influencing food consumption patterns

4.7.2 Association between the number of meals for children under 5 yrs during food shortage and categorical variables

4.8 Factors influencing the nutritional status of the study children
4.8.1 Association between the age of mother/caretaker and stunting, underweight and wasting levels

50

4.8.2 Association between stunting levels and categorical variables

51

4.8.3 Association between cultural practices associated with food consumption and categorical variables

53

4.9 Discussion of results

54

4.9.1 Diarrhea morbidity

54

4.9.2 Food consumption patterns

57

4.9.3 Nutritional status of the study children

58

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

62

5.2 Summary and implication of the major findings

62

5.3 Conclusion

62

5.3.1 Diarrhea morbidity

62

5.3.2 Food consumption patterns

63

5.3.3 Nutritional status of the study children

63

5.4 Recommendations

66

5.5 Suggestions for further research

64

REFERENCES

65

APPENDICES

69

APPENDIX I: Interview guide

69
APPENDIX II: Study location maps-----------------------------------------------

APPENDIX III: Market environment---------------------------------------------
LIST OF TABLES

4.1 Socio demographic information of the mother/caretaker

4.2 Household size of the mother/caretaker in the two markets

4.3 Food availability for the household

4.4 Food consumed by the child on the day or night preceding the interview

4.5 Age when the mother stopped breastfeeding the child

4.6 Height for Age of index child (stunting)

4.7 Weight for Age of index child (underweight)

4.8 Weight for Height of index child (wasting)

4.9 Texture of stool displayed by children who had episodes of diarrhea

4.10 Observation checklist

4.11 Association between diarrhea morbidity and categorical variables

4.12 Association between the number of meals for children under 5 yrs during food shortage and categorical variables

4.13 Association between the age of mother/caretaker and stunting, underweight and wasting levels

4.14 Association between stunting levels and categorical variables

4.15 Association between underweight levels and categorical variables

LIST OF FIGURES

2.1 Determinants of diarrhoea morbidity and nutritional status

4.1 Number of children between 6-59 months in the household
<p>| 4.2 | Household main source of income |
| 4.3 | Gender of youngest child |
| 4.4 | Main source of fuel for household |
| 4.5 | Number of meals taken by children age 6-59 months during food shortage |
| 4.6 | Household members going without food |
| 4.7 | How household survives during food shortage |
| 4.8 | Frequency of breastfeeding among the mothers in a day |
| 4.9 | Number of times the child is fed on other foods other than breast milk in a Day |
| 4.10 | Cultural practices associated with food consumption in relation to children |
| 4.11 | Age when complementary feeding was initiated |
| 4.12 | Foods withheld from the child and reasons for withholding the foods |
| 4.13 | How often the child is taken for growth monitoring |
| 4.14 | When mothers/caretakers considered children to have diarrhea |
| 4.15 | Texture of the stool displayed by children who had episodes of diarrhea |
| 4.16 | Mothers/caretakers opinion on what caused |
| 4.17 | Source of drinking water |
| 4.18 | How water for drinking is stored |</p>
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBS</td>
<td>Central Bureau of Statistics</td>
</tr>
<tr>
<td>KDHS</td>
<td>Kenya Demographic Health Survey</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nation’s Education Children’s Fund</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>NGO</td>
<td>Non Governmental Organization</td>
</tr>
<tr>
<td>WFS</td>
<td>World Food Summit</td>
</tr>
<tr>
<td>PEM</td>
<td>Protein Energy Malnutrition</td>
</tr>
<tr>
<td>MSF</td>
<td>Medicines San Frontiers</td>
</tr>
<tr>
<td>GAM</td>
<td>Global Acute Malnutrition</td>
</tr>
<tr>
<td>KFSSG</td>
<td>Kenya Food Security Steering Group</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>NCHS</td>
<td>National Centre for Health Statistics</td>
</tr>
<tr>
<td>WFP</td>
<td>World Food Programme</td>
</tr>
<tr>
<td>IMR</td>
<td>Infant Mortality Rate</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>BCG</td>
<td>Bacillus Calmet Guerin</td>
</tr>
<tr>
<td>DPT</td>
<td>Diphtheria, Pertusis and Tetanus</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agricultural Organization</td>
</tr>
<tr>
<td>H/A</td>
<td>Height for Age</td>
</tr>
<tr>
<td>W/A</td>
<td>Weight for Age</td>
</tr>
<tr>
<td>HH</td>
<td>Household</td>
</tr>
<tr>
<td>GMP</td>
<td>Growth Monitoring Programme</td>
</tr>
</tbody>
</table>
The under-five mortality continues to rise globally at an annual rate of 24% despite efforts to counteract it through vertical programmes. Seven out of ten child deaths are due to diarrhea, acute respiratory infections, measles and malnutrition. Malnutrition and diarrhea morbidity continues to be a public health problem of considerable magnitude in most developing countries. Efforts to combat it focus primarily on preventive and curative health services. The main objective of this study was to assess the diarrhea morbidity and nutritional status among the pre-school children of hawking mothers in Nairobi. This was a descriptive cross-sectional survey that was carried out in Muthurwa and Toi markets in Nairobi. Simple random sampling was used in selecting the markets whereas systematic random sampling was used in respondent’s selection. A sample size of 350 hawking mothers was selected. Data for this study were collected using structured interviews and an observation checklist. Data were analyzed using the SPSS software, Epi info and presented in tables, graphs and charts. Chi-square was used to test for statistical associations. The study revealed reasonable literacy levels among the mothers/care giver with 68% of them having attained primary, secondary and college education. The literacy levels were positively associated with diarrhea morbidity among the children (P-value=0.047). In regard to food availability and consumption patterns the main source of food for 47.1% households was purchasing. During food shortage 52.3% children under five years have only three meals whereas 82.3% of the mothers/caregivers gave complimentary feeds to their children before the age of six months. There was a positive association between age when complementary feeding was started and whether the child had suffered from diarrhea (P-value=0.027). Children of 53.4% of the mothers/caregivers had suffered from diarrhea in the previous two weeks before the study: mothers/caregivers whose children had suffered from diarrhea 38% had the opinion that the cause had been contaminated food and milk. Of 53.4% children who had suffered from diarrhea 50.3% displayed watery stool with 26% displaying loose stool. At least 29% of the study children are stunted; higher proportions (34%) of male children are stunted compared with 24.3% of female children. Stunting is highest (25.7%) in children age 12-23 months a similar age group that recorded higher percentages 33.7% of diarrhea cases likewise, 19.5% of the study children are underweight. The levels are lowest (3.4%) in the age group 6-11 months, the same group that had indicated lower incidences of diarrhea. Association between the Age of mother/caretaker and stunting levels was positively significant (P-value=0.01). From the study findings it can be concluded that diarrhea is a common occurrence among children of hawking mothers and the children were malnourished as indicated by cases of stunting, wasting and underweight levels. The study recommends that The Ministry of Public Health and Sanitation should plan and implement intensive health education programmes to change incorrect practices especially those related to food consumption and to educate mothers/caretakers about the role of infection in causing diarrhea. 

On further research, the study suggests that a national survey targeting the under five children of hawking mothers be undertaken so as to ascertain the magnitude of diarrhea and malnutrition among this group. This will help in establishing their patterns of growth.
CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Malnutrition and diarrhea morbidity is a public health problem amongst children under five years of age in developing countries with the outcome usually being poor health, stunted growth, mental retardation and micro nutrient deficiencies (Black, 2003). Children are one of the major vulnerable groups to diseases and malnutrition. Those under five years of age are especially more vulnerable because they are at a stage of rapid growth and development and their immune system is not fully developed to fight infections (Black 2003).

Today, diarrhea remains a major public health problem directly related to water and sanitation by being the leading cause of mortality and morbidity especially among young children (Clansen, 2006). Globally close to 2 million children die from diarrhea every year (UNICEF, 2007) while many millions more have their development disrupted and their health undermined by diarrhea related diseases (UNICEF, 2006a).

Diarrhea diseases among children under five accounts for over 4.7% of all outpatient cases countrywide. The annual incidence of diarrhea is 3.5 to 4.6 episodes per child per year. Dehydration caused by severe diarrhea is a major cause of morbidity and mortality (CBS, MOH, 2004). It is reliably estimated that, globally 226 million children below 5 years old are stunted, 67 million are wasted and 183 million weigh less than they should for their age (UNICEF, 2005). In Kenya, 33% of the children under five years of age are chronically malnourished (KDHS, 2003.).
In Kenya, children living in unsanitary conditions have a higher percentage of diarrhoea and are more likely to experience stunted growth due to worm infestation than their counterparts living in healthy environments (UN-HABITAT, 2008).

National governments and donors emphasize the progressive realization of access to food and good nutrition as a human right. For this reason, reducing food insecurity and improving nutrition have acquired increased importance within the context of poverty reduction strategies.

Child mortality rates and malnutrition remain high in spite of the government’s commitment to create an enabling environment for the provision of quality health care and reduction of mortality and malnutrition levels. Under-five mortality rates remain above 100 per 1,000 live births while infant mortality rates are well above 60. The prevalence of these problems is most critical in rural areas, drought-stricken areas, and among poor households (CBS, 2004).

Nutritional deficiencies contribute to high rates of disability, illness and death. They also affect the long term physical growth and development of children, and may lead to high levels of chronic illness and disability in adult life. In addition, high rates of malnutrition jeopardize future economic growth by reducing the intellectual and physical potential of the entire population (CBS, 2004).

In its efforts to ensure health for all Kenyans, the Ministry of Health’s strategic plan (1999-2004) aimed among other targets at: reducing malnutrition among under five year olds by 30%; reducing the proportion of under-five morbidity and mortality rates attributable to key
childhood diseases and malnutrition from 70 to 40 percent and eliminate vitamin A deficiency in under five year olds. However, the achievement of these targets continues to be undermined by lack of progress in key determinants of children malnutrition, morbidity and mortality.

1.2 PROBLEM STATEMENT

More than 5,000 children under five years globally die every day due to a lack of sanitation and hygiene, resulting in more than 1.5 million diarrhea-related deaths among children. This amounts to 18 per cent of all under-five deaths. Diarrhea thus is the 2nd highest single cause of child mortality after pneumonia (UNICEF, 2007).

In developing countries an estimated 50.6 million children under the age of five are malnourished (WHO, 2003). Every year 10.6 million children die before their fifth birthday. Seven out of ten of these deaths are due to diarrhea or malnutrition (WHO, 2003).

In the urban settings of Kenya, the under five wasting is estimated at 4% where as diarrhea is estimated at 31%. In Nairobi province wasting levels of the same group stands at 5% and diarrhea levels are at 35% which is way above the general estimation of the urban population. During the two weeks before the survey, 16 percent of Kenyan children under five had diarrhoea. The rate was highest (29 percent) among children 6 to 11 months old. (KDHS, 2003).

The under five year’s old children of hawking mothers are a vulnerable group to diarrhea and malnutrition because of the difficult conditions they are exposed to. Conditions resulting from deprivation of adequate food and poor environmental conditions manifest in
disease and nutritional related problems. These children spend most of their time with their mothers either in the market place or alongside the market areas.

Due to the nature of work of the mothers/caregiver, the feeding patterns of the children might be compromised and also considerations not put in place by the mothers on the choice and type of food given to these children during the hawking sessions.

Studies on diarrhea and malnutrition among the preschoolers have concentrated in food insecure settings like slums, refugee camps, among street families and food insecure regions. Not much has been done among preschoolers especially those of hawking mothers.

There is need to address the immediate causes of diarrhea morbidity and malnutrition among this group and also their underlying basic factors if developing nations are to achieve complete well-being and reach functional and productive capacity in the population.

Coupled with the fact that limited studies have been done on the determinants of diarrhea morbidity and nutritional status among the pre-school children of hawking mothers, it is important to undertake this study in order to identify areas that need intervention so as to decrease direct health care costs and improve the quality of life.

**1.3 PURPOSE OF THE STUDY**

The purpose of this study was to assess the diarrhea morbidity and nutritional status among the pre-school children of hawking mothers in Nairobi.

**1.4 OBJECTIVES**

1.4.1 General objective.

To assess the diarrhea morbidity and nutritional status among the pre-school children of hawking mothers in Nairobi.

1.4.2 Specific objectives.
1. To determine the food consumption patterns of the pre-school children of hawking mothers.

2. To determine the nutritional status of the pre-school children of hawking mothers.

3. To establish the diarrhea morbidity status of the pre-school children of hawking mothers.

4. To establish factors that influence diarrhea morbidity, food consumption patterns and nutritional status among the children.

1.5 NULL HYPOTHESES

Food handling practices and consumption patterns has no association with diarrhea morbidity and nutritional status of the children.

1.6 JUSTIFICATION OF THE STUDY.

Although adequate nutrition cannot guarantee that a child will experience normal growth and development, inadequate nutrition can prevent the child from reaching his or her genetic potential for physical mental growth and development (Susan, 2007). Although the focus of childhood nutrition has traditionally been on getting enough calories and nutrients; nutrition guidance for children has expanded beyond getting enough to include recommendation for healthy eating (Susan et al).

There is a synergistic interaction between malnutrition and diarrheal diseases as one fuels the other. A child who is constantly sick will not feed well due to lack of appetite and will continue to get malnourished as the effects of the sickness takes toll on the Childs health (UNICEF, 2005).

The problem of diarrhea and malnutrition is still the biggest issue affecting child development in the developing countries. In order to avert this long-term effect, prevention
of diarrhea and malnutrition is paramount to national development and this can only be possible if information on the prevalence and causes of the problem are available. The study is relevant during this time when the international community is being called upon to strengthen and reduce under fives mortality by two thirds (UN, 2005).

1.7 SIGNIFICANCE OF THE STUDY.

The findings of this study will provide insight on the diarrhea morbidity and nutritional status of the pre-school children of hawking mothers. This information will also be beneficial to the ministry of Public Health and sanitation, and NGOs interested in health issues of children, mothers and the community at large in coming up with intervention measures to curb the problems that arise due to diarrhea morbidity and malnutrition. The information generated from the study will help policy makers, planners and implementers of programmes to be able to approach the fight against diarrhea morbidity and malnutrition in a more holistic way. Lastly the study will contribute to the field of knowledge in diarrhea diseases and nutrition and act as a basis for future research in this area.

1.8 LIMITATION OF STUDY

The study concentrated on mothers and/or caretakers who were selected because they were the primary caregivers of the children. The limitations of this study were mainly in regard to the data which was based on the mother and/or caretakers’ self reporting hence issues like age of the children could not adequately be verified.
1.9 CONCEPTUAL FRAME WORK

The conceptual framework used in this study is a modification of the expanded UNICEF conceptual framework for understanding possible causes of malnutrition and diarrhea.

Source: Adapted from UNICEF 1998.
Figure 2.1: Determinants of diarrhea morbidity and nutritional status.

Health and hygiene practices include environmental hygiene, access to clean and safe water and proper sanitation. Care practices entail ensuring that the food provided to the child result in optimal utilization. Food security is a key determinant but still it requires the intervention of proper care practices, access to health and proper hygiene practices so as to guarantee optimal food security. Food utilization in the body is influenced by health status that is ill health leads to mal absorption of nutrients and loss of appetite thus reducing food intake. Presence of diseases aggravates malnutrition and weakens health status of children (FSAU, 2003).
1.10 OPERATIONAL DEFINITIONS OF TERMS

**Diarrhea:** the frequent passage of loose or liquid stools 3-4 times a day (WHO, 2006).

**Water treatment:** Any activity undertaken by a household to make water more acceptable for a desired end-use which includes drinking water so that the water does not pose any immediate or long-term health risk.

**Hawking:** To peddle or sell goods aggressively, especially by calling out to entice the clients.

**Children:** children in this study referred to any person who was aged 6-59 months.

**Morbidity:** in this study it referred to the number of children aged 6-59 months who had diarrhea.

**Prevalence:** the percentage number of children who had diarrhea two weeks before the time of the study.

**Sanitation:** in this context it referred to collection and disposal of waste and included facilities used in the disposal of waste.

**Mother/caretaker:** a person that is involved with provision of the child’s care.

**Household:** the smallest and most common unit of production, consumption and organisation in a society. It involves all people or one person living in a house.
CHAPTER TWO
LITERATURE REVIEW

2.1 Malnutrition and child health

The underlying cause of all deaths due to childhood illness is malnutrition. It leaves children more vulnerable to a host disease. A malnourished child has a weakened immunity and less strength to fight off diseases once they become ill. Distended bellies and thin limbs are common signs of malnutrition. Other signs include sunken eyes, skin lesions and lightening or loss of hair (Factor, et al 2006). Malnutrition in children can result from inadequate intake, mal-absorption, and abnormal systemic loss of nutrients due to diarrhea, hemorrhage, or infection (Merck, 2005).

Malnutrition, whether under or over nutrition, may adversely affect the child’s intellectual development and consequently, health and productivity in later life. It is likely to perpetuate inequities and inequalities in health and other dimensions of household welfare. Child malnutrition is one of the measures of health status that the WHO recommends for assessing equity in health (Eyob and Diane, 2003).

According to Susilowati (2002), there are 800 million chronically hungry people and 160 million malnourished children under five years in the world. About 12 million children under five years die per year of which 50% is related to malnutrition. The high level of children malnourished in a community signifies their susceptibility to infection and their
chances of dying, thus increasing the infant mortality rate in the community. This clearly indicates why infant mortality is high in the African region of the world.

2.2 Diarrhoea related diseases.

The five major and most common childhood diseases of public health concern are malnutrition, acute respiratory infections, diarrhoea diseases, malaria and measles.

More than 5,000 children under five die every day due to a lack of sanitation and hygiene, resulting in more than 1.5 million diarrhea-related deaths among children. This amounts to 18 per cent of all under-five deaths (UNICEF, 2006)

Diarrhoea diseases are pathological conditions that lead to an increase in the volume of stools with an alteration in the consistency mainly due to an increased water content.

Sometimes the fluid stool also contains mucus, pus or blood. The patho-physiological mechanisms resulting to increase in water in the stools is due to inadequate absorption by the bowels or increased fluid poured into the bowels by active secretion or by damage and exudation into the lumen (Factor et al, 2006)

Acute diarrhoea implies a sudden onset, generally over hours rather than days and duration of less than one week. Chronic diarrhea is generally more gradual in onset and lasts for more than one or two weeks. Diarrhoea affects under fives more than any other group of people. Crawling toddlers have more episodes of diarrhea especially those who grow up in unclean environment. Warmer weather conditions are known to be associated more with diarrhoea diseases because most organisms multiply faster in warm condition. Despite the existence of inexpensive and efficient means of treatment, diarrhea kills more children than AIDS, malaria and measles combined (UNICEF, 2009).
Most diarrhoea in children is viral. Rotavirus is responsible for more than 40 percent of all diarrhea-related hospital admissions of children under five. A new vaccine for Rotavirus has been found to be safe and effective but is still largely unavailable in most developing. Many bacteria can cause diarrhea especially in lowered immunity. The most common bacteria are salmonella, shigella, staphylococcus Aureus, Escherichia coli and Vibrio Cholerae. The most common parasites are Entamoeba Histolytica, hookworm and Giardia Lamblia among others. Identification depends not only on microbiological laboratory but also on a history of the episodes, clinical examination and epidemiological knowledge. The clinical features are usually associated with dehydration which manifests in thirst and dryness of the mouth, altered consciousness, skin elasticity, sunken eyeballs, irritability and a depressed anterior fontanel in children. Management of the ill child mainly involves rehydration and continued feeding (WHO UNICEF, 2006).

Access to clean water and good hygiene practices are extremely effective in preventing childhood diarrhea. Hand washing with soap has been shown to reduce the incidence of diarrheal disease by over 40 percent, making it one of the most cost-effective interventions for reducing child deaths caused by this neglected killer.

2.4 Nutritional status and diarrhoea morbidity

The frequency, duration and severity of diseases contribute directly or indirectly to malnutrition. While the widespread use of oral rehydration therapy and antibiotics has led to a decline in disease severity and mortality from diarrhea diseases, the prevalence of these infections has not been significantly reduced. As a result the positive effect on malnutrition continues (SCN, 2003). The frequency of diarrhea infections is highly prevalent early in life and damages mucosal surfaces required for absorption and is associated with vulnerability
to malnutrition. Prevalence of diarrhea increases sharply after birth peaking between 9-18 months of life before beginning to decline (SCN et al, 2006). Undernourished children are at higher risk of suffering more frequent, severe and prolonged episodes of diarrhea, and repeated bouts of diarrhea also place children at greater risk of worsening nutritional status (WHO/UNICEF, 2009).

2.5 **Factors influencing diarrhoea morbidity and nutritional status.**

Linkages exist between availability of adequate and safe water, environmental sanitation and human behavior on one hand and good health on the other hand. Lack of adequate health services, safe water, proper sanitation and inadequate food handling procedures are risk factors that predispose pre-school children to diarrhea and malnutrition. Clinical records show that top diseases reported in Kenya are sanitary related and inhibit child growth (UNICEF, 2003).

Globally 1.1 billion people lack access to clean water. Without clean water maintaining hygiene is a hardship. There is increased risk of diarrhea and other waterborne diseases which inhibit child growth. The national coverage of water and sanitation averages 48% and 42% respectively. This low coverage predisposes a large percentage of the population to preventable diseases that emanate from unsanitary environment particularly children. It also explains why diarrhea is among the leading cause of death among the under fives (UNICEF et al, 2003).

In Sub-Saharan Africa, there are several factors that expose children to the risk of malnutrition (Factor, 2006).
• Age: Children 6-48 months old are growing fast and need enough to eat; therefore any shortage in food supply hinders this growth.

• Large Family Size: Children in large families always have less food for each person to eat, and the mother also has too much work to be able to care enough for the smaller child.

• Poor child spacing: The mother has less breast milk for the younger child as well as less time for the older child who may also be in the growing age needing attention.

• Poor weaning methods: Weaning is the process of introducing other food to supplement the breast milk. Children who do not get enough proper diet at weaning time are usually at risk of developing malnutrition.

• Sickness or ill-health of the child: Children who are sick usually cannot feed well which leads to poor protein and energy supply to meet the demands of the growing body. The diseases that are commonly known to cause malnutrition in children are Diarrhoea, measles, worm infestation and acute respiratory tract infections.

• Poverty/Low socio-economic status: Poor families cannot afford to buy enough and proper food for the family. Children in such family usually do not get enough to eat for proper growth.

• Poor Environmental Sanitation and Water supply: Children who live in poor environment and whose family get water from a protected source are more likely to get sick and thus suffer from diarrhoea and malnutrition.

• Knowledge of Mothers/caregivers: The knowledge of mothers and caregiver on child nutrition and proper food hygiene and handling methods is very important in alleviating diarrhoea and malnutrition. Food may be available but cannot be well prepared or hygienically given to the child.
- Cultural Beliefs: Some cultural beliefs about food in the family have negative impact on the child's nutritional status. An example of one such is the belief that if you give fish to children they will develop worms. Other beliefs also say that giving eggs to children will turn them into thieves as they grow old. Such families therefore do not give these important protein sources to the children. Different communities have different views of what causes diarrhea, its management and classification of foods usefull in its prevention and treatment.

Several studies have been done over the years around the world but mostly in Sub-Saharan Africa to determine the relationships between risk factors and malnutrition. A study done in Garisa and Ijara districts in Kenya in September 2000 looked at the rate of malnutrition among various age groups of under five children; and found out that out of 1806 children between 6-59 months of age studied, the prevalence of malnutrition was 19.3% in the 24-48 months age group (Mwandime and Teshome, 2000).

These findings were supported by another study done in Aynalem village, Ethiopia which found out that out of a total 330 children studied, the prevalence of stunting, wasting, and underweight were 45.7% 7.1% and 43.1% respectively in 12-24 months (Asfaw and Goitom, 2000).

A study conducted in Mjini village, Bungoma in 2007 studying barriers to child nutrition security revealed a high proportion of household with malnourished children. 43% reported diarrhoea as the illness of great concern to nutritional status of the children (Echoka, 2007). A similar study conducted in Viet Nam revealed that prevalence of diarrhea among children
aged less than five years was 11%. Inadequate food hygiene was considered to be one of the major contributors to diarrhea. The prevalence of diarrhea among children was significantly higher in families where mothers less often washed their hands before feeding children (Takanashi, Kumiko, 2009)

A study done in Uganda in 1998 studying 261 children, looked at several factors which included large family size, health of the child, Environmental conditions including water supply, weaning practices, the characteristics of the mother which included age and education and economic status of the family. In this study, it was found out that although the total number of children of the mother had no significance on the rate of kwashiorkor; children whose mothers had three children below 5 years of age had more Kwashiorkor than those whose mothers had two in the same age range. It also found out those children who had an episode of Diarrhea in the week preceding the survey had greater incidence of marasmus. In this same study, it was found that the age of the mother, occupation, and parity had no effect on the prevalence of stunting or underweight (Kikafunda, 1998).

These findings are similar to a study conducted in Kimilli division that revealed that children who had suffered illness two weeks preceding the study had higher cases of stunting and wasting. Frequent episodes and duration of infections worsen the nutritional status of children by damaging mucosal surfaces required for absorption, lessening the efficiency of conservation and utilization of nutrients (Waswa, 2005)

A study done in Kibera in October 1999 studying 132 children between 6-23 months, also looked at some of these risk factors which included the health of the child, large family size
and the age of the mother. In this study, it revealed a significant relationship between chronic malnutrition and morbidity, meaning there is an association between illness and malnutrition. The study also revealed an association between household size and nutritional status meaning that children living in household with more than five people were more likely to get malnourished than children living in household with less than five people. Having children at an early age may also be risk factor as found out by this study although this was not significant, 50% of children whose mothers were between 15-19 years were stunted and the risk decreased as the age increased.

2.6 MAGNITUDE OF MALNUTRITION IN CHILDREN

In Nairobi, the prevalence of severe stunting almost doubled from five per cent in 2003 to nine per cent in 2008, while the percentage of children who were severely under-weight marginally declined from 1.7 per cent to 1.6 per cent (KDHS, 2008).

A maternal and child health study conducted by APHRC in two slum communities in Nairobi showed that children suffer malnutrition and other common diseases between the ages of 11-20 months. The results on about 3,500 children showed a grim picture of child stunting, chronic malnutrition that results from recurrent episodes or prolonged ill-health (APHRC, 2008).

Malnutrition is a major cause and consequences of poverty, deprivation, food insecurity and social inequality, and is also a cause not only of increased vulnerability to infection and other diseases, including growth retardation, but also of intellectual, mental, social and developmental handicap, and of increased risk of disease.

There is deep concern to improve infant and young child nutrition and to alleviate all forms of malnutrition in the world, because more than one third- of under-five children are still
malnourished (whether stunted, wasted, or deficient in micronutrients) and also because malnutrition still contributes to nearly half of the 10.5 million deaths each year among under five and preschool children worldwide (UNICEF, 2004). The high demand for energy and essential nutrients for growing infants and children puts them at particular risk of undernutrition, Protein-energy malnutrition in children a severe form of under-nutrition that retards growth and development (Merck, 2005). The poor nutritional status of children in Kenya is concentrated around the rural areas as well as the urban-rural around the city.

This research sought to add knowledge on existing body of literature, knowing that diarrhoea and malnutrition has long term effects on children’s health and nutrition status. This study therefore came up with possible recommendations which could assist in addressing some of the challenges affecting the preschool children of hawking mothers.
CHAPTER THREE
METHODOLOGY

3.1 Introduction
The chapter presents the procedures and strategies used in the study. Research design, location, target population, the sample and sampling procedures, data collection, data analysis and presentation are also discussed.

3.2 Research design
The study adopted a descriptive survey design and sought to establish and describe the prevailing phenomena. The design allowed for collection of extensive data within a short time on issues based on the variables of study. The design was justified because it described current diarrhoea and nutritional status as influenced by the prevailing practices (Mugenda O and Mugenda A, 1999).

3.3 Variables
3.3.1 Dependent variables
These were diarrhea morbidity and nutritional status. Diarrhea morbidity as one of the dependent variables was determined by the frequency of watery stools. Nutritional status was determined using anthropometry. Weight, height and age of the index child were taken and compared with the WHO reference standards and presented as indices; weight for age (underweight), height for age (stunting) and weight for height (wasting).

3.3.2 Independent variables
These included food availability and consumption patterns, child care practices that included frequency of feeding, breastfeeding, complimentary feeding and food taboos, health and hygiene practices in regard to the environment, sanitation, water safety and food handling practices.
3.4 Location of study

The study was conducted in Nairobi County because diarrhea among the under-fives was estimated at 35% (KDHS, 2003) which was way above the reported urban average of 14%. The selected markets were Muthurwa and Toi markets. Muthurwa market is located about one and a half kilometres from Nairobi CBD. It spans a two kilometre square area which also consists of a bus terminus. The Nairobi city council reports that the market can accommodate up to 8,000 hawkers, but currently, more than 12,000 people are trading in the market. Clearly, lack of space is a big question facing the market. Toi market is located in the outskirts of Kibera slum, Nairobi, Kenya. It is one of the largest informal markets in Nairobi, with over 5000 traders. It lies on a bystreet to Ngong Road which runs almost the length of Nairobi, from the Langata area into the center of the city. Toi is a word that means mud in the language of the Nubians who were the first settlers in the area.

3.5 Target population

The target population consisted of all pre-school children aged 6-59 months accompanying their mothers and / or caregivers to the markets during the study period. The mothers/caregivers were interviewed on the youngest child who was the index child representing the household.

3.5.1 Inclusion criteria and exclusion criteria

The study involved children aged 6-59 months and Mothers and / or caregivers with the above described child in the market.

3.6 Sampling techniques and sample size.

3.6.1 Sampling techniques

Multistage sampling procedure was used to identify the respondents who participated in the study. Nairobi was purposively selected because the diarrhea morbidity and nutritional
status of the pre-school children in the district as a whole tend to be higher than the urban average. Out of the eight divisions (Embakasi, Dagoreti, Westlands, Langata, Starehe, Kamukunji and Madaraka) two divisions were randomly selected which were Langata and Kamukunji. Langata has a total of six markets and Kamukunji twelve markets. All the names of the markets in each division were written on separate pieces of papers which were then folded and put into a separate container as per the division. Only one paper was picked from each of the two containers with the assumption that it represents the other markets. These were Muthurwa and Toi markets.

Systematic random sampling method was used in respondent selection in all the sheds of the Muthurwa and Toi markets. The sheds are numbered therefore this limited error of crossing over. The market sheds were visited and those with the target population identified and their shed numbers noted. A total of four hundred eight three sheds in muthurwa and four hundred five in Toi had Mothers and / or caregivers with children aged 6-59 months. To determine the sampling interval the total number of sheds in each market with the required target population was divided by 175 the number of children aged 6-59 months and Mothers and / or caregivers required from each market. This gave an average of three therefore the interval was that every third number representing a shed was included in the study.

Nairobi
  ↓
Divisions (Langata and Kamukunji)
    ↓
Markets (Toi Muthurwa)
      ↓
Respondents
  ↓
purposive sampling
  ↓
simple random sampling
  ↓
simple random sampling
  ↓
systematic random sampling

### 3.6.2 Sample size

The required sample size was calculated using the statistical formula for population sample size estimation.
Sample size \[ n = \frac{(Z^2pq)}{d^2} \]

Where \( n \) = required sample size

\( Z \) = standard normal deviate

\( P \) = the proportion in the target population estimated to have a particular characteristic.

(Diarrhea among the under-fives in Nairobi is estimated at 35% (KDHS, 2003).

\( q = 1.0 - p \)

\( d \) = the degree of accuracy required.

Therefore using a confidence of 95% that corresponds to the standard normal deviate of 1.96 and the proportion in the target population estimated at 35% and the degree of accuracy required set at 0.05 the sample size thus will be;

\[ n = \frac{(1.96^2 \times 0.35 \times 0.65)}{0.05^2} \]

\[ = 0.87397 / 0.0025 = 349.5 \]

\( n \approx 350 \)

A total of one hundred seventy five mothers/caregivers from each of the two study locations were interviewed.

### 3.7 Research instruments

Data collection tools included interviews schedules, observation checklists and anthropometry.

Interview schedules were used to collect socio economic and demographic characteristics. Frequency of watery stools was used to measure diarrhea morbidity. An episode of water stool with blood described a child with severe diarrhea. The mother\'s caregiver provided information of presence of watery stools of the period two weeks prior to the study.

Information on food availability and utilization was gathered using items incorporated into the main interview schedule.
Observation checklist was used and observations made were based on presence and use of latrines, garbage collection and drainage, water supply and safety, hygiene practices in regard to child feeding and food handling. This focused on the duration in which the study was being carried out. Spot checks were made to assess hygiene practices of hand washing before feeding the child.

Anthropometry was used to assess the nutritional status. Two weight measurements were taken and the average calculated to the nearest 0.1kg using bathroom scale in light or no clothing. Two length measurements of children below two years were measured and average calculated to the nearest 0.5cm using length boards while height meter was used for older children (FSAU, 2003). The data were collected by research assistants who were given training on all the necessary aspects of the study including the collection of the quantitative data (weight and height). The data were obtained by use of structured interview for the respondents and observation checklists were used in assessing the environmental and sanitation aspects of the market areas.

3.8 Pre testing

The instruments were pre-tested in Mutindwa market of Embakasi division. A total of ten mothers were interviewed and defects observed in the instruments were corrected and changes implemented before the actual data collection exercise.

3.8.1 Validity

At the end of each day the filled interview schedules were counterchecked by the researcher to ascertain that all questions had been answered correctly and consistently. This involved
going through the entire filled in schedule and if an error or anomaly was found the field assistants visited the mother\'caregiver again to verify and filled in the missing information.

3.8.2 Reliability

Reliability was achieved through close supervision of the field assistants. In cases where there was a problem with age recall by the mother/ or caregiver, the field assistants used a prominent event calendar to help determine the year and month of the child’s birth.

Reliability of the research instruments was ascertained by analysing the data obtained from the pre-testing exercise. Field assistants with a minimum of form four education level were recruited and trained in interview techniques and anthropometry.

3.9 Data collection procedures:

The exercise was carried out after pretesting. Training of field assistants was done after seeking permission to carry out research from the relevant authorities. Data were collected with the help of four field assistants who had been trained in interview administration.

3.10 Data analysis.

Both qualitative and quantitative data were collected during the study. Data coding and entry and analysis was done using the SPSS software. Data were first entered and verified in Microsoft Excel programme. It was then exported to SPSS for analysis. The anthropometric data were first translated to nutritional indices using the Epi info package. Chi-square was used to test the association among categorical variables. The confidence level was set at 0.05 (95%) as recommended for most descriptive researches (Field, 2005). Descriptive statistics such as percentages and frequencies were used to describe the data while tables and charts were used to present the results. Diets taken by children were analyzed using the Nutri-survey package as shown in chapter four.
3.11 Logical and ethical considerations.

Necessary protocol was undertaken from Kenyatta University and the Ministry of Higher Education, Science and Technology (National Council for Science and Technology). The Langata and Kamukunji District office was informed about the study. Oral consent was sought from the subjects and the participants were assured of confidentiality and anonymity for any information they were to give, participation was voluntary and free of any coercion. Informed Consent was obtained from the clients after explanations of the study protocol.
CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.1 INTRODUCTION
This chapter is a presentation of the results of this study. It involves a descriptive analysis of the socio-demographic characteristics of the study population, food consumption patterns of the preschool children, nutritional status of the study children, diarrhea morbidity of the study children and factors that influence diarrhea morbidity, food consumption patterns and nutritional status of the study children. The survey was undertaken in two markets in Nairobi whereby each market had 175 respondents. The respondents who participated in the survey were hawking mothers/caretakers with children aged between 6-59 months.

4.2: SOCIO DEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION
This section presents the socio demographic characteristics of the respondents in the study area. Thus attributes such as age, level of education and marital status are presented.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td>30 Yrs and below</td>
<td>236</td>
<td>67.4</td>
</tr>
<tr>
<td></td>
<td>31-36 Yrs</td>
<td>109</td>
<td>31.1</td>
</tr>
<tr>
<td></td>
<td>Above 36 Yrs</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>Level of education</td>
<td>No schooling</td>
<td>112</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Primary</td>
<td>121</td>
<td>34.6</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>82</td>
<td>23.4</td>
</tr>
<tr>
<td></td>
<td>College and above</td>
<td>35</td>
<td>10.0</td>
</tr>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>88</td>
<td>25.1</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>110</td>
<td>31.4</td>
</tr>
<tr>
<td></td>
<td>Separated</td>
<td>77</td>
<td>22.0</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>40</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>widowed</td>
<td>35</td>
<td>10.0</td>
</tr>
</tbody>
</table>

4.2.1 Socio demographic information of mothers/caretakers
About 236 of the mothers/caretakers were below 30 years of age. This is followed by 109 who are in the age gap of 31-36 years. Only 5 were above 36 years old. At least 31.4% of
the mothers/caretakers were married while 25.1% were single and only 10% widowed. At least 68% had attained primary, secondary and college education whereas only 32% had no schooling.

4.2.2 Household size of the mothers/caretakers in the two markets.

Most households had five members with 39.1%. About 20.3% had six members and 0.3% had two members.

Table 4.2: Household size of the mothers/caretakers in the two markets.

<table>
<thead>
<tr>
<th>No of members</th>
<th>Frequency</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td>5.1</td>
</tr>
<tr>
<td>4</td>
<td>76</td>
<td>21.7</td>
</tr>
<tr>
<td>5</td>
<td>137</td>
<td>39.1</td>
</tr>
<tr>
<td>6</td>
<td>71</td>
<td>20.3</td>
</tr>
<tr>
<td>7</td>
<td>28</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>15</td>
<td>4.3</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
<td>350</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.2.3: Number of children between 6-59months in the household.

More than half, 56.3% of the respondents households had two children below age five years, 17.1% had three children and 26.6% had only one child (Fig 4.1). In urban setting, children below five years account for 13.6% of the household population (KDHS, 2008).

Studies have revealed that household size has got influence on the nutritional status of the children meaning that children living in household with more than five people are more likely to get malnourished than children living in household with less than five people (Pande, 2006).
4.2.4: The main source of income for the mothers/caretakers households.

The main source of income for most households was casual labour with 48.6% followed by petty trading at 46.3% while only 5.1% of the households derive their income from salaried employment.

Figure 4.2: The main source of income for the mothers/caretakers households.

NB: No multiple response.
4.2.5 Food availability for the household

The main source of food for most households is purchasing which is 47.1%. Eighteen percent of the households depend on begging whereas 1.7% derives their income from other activities such as urban agriculture. Only 33% depend on gifts from friends and well wishers. Out of the 350 households, 54.6% go without food at times while 45.4% always have food. Out of 191 households who go without food at times, 39.8% skipped meals for three days to one week. About 28.3% of the respondents skipped meals for more than one week.

Table 4.3: Food availability for the household

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>CATEGORY</th>
<th>FREQUENCY</th>
<th>PROPORTION (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH main source of food</td>
<td>Purchases</td>
<td>165</td>
<td>47.1</td>
</tr>
<tr>
<td></td>
<td>Remittance/Gifts</td>
<td>116</td>
<td>33.1</td>
</tr>
<tr>
<td></td>
<td>Begging</td>
<td>63</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>6</td>
<td>1.7</td>
</tr>
<tr>
<td>Skipping meals</td>
<td>Yes</td>
<td>191</td>
<td>56.6</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>159</td>
<td>45.4</td>
</tr>
<tr>
<td>Frequency of skipping meals</td>
<td>1-2 days</td>
<td>61</td>
<td>31.9</td>
</tr>
<tr>
<td></td>
<td>3-7 days</td>
<td>76</td>
<td>39.8</td>
</tr>
<tr>
<td></td>
<td>More than a week</td>
<td>54</td>
<td>28.3</td>
</tr>
</tbody>
</table>

4.2.6 Gender of youngest child

Out of the 350 mothers/caregivers surveyed, their youngest children were male (58.3%) while 41.7% were female.
4.2.7 Main Source of fuel for the household

More than half (58.3%) of the mothers/caretakers derive their fuel from solid wood with 16.9% depending on liquid petroleum gas whereas 18.9% and 5.9% use kerosene and electricity respectively. Solid fuels include charcoal, wood, shrubs and straws. Cooking with solid fuels can lead to high levels of indoor smoke, a complex mix of health-damaging pollutants that could increase the risks of acute respiratory diseases.
4.3: FOOD CONSUMPTION PATTERNS OF PRESCHOOL CHILDREN

4.3.1: Food consumed by the child on the night preceding the interview.

Table 4.4 provides information on the types of food given to the youngest children on the day or night preceding the survey. The most commonly used foods given to children age 6-11 months include fruits and vegetables. These are green leafy vegetables, mangoes, papaya, pumpkin and butternut. Foods made from roots and tubers, grains, cereals and nuts are introduced gradually and account for a higher percentage 5.4%, 4.6% and 4.9% consecutively among the older age group 12-23 months. These include porridge from maize, cassava and millet flours, Soya, and mashed beans. Protein-rich foods (meat, milk, fish poultry and eggs) the percentage of consumption is highest among the age group of 36-37 months. This feeding practice is likely to explain why we have lower stunting levels 3.4% among the same group as compared to 25.7% among the age group 12-23 months (Table 4.6).
Table 4.4: Food consumed by the child on the night preceding the interview.

<table>
<thead>
<tr>
<th>Age in Months</th>
<th>Animal proteins</th>
<th>Fruits and vegetables</th>
<th>Roots and tubers</th>
<th>Food from grains</th>
<th>Cereals and nuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 - 11</td>
<td>5 (1.4%)</td>
<td>12 (3.4%)</td>
<td>7 (2%)</td>
<td>8 (2.3%)</td>
<td>7 (2%)</td>
</tr>
<tr>
<td>12 - 23</td>
<td>12 (3.4%)</td>
<td>33 (9.4%)</td>
<td>19 (5.4%)</td>
<td>16 (4.6%)</td>
<td>17 (4.9%)</td>
</tr>
<tr>
<td>24 - 35</td>
<td>15 (4.3%)</td>
<td>23 (6.6%)</td>
<td>11 (3.1%)</td>
<td>15 (4.3%)</td>
<td>15 (4.3%)</td>
</tr>
<tr>
<td>36 - 47</td>
<td>25 (7.1%)</td>
<td>26 (7.4%)</td>
<td>14 (4%)</td>
<td>8 (2.3%)</td>
<td>9 (2.6%)</td>
</tr>
<tr>
<td>48 - 59</td>
<td>9 (2.6%)</td>
<td>14 (4%)</td>
<td>7 (2%)</td>
<td>9 (2.6%)</td>
<td>14 (4%)</td>
</tr>
<tr>
<td>Total</td>
<td>66 (18.9%)</td>
<td>108 (30.9%)</td>
<td>58 (16.6%)</td>
<td>56 (16%)</td>
<td>62 (17.7%)</td>
</tr>
</tbody>
</table>

4.3.2: Number of meals taken by children age 6-59 months during food shortage

During food shortage 52.3% of the children aged 6-59 months had three meals, 35% had two meals and only 12.6% of the children had four meals.

![Figure 4.5: Number of meals taken by children age 6-59 months during food shortage](image)

4.3.3: Household members who go without food in times of food shortage.

Regarding family members going without food fig 4.6 shows that over 62.3% of the mothers/caretakers had the adult women going without food whereas only 6.3% and 9.9% were children under five years and children over five years. These findings are in line with
other studies that have consistently shown that in times of food shortages, mothers and adult women mostly go without food as compared to other members of the family.

4.3.4: How the household survives during periods of food shortage

During food shortage 66.9% of the households survive by skipping meals. About 16.6% split their families by going to visit and stay at their relatives and friends homes whereas only 6.9% depend on begging.
4.3.5: Mothers/caretakers currently breastfeeding the index child.

Information on complementary feeding was obtained by asking mothers/caretakers about the current breast feeding status of the index child. Most mothers/caretakers (51.4%) are not currently breast feeding the child while the rest (48.6%) are still breast feeding in addition to giving other foods.

4.3.6 Frequency of breastfeeding among the mothers in a day

Of the 48.6% (170) mothers/caretakers who are still breast feeding, 34.1% breast feed their children six times daily, 30% breast feed five times, 20% breast feed three times while the rest (15.9%) breast feed four times.
4.3.7 Age when the mother stopped breastfeeding the child.

At least 22.2% of the children stopped being breast fed when they were eight months old. However 3.9% of the children stopped breast feeding in the fourth month. Only 1.1% of the mothers stopped breastfeeding at the sixteenth month.

Table: 4.5 Age when the mother stopped breastfeeding the child.

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-7 months</td>
<td>70</td>
<td>38.9</td>
</tr>
<tr>
<td>8-12 months</td>
<td>95</td>
<td>52.8</td>
</tr>
<tr>
<td>13-20 months</td>
<td>15</td>
<td>8.3</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>100</td>
</tr>
</tbody>
</table>
4.3.8: Number of times the child is fed on other foods apart from breast milk in a day.

Of the 170 mothers/caretakers who are currently breast feeding, 44% of them feed their children twice daily on other foods. However, 13.7% feed only once while 18.9% feed their children four times.

Infant and young child feeding practices include timely initiation of feeding solid/semisolid foods from age 6 months and increasing the amount and variety of foods and frequency of feeding as the child gets older, while maintaining frequent breastfeeding (Pan-American Health Organization/WHO, 2003 and WHO, 2005). Breast fed children are considered as being fed with the minimum standards if they receive foods other than breast milk at least three times per day. Non-breastfed children are considered to be fed in accordance with the minimum standards if they are fed at least four times a day. The feeds should include milk and milk products and food from other food groups (WHO, 2005).

![Figure 4.9: Number of times the child is fed on other foods apart from breast milk in a day](image-url)
4.3.9 Cultural practices associated with food consumption in relation to children

Most (62.9%) mothers/caretakers have cultural belief that children should not be breastfed in public. Nineteen percent believe that children should not eat eggs which can hamper talking while 4.9% believe that children should not eat bananas as it causes bloating.

![Figure 4.10: Cultural practices associated with food consumption in relation to children](image)

4.3.10 Age when complementary feeding was initiated

About 30.9% of the mothers/caregivers introduced solid foods to their children at the age of three months. At the age of two months, 18.9% of them started complimentary feeding whereas 17.7% weaned at the sixth month.
4.3.11 Foods withheld from the child and reasons for withholding the foods.

Mothers/caregivers (49.4%) withhold certain foods from their children while the rest (50.6%) do not withhold any food from their children.

Mothers/caregivers (38.7%) claimed that Ugali can choke their children. About 36.4% of them believe that eggs if eaten by the children can make the child have a delayed milestone in speech development. According to 20.2% of the mothers/caretakers, porridge can cause constipation whereas the rest 4.6% claim sour milk can cause diarrhea.
4.4: NUTRITIONAL STATUS OF THE STUDY CHILDREN.

4.4.1: Height for Age of index child (stunting)
The height-for-age index is an indicator of linear growth retardation and cumulative growth deficits. Overall 29% of the study children are stunted. Higher proportions (34%) of male children aged 5-59 months are stunted compared with 24.3% of female children. The observation that boys are more likely to be stunted than girls is similar to the findings of a study conducted in Kimilli division, Kenya (Waswa, 2005). Analysis of the indicator by age group shows that stunting is highest (25.7%) in children age 12-23 months and lowest (3.4%) in children age 36-47 months.
Table 4.6: Height for Age of index child (stunting)

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Normal</th>
<th>Mild to Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-11</td>
<td>38 (10.9%)</td>
<td>119 (34%)</td>
<td>47 (13.4%)</td>
</tr>
<tr>
<td>12-23</td>
<td>9 (2.6%)</td>
<td>85 (24.3%)</td>
<td>52 (14.9%)</td>
</tr>
</tbody>
</table>

Numerals in parentheses represent proportions expressed as percentage.

4.4.2 Weight for Age of index child (underweight)

Weight for age is a composite index of height for age and weight for height. Children whose weight for age is below minus two standard deviations (-2SD) are classified as underweight.

Overall 19.5% of the study children are underweight. The proportion of underweight is highest (13.%) in the age group 12-23 months which is slightly above the figures (12 %) of the same age group in the KDHS 2008 survey. Underweight levels are lowest (3.4%) in the age group 6-11 months. Female children (12.9%) are less likely to be underweight than the male children (26%).

Table 4.7: Weight for Age of index child (underweight)

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Above normal</th>
<th>Normal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-11</td>
<td>2 (0.6%)</td>
<td>12 (3.4%)</td>
<td>52 (14.9%)</td>
<td>91 (26%)</td>
<td>47 (13.4%)</td>
</tr>
<tr>
<td>12-23</td>
<td>1 (0.3%)</td>
<td>10 (2.9%)</td>
<td>34 (9.7%)</td>
<td>46 (13.1%)</td>
<td>19 (5.4%)</td>
</tr>
<tr>
<td>24-35</td>
<td>1 (0.3%)</td>
<td>1 (0.3%)</td>
<td>17 (4.9%)</td>
<td>39 (11.1%)</td>
<td>21 (6%)</td>
</tr>
<tr>
<td>36-47</td>
<td>2 (0.6%)</td>
<td>5 (1.4%)</td>
<td>17 (4.9%)</td>
<td>20 (5.7%)</td>
<td>25 (7.1%)</td>
</tr>
<tr>
<td>48-59</td>
<td>1 (0.3%)</td>
<td>7 (2%)</td>
<td>10 (2.9%)</td>
<td>19 (5.4%)</td>
<td>16 (4.6%)</td>
</tr>
</tbody>
</table>

Numerals in parentheses represent proportions expressed as percentage.
4.4.3 Weight for Height of index child (wasting)

Wasting levels among the study population is 7.6%. Wasting is highest (6.3%) in children age 12-23 months with the same age group having highest levels of overweight (7.1%) cases.

Table 4.8: Weight for Height of index child (wasting)

<table>
<thead>
<tr>
<th>Sex</th>
<th>Above normal</th>
<th>Normal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>50 (14.3%)</td>
<td>56 (16%)</td>
<td>49 (14%)</td>
<td>33 (9.4%)</td>
<td>16 (4.6%)</td>
</tr>
<tr>
<td>Female</td>
<td>52 (14.9%)</td>
<td>28 (8%)</td>
<td>37 (10.6%)</td>
<td>20 (5.7%)</td>
<td>9 (2.6%)</td>
</tr>
<tr>
<td>Age in months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-11</td>
<td>22 (6.3%)</td>
<td>6 (1.7%)</td>
<td>8 (2.3%)</td>
<td>2 (0.6%)</td>
<td>1 (0.3%)</td>
</tr>
<tr>
<td>12-23</td>
<td>25 (7.1%)</td>
<td>26 (7.4%)</td>
<td>33 (9.4%)</td>
<td>22 (6.3%)</td>
<td>4 (1.1%)</td>
</tr>
<tr>
<td>24 - 35</td>
<td>13 (3.7%)</td>
<td>38 (10.9%)</td>
<td>12 (3.4%)</td>
<td>11 (3.1%)</td>
<td>5 (1.4%)</td>
</tr>
<tr>
<td>36 - 47</td>
<td>25 (7.1%)</td>
<td>10 (2.9%)</td>
<td>20 (5.7%)</td>
<td>10 (2.9%)</td>
<td>4 (1.1%)</td>
</tr>
<tr>
<td>48 - 59</td>
<td>17 (4.9%)</td>
<td>4 (1.1%)</td>
<td>13 (3.7%)</td>
<td>8 (2.3%)</td>
<td>11 (3.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>14.6%</td>
<td>12%</td>
<td>12.3%</td>
<td>7.6%</td>
<td>3.6%</td>
</tr>
</tbody>
</table>

Numerals in parentheses represent proportions expressed as percentage.

4.4.4 How often the child is taken for growth monitoring.

Only 39.1% of the mothers/caretakers take their children for growth monitoring while the rest (60.9%) do not. Mothers/caregivers who take their children for growth monitoring, about 40.1% do so once in three months. Only 27% of the mothers/caregivers monitor growth monthly whereas 8.8% do so yearly. The ministry of Public Health and Sanitation recommends that growth monitoring be carried out every month as this will ensure early diagnosis and prompt treatment of deficiencies (MOH, Kenya 2004).
4.4.5: Where mothers/caretakers seek medication when the child is sick.

Most mothers/caretakers (52.6%) do not seek medication when their children fall sick while 47.4% of the mothers/caretakers take their children for medication. Out of 47.4% mothers/caretakers who seek medical assistance 34.9% visited the clinics/pharmacies while 31.3% went to traditional healers. Eighteen percent of the mothers/caretakers visited public health facilities whereas 15.7% depended on self treatment. Overall 53 percent of children with diarrhea in the two weeks preceding the survey were treated in a public health facility and private clinic or pharmacy. A study conducted by Arungo, 2006 revealed that herbalists and the health centers were important consultation choices in the management of diarrhea and the perceived cause of diarrhea greatly influenced the consultation and treatment resorted to.

4.5 DIARRHOEA MORBIDITY OF THE STUDY CHILDREN.

4.5.1 When mothers/caretakers considered children to have diarrhea.

All mothers/caretakers reported having had episodes of diarrhea in their children at one time or another during their growth process. At least 48.3% of the mothers/caretakers considered
a child to have diarrhea when a child had loose stool while 30% of them regarded it as diarrhea when a child had watery stool. On the other hand 21.7% considered it as diarrhea when a child had bloody stool.

![Figure 4.14 When mothers/caretakers considered children to have diarrhea.](image)

### 4.5.2 Children age 6-59 months who had diarrhea in the two weeks preceding the survey
Children from 53.4% of the mothers/caretakers had suffered from diarrhea in the previous two weeks while 46.6% had not.

### 4.5.3: Texture of stool displayed by children who had episodes of diarrhea.
Most children who had suffered from diarrhea (50.3%) displayed watery stool.

Twenty six percent of the children had loose stool while the rest (23.5%) displayed stool that was watery with blood. Diarrhea prevalence increases with age, peaking at 12-23 months (33.7 %) and then falling off at 36-47 and 48-5 consecutively. Diarrhea is less common among children whose mothers/caretakers have some secondary and college
education. It is also less common among children who get their water from taps as compared to those getting from wells and vendors as seen in table 4.6.1.1.

![Figure 4.15: Texture of the stool displayed by children who had episodes of diarrhea.](image)

**Table 4.9: Texture of stool displayed by children who had episodes of diarrhea.**

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Watery stool</th>
<th>Loose stool</th>
<th>Bloody stool</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-11</td>
<td>8 (4.3%)</td>
<td>12 (6.4%)</td>
<td>3 (1.6%)</td>
</tr>
<tr>
<td>12-23</td>
<td>17 (9.1%)</td>
<td>28 (15.0%)</td>
<td>18 (9.6%)</td>
</tr>
<tr>
<td>24-35</td>
<td>8 (4.3%)</td>
<td>21 (11.2%)</td>
<td>11 (5.9%)</td>
</tr>
<tr>
<td>36-47</td>
<td>8 (4.3%)</td>
<td>17 (9.1%)</td>
<td>9 (4.8%)</td>
</tr>
<tr>
<td>48-59</td>
<td>8 (4.3%)</td>
<td>16 (8.6%)</td>
<td>3 (1.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>49 (26.2%)</td>
<td>94 (50.3%)</td>
<td>44 (23.5%)</td>
</tr>
</tbody>
</table>

Numerals in parentheses represent proportions expressed as percentage.

**4.5.4: Mothers/caretakers’ Opinion on what caused diarrhea in their children.**

Of the 187 mothers/caretakers whose children had suffered from diarrhea, 38% had the opinion that the cause had been contaminated food/milk while 28.3% believe dirty water had been the cause. However, 15% believed their children had been bewitched while the rest attributed it to teething problems.
Figure 4.16: Mothers/caretakers’ Opinion on what caused diarrhea in their children

4.5.5: Source of drinking water

Most of the mothers/caregivers (49.7%) obtain their drinking water from wells. 27.7% of them get drinking water from taps whereas the rest 22.6% use vendor-provided water.

Figure 4.17: Source of drinking water

4.5.6: How water for drinking is stored

Most mothers/caregivers (45.1%) store water in buckets, 22% store in jerry cans while 11.1% use drums to store water.
4.5.7: Observation checklist
From the market observation checklist 52% of the visits revealed unclean toilets. At least 48.3% observations revealed presence of open drains. 52.3% of the observations displayed waste littered. 64% places had no garbage collection points. 53.1% of the foods were not covered. 53.1% persons never washed their hands before feeding. 56.6% of the children did not wear footwear all the time and 52.9% water supply points were not protected.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilet present</td>
<td>50% (175)</td>
<td>50% (175)</td>
</tr>
<tr>
<td>State of toilet floor (clean)</td>
<td>48% (168)</td>
<td>52% (182)</td>
</tr>
<tr>
<td>Presence of open drains</td>
<td>48.3% (169)</td>
<td>51.7% (181)</td>
</tr>
<tr>
<td>Waste littered</td>
<td>47.7% (167)</td>
<td>52.3% (183)</td>
</tr>
<tr>
<td>Garbage collection points</td>
<td>36% (126)</td>
<td>64% (224)</td>
</tr>
<tr>
<td>Food seen covered</td>
<td>46.3% (162)</td>
<td>53.7% (188)</td>
</tr>
<tr>
<td>Washing hands before feeding</td>
<td>46.9% (164)</td>
<td>53.1% (186)</td>
</tr>
<tr>
<td>Child wearing footwear all the time</td>
<td>43.4% (152)</td>
<td>56.6% (198)</td>
</tr>
<tr>
<td>Water supply protected</td>
<td>47.1% (165)</td>
<td>52.9% (185)</td>
</tr>
</tbody>
</table>
4.6: Factors influencing diarrhea morbidity.

Table: 4.11 Association between diarrhea morbidity and categorical variables.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Child had diarrhea</th>
<th>Child did not have diarrhea</th>
<th>X² statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of children under 5yrs in household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 child</td>
<td>39(11.1%)</td>
<td>54(15.4%)</td>
<td>X²=6.750</td>
</tr>
<tr>
<td>2 children</td>
<td>114(32.6%)</td>
<td>83(23.7%)</td>
<td>df=2</td>
</tr>
<tr>
<td>3 children</td>
<td>34(9.7%)</td>
<td>26(7.4%)</td>
<td>p=0.034*</td>
</tr>
<tr>
<td>Mother's/ Caretaker's level of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No schooling</td>
<td>67(19.1%)</td>
<td>45(12.9%)</td>
<td>X²=7.935</td>
</tr>
<tr>
<td>Primary</td>
<td>61(17.4%)</td>
<td>60(17.1%)</td>
<td>df=3</td>
</tr>
<tr>
<td>Secondary</td>
<td>47(13.4%)</td>
<td>35(10%)</td>
<td>P=0.047*</td>
</tr>
<tr>
<td>College and above</td>
<td>12(3.4%)</td>
<td>23(6.6%)</td>
<td></td>
</tr>
<tr>
<td>Source of drinking water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap</td>
<td>32(9.1%)</td>
<td>65(18.6%)</td>
<td>X²=32.141</td>
</tr>
<tr>
<td>Well</td>
<td>118(33.7%)</td>
<td>56(16%)</td>
<td>df=2</td>
</tr>
<tr>
<td>Vendor-provided water</td>
<td>37(10.6%)</td>
<td>42(12%)</td>
<td>P=0.0001*</td>
</tr>
<tr>
<td>How water for drinking is stored</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In a jerry can</td>
<td>36(10.3%)</td>
<td>41(11.7%)</td>
<td>X²=10.321</td>
</tr>
<tr>
<td>In a bucket</td>
<td>99(28.3%)</td>
<td>59(16.9%)</td>
<td>df=3</td>
</tr>
<tr>
<td>In a basin</td>
<td>36(10.3%)</td>
<td>40(11.4%)</td>
<td>p=0.016*</td>
</tr>
<tr>
<td>In a drum</td>
<td>16(4.6%)</td>
<td>23(6.6%)</td>
<td></td>
</tr>
<tr>
<td>Whether toilet is clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>109(31.1%)</td>
<td>59(16.9%)</td>
<td>X²=17.030</td>
</tr>
<tr>
<td>No</td>
<td>78(22.3%)</td>
<td>104(29.7%)</td>
<td>df=1</td>
</tr>
<tr>
<td>P=0.0001*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age when complimentary feeding was initiated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 months</td>
<td>36(10.3%)</td>
<td>30(8.6%)</td>
<td>X²=10.98</td>
</tr>
<tr>
<td>3 months</td>
<td>47(13.4%)</td>
<td>61(17.4%)</td>
<td>p =0.027*</td>
</tr>
<tr>
<td>4 months</td>
<td>38(10.9%)</td>
<td>20(5.7%)</td>
<td>df=4</td>
</tr>
<tr>
<td>5 months</td>
<td>36(10.3%)</td>
<td>20(5.7%)</td>
<td></td>
</tr>
<tr>
<td>6 months</td>
<td>30(8.6%)</td>
<td>32(9.1%)</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at p< 0.05

4.6.1: Association between diarrhea morbidity and categorical variables.

At least fifty six percent of the respondents’ household had two children with only about one quarter (26.6%) having one child aged 6-59 months. The number of children under 5yrs in household was found to have a positive significant with diarrhea morbidity P=0.034,
χ²=6.750 and DF=2. Most of the respondents (68%) had attained primary, secondary and college education whereas only 32% had no schooling. The Mother's/ Caretaker's level of education was found to be significant with diarrhea morbidity. The higher the education level the lower the diarrhea morbidity P=0.047, χ²=7.935 and DF=3. Almost half of the mothers/caregivers (49.7%) obtain their drinking water from wells and about a quarter (27.7%) of them get drinking water from taps whereas the rest 22.6% use vendor-provided water. The Source of drinking water was found to have a highly positive significance with diarrhea morbidity P=0.0001, χ²=32.141 and DF=2. Almost half of the mothers/caregivers (45.2%) store water in buckets while 22% store in jerry cans. Eleven percent stored their water in a drum with 21.7% storing in a basin. The method of storing water for drinking was found to be significant with diarrhea morbidity P=0.016, χ²=10.321 and DF=3. From the observations done in the markets during the survey period, 52% of the visits revealed unclean toilets and 48% of the visits revealed clean toilets. The state of cleanliness of the toilet was found to be highly significant with diarrhea morbidity P=0.0001, χ²=17.030 and DF=1. About 30.9% of the mothers/caregivers introduced solid foods to their children at the age of three months. At the age of two months, 18.9% of them started complimentary feeding whereas 17.7% weaned at the sixth month. Age when complimentary feeding started was found to be positively associated with diarrhea morbidity P value =0.027, χ²=10.98 and DF=4 as shown in the table 4.11.
### 4.7: Factors influencing food consumption patterns.

#### Table 4.12: Association between the number of meals for children under 5 yrs during food shortage and categorical variables.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Number of meals for children under 5 yrs during food shortage</th>
<th>X² statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural practices associated with food consumption by children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children are not supposed to eat eggs</td>
<td>2 meals</td>
<td>3 meals</td>
</tr>
<tr>
<td>2 meals</td>
<td>17(4.9%)</td>
<td>38(10.9%)</td>
</tr>
<tr>
<td>3 meals</td>
<td>89(25.4%)</td>
<td>111(31.7%)</td>
</tr>
<tr>
<td>4 meals</td>
<td>9(2.6%)</td>
<td>25(7.1%)</td>
</tr>
<tr>
<td></td>
<td>X²=19.404</td>
<td>Df=6</td>
</tr>
<tr>
<td>Children shouldn't be breastfed in public</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 meals</td>
<td>17(4.9%)</td>
<td>38(10.9%)</td>
</tr>
<tr>
<td>3 meals</td>
<td>89(25.4%)</td>
<td>111(31.7%)</td>
</tr>
<tr>
<td>4 meals</td>
<td>9(2.6%)</td>
<td>25(7.1%)</td>
</tr>
<tr>
<td></td>
<td>X²=20.179</td>
<td>Df=8</td>
</tr>
<tr>
<td>Children are supposed to be served after adults have eaten</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 meals</td>
<td>17(4.9%)</td>
<td>38(10.9%)</td>
</tr>
<tr>
<td>3 meals</td>
<td>89(25.4%)</td>
<td>111(31.7%)</td>
</tr>
<tr>
<td>4 meals</td>
<td>9(2.6%)</td>
<td>25(7.1%)</td>
</tr>
<tr>
<td></td>
<td>X²=20.179</td>
<td>Df=8</td>
</tr>
<tr>
<td>Children shouldn't eat bananas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 meals</td>
<td>17(4.9%)</td>
<td>38(10.9%)</td>
</tr>
<tr>
<td>3 meals</td>
<td>89(25.4%)</td>
<td>111(31.7%)</td>
</tr>
<tr>
<td>4 meals</td>
<td>9(2.6%)</td>
<td>25(7.1%)</td>
</tr>
<tr>
<td></td>
<td>X²=20.179</td>
<td>Df=8</td>
</tr>
<tr>
<td>Mother's/Caretaker's marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>40(11.4%)</td>
<td>34(9.7%)</td>
</tr>
<tr>
<td>Separated</td>
<td>29(8.3%)</td>
<td>40(11.4%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>6(1.7%)</td>
<td>26(7.4%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>8(2.3%)</td>
<td>25(7.1%)</td>
</tr>
<tr>
<td>Married</td>
<td>40(11.4%)</td>
<td>58(16.6%)</td>
</tr>
<tr>
<td>Household size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10(0.3%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>3</td>
<td>4(1.1%)</td>
<td>9(2.6%)</td>
</tr>
<tr>
<td>4</td>
<td>40(11.4%)</td>
<td>31(8.9%)</td>
</tr>
<tr>
<td>5</td>
<td>39(11.1%)</td>
<td>85(24.3%)</td>
</tr>
<tr>
<td>6</td>
<td>25(7.1%)</td>
<td>38(10.9%)</td>
</tr>
<tr>
<td>7</td>
<td>11(3.1%)</td>
<td>9(2.6%)</td>
</tr>
<tr>
<td>8</td>
<td>0(0%)</td>
<td>10(2.9%)</td>
</tr>
<tr>
<td>9</td>
<td>3(0.9%)</td>
<td>1(0.3%)</td>
</tr>
<tr>
<td>Number of children under 5yrs in household</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 child</td>
<td>45(12.9%)</td>
<td>38(10.9%)</td>
</tr>
<tr>
<td>2 children</td>
<td>55(15.5%)</td>
<td>112(32%)</td>
</tr>
<tr>
<td>3 children</td>
<td>23(6.6%)</td>
<td>33(9.4%)</td>
</tr>
<tr>
<td></td>
<td>X²=13.949</td>
<td>Df=4</td>
</tr>
</tbody>
</table>

* Significant at p< 0.05

#### 4.7.1: Association between the number of meals for children under 5 yrs during food shortage and categorical variables.

Most (62.9%) mothers/caretakers have cultural belief that children should not be breastfed in public. Nineteen percent believe that children should not eat eggs which can hamper
talking while 4.9% believe that children should not eat bananas as it causes bloating.

Cultural practices associated with food consumption was found to have a positive
association with the number of meals the children under five years eat P value =0.004,
$\chi^2=19.404$ and DF=6 as shown in table 4.12.

At least 31.4% of the mothers/caretakers were married, 25.1% were single and 10% were
widowed. Only 16.6% of the married are able to afford three meals in a day and just 0.6% of
the widowed afforded four meals in a day. Mother's/Caretaker's marital status was found to
have a positive association with the number of meals the children eat a P value =0.010,
$\chi^2=20.179$ and DF=8. About 39.1% of the households had five members, 20.3% had six
members and 0.3% had two members. Household size was found to be positively associated
with the number of meals the children ate P value =0.0001, $\chi^2=44.02$ and DF=14.

Thirty two percent of the mothers/caretakers with two children were able to provide three
meals for their children as compared to 9.4% with three children. Fifty six percent of the
respondents’ household had two children with only about a quarter (26.6%) having one
child aged 6-59 months. The number of children under 5yrs in household was found to have
a positive association with the number of meals for children under 5 yrs during food shortage
P=0.007, $\chi^2=13.949$ and DF=2.
4.8: Factors influencing the nutritional status of the study children.

Table 4.13 Association between the age of mother/caretaker and stunting, underweight and wasting levels

<table>
<thead>
<tr>
<th>Nutrition indicator</th>
<th>Variable: Age of mother/caretaker</th>
<th>X² statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nutritional status</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Below 30 Yrs</td>
<td>31 - 36 Yrs</td>
</tr>
<tr>
<td>W/H (wasting)</td>
<td>Above normal</td>
<td>66 (18.9%)</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>58 (16.6%)</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
<td>63 (18%)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>34 (9.7%)</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>15 (4.3%)</td>
</tr>
<tr>
<td>W/A (underweight)</td>
<td>Above normal</td>
<td>5 (1.4%)</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>19 (5.4%)</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
<td>59 (16.9%)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>91 (26%)</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>62 (17.7%)</td>
</tr>
<tr>
<td>H/A (stunting)</td>
<td>Normal</td>
<td>40 (11.4%)</td>
</tr>
<tr>
<td></td>
<td>Mild to moderate</td>
<td>126 (36%)</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>70 (20%)</td>
</tr>
</tbody>
</table>

*Significant at p< 0.05 *,

**Not Significant at p< 0.05

4.8.1: Association between the age of mother/caretaker and stunting, underweight and wasting levels

Stunting levels were higher (36%) among mothers/caretakers aged below thirty years.

Mothers/caretakers above thirty six years had only 0.6% cases of stunting. Association between the age of mother/caretaker and stunting levels had a positive significance p-value=0.01, χ² = 13.23, DF=4. Mothers above the age of thirty six years had no children who are moderately or severely wasted as compared to those aged below 30 years. Wasting levels decrease with age. There was a negative association between age of the
mother/caretaker and wasting levels P value=0.76, \( \chi^2 = 4.95 \), DF=8. Age of the mother/caretaker also had a significant association with the underweight levels in the children P-value=0.76, \( \chi^2 = 4.93 \), DF=8.

**Table 4.14 Association between stunting levels and categorical variables**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variable</th>
<th>( \chi^2 ) statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height for Age (Stunting)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>Mild to Moderate</td>
</tr>
<tr>
<td>Age when complementary feeding was initiated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 months</td>
<td>7 (2%)</td>
<td>43 (12.3%)</td>
</tr>
<tr>
<td>3 months</td>
<td>18 (5.1%)</td>
<td>61 (17.4%)</td>
</tr>
<tr>
<td>4 months</td>
<td>8 (2.3%)</td>
<td>34 (9.7%)</td>
</tr>
<tr>
<td>5 months</td>
<td>7 (2%)</td>
<td>34 (9.7%)</td>
</tr>
<tr>
<td>6 months</td>
<td>7 (2%)</td>
<td>32 (9.1%)</td>
</tr>
<tr>
<td>Frequency of breast feeding in a day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 times</td>
<td>4 (2.4%)</td>
<td>17 (10%)</td>
</tr>
<tr>
<td>4 times</td>
<td>3 (1.8%)</td>
<td>15 (8.8%)</td>
</tr>
<tr>
<td>5 times</td>
<td>11 (6.5%)</td>
<td>27 (15.9%)</td>
</tr>
<tr>
<td>6 times</td>
<td>8 (4.7%)</td>
<td>34 (20%)</td>
</tr>
<tr>
<td>Age when breast feeding was stopped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - 7 Months</td>
<td>11 (6.1%)</td>
<td>41 (22.8%)</td>
</tr>
<tr>
<td>8 - 12 Months</td>
<td>10 (5.6%)</td>
<td>58 (32.2%)</td>
</tr>
<tr>
<td>13 - 20 Months</td>
<td>0(0%)</td>
<td>12 (6.7%)</td>
</tr>
</tbody>
</table>

**Significant at p < 0.05**

4.8.2: Association between stunting levels and categorical variables.

Stunting levels were lower (9.1%) among children who were complementary fed at the age of six months as compared to 12.3% and 17.4% of those were fed at the age of two and three months consecutively. However, association between the age when complementary feeding started and stunting levels was not positively significant P-value=0.77, \( \chi^2 = 4.82 \), DF=8. as shown in the table 4.6.3.2. Information on breastfeeding frequencies was obtained by asking mothers/caretakers about the current breast feeding status of the index child. Half of the
mothers (51.4%) were not currently breast feeding the child while the rest (48.6%) were still breast feeding in addition to giving other foods. Of the 48.6% mothers who were still breast feeding, only 34.1% breast fed their children six times daily, 30% breast fed five times, 20% breast fed three times while the rest (15.9%) breast fed four times in a day. Association between frequency of breast feeding in a day and stunting levels was not positively significant $P$-value=0.72, $\chi^2=3.64$, DF=6 as shown in the table 4.6.3.2 above. At least 52.8% of the children stopped being breast fed when they were between eight and twelve months old. However 38.9% of the children stopped breast feeding before the seventh month with only 8.3% stopping to breastfeed after one year. This was not statistically significant with stunting in the children $P$ value=0.38, $\chi^2=4.15$, and DF=4. as shown in the table 4.13

Table 4.15: Association between underweight levels and categorical variables

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Dependent variable</th>
<th>Weight for Age (underweight)</th>
<th>$X^2$ statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural practices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>associated with food</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>consumption</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children not to eat</td>
<td>Overweight 2 (0.6%)</td>
<td>Normal 5 (1.4%)</td>
<td></td>
</tr>
<tr>
<td>eggs</td>
<td>Mild 21 (6%)</td>
<td>Moderate 26 (7.4%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe 14 (4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children not be</td>
<td>Overweight 3 (0.9%)</td>
<td>Normal 20 (5.7%)</td>
<td></td>
</tr>
<tr>
<td>breastfed in public</td>
<td>Mild 51 (14.6%)</td>
<td>Moderate 87 (24.9%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe 59 (16.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children are to be</td>
<td>Overweight 1 (0.3%)</td>
<td>Normal 5 (1.4%)</td>
<td>$X^2$=7.21</td>
</tr>
<tr>
<td>served after adults</td>
<td>Mild 14 (4%)</td>
<td>Moderate 15 (4.3%)</td>
<td>Df=12</td>
</tr>
<tr>
<td>have eaten</td>
<td>Severe 10 (2.9%)</td>
<td></td>
<td>$p=0.84^{**}$</td>
</tr>
</tbody>
</table>

** Age when breast feeding was stopped

<table>
<thead>
<tr>
<th>Age when breast feeding was stopped</th>
<th>4 - 7 Months</th>
<th>8 - 12 Months</th>
<th>13 - 20 Months</th>
<th>$X^2$=11.32</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17 (9.4%)</td>
<td>20 (11.1%)</td>
<td>2 (1.1%)</td>
<td>Df=8</td>
</tr>
<tr>
<td>Overweight</td>
<td>15 (8.3%)</td>
<td>27 (15%)</td>
<td>5 (2.8%)</td>
<td>$p=0.18^{**}$</td>
</tr>
<tr>
<td>Normal</td>
<td>17 (9.4%)</td>
<td>12 (6.7%)</td>
<td>4 (2.2%)</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>18 (10%)</td>
<td>11 (6.1%)</td>
<td>1 (0.6%)</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>3 (1.7%)</td>
<td></td>
<td>3 (1.7%)</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Not Significant at $p<0.05$
4.8.3: Association between cultural practices associated with food consumption and categorical variables.

Mothers/caretakers who believed that children should not be breastfed in public experienced higher cases (24.9%) of underweight levels, followed by 7.4% who believed that children are not supposed to eat eggs. Almost half (49.4%) of Mothers/caregivers withhold certain foods from their children while the rest (50.6%) do not withhold any food from their children. Mothers/caregivers (38.7%) claimed that Ugali can choke their children. About 36.4% of them believe that eggs if eaten by the children can make the child have a delayed milestone in speech development. According to 20.2% of the mothers/caretakers, porridge can cause constipation whereas the rest 4.6% claim sour milk can cause diarrhea. This did not have a positive significant with underweight levels in the children $P$ value=0.84, $\chi^2=7.21$, and $DF=12$.

At least 52.8% of the children stopped being breast fed when they were between eight and twelve months old. However 38.9% of the children stopped breast feeding before the seventh month with only 8.3% stopping to breastfeed after one year. This did not have a positive association with stunting in the children $P$ value=0.18, $\chi^2=11.32$, and $DF=8$. As shown in the table 4.6.3.3.
4.9 DISCUSSION OF RESULTS

4.9.1 Diarrhea morbidity

According to KDHS 2008, the prevalence of diarrhea among the under fives in Nairobi is 12% which is lower than the 53.4% reported in this study. However diarrhea prevalence varies seasonally and bearing in mind that this study was carried out during relatively rainy season, this might have influenced the result findings. This study revealed reasonable literacy levels among the mothers/caregiver in the study areas. At least 68% had primary, secondary, college and above levels which compared well with the findings of Rok (2004) that reported 92.2% literacy with only 7.8% with no education in Nairobi. The high literacy levels were significantly associated with diarrhea morbidity among the children (p-0.047). About 19% of the mothers with no schooling reported cases of diarrhea as compared to only 3.4% cases from mothers with college education. The higher the education level the lower the cases of diarrhea. Education is a key determinant of the lifestyle and status an individual enjoys in a society. Studies have consistently shown that education attainment has a strong effect on health behaviors and attitudes (KDHS 2008).

There is association between how water for drinking is stored and whether the child has suffered from diarrhea (P-value=0.016). Most mothers/caregivers (45.1%) store water in buckets. More than half 62.7% of the mothers/caretakers who store their drinking water in buckets reported episodes of diarrhea. Generally, buckets were usually not covered or well covered and exposed to dust. In addition, Children usually scoop water for drinking directly from buckets with any reasonably clean cup or bowl, thereby increasing the risk of
contamination. Storage of water in buckets exposed it to contamination especially if not well covered thus compromised its safety. Such findings agree with Habitat who states that in Cote d’vore, 41% of the stored water samples were contaminated than those from water sources, and in Peru, children in households with water stored in containers without a tap were twice as likely to have a high incidence of diarrhea (UN HABITAT, 2003). Trevett and Carter (2008) recommend that water should be stored in vessels that are covered and regularly cleaned. Drinking water should be stored in a separate container from other domestic water and that this drinking water should be taken away from the storage vessel in such a way that hands, cups or other objects cannot contaminate the water.

Most mothers/caregivers (82.3%) gave complimentary feeds to their children before the age of six months with only 17.7% being complimentary fed at the sixth month. UNICEF and WHO recommend the introduction of solid foods to infants at the age of 6 months because by that age breast milk alone is no longer sufficient to maintain a child’s optimal growth (UNICEF, 2006). The findings of this study closely parallel those reported by Waswa in which all mothers had introduced complementary food to their index child before the sixth month (Waswa, 2005). There was association between age when complementary feeding was started and whether the child had suffered from diarrhea (P-value=0.027). At least 13.4% of children complementary fed at the age of three months suffered from diarrhea as compared to only 8.6% who were complementary fed at six months. The prevalence of diarrhea was attributed to poor feeding practices and unhygienic procedures in the preparation of feeds as well as early initiation of solid foods. This was as a result of the child’s digestive system not being well developed and thus when the child was fed on other
foods other than breast milk before the sixth month it may result to ulceration and irritation of the gastrointestinal tract thus exposing the child to diarrhea cases.

There was association between cleanliness of the toilets in the market and whether the child suffered from diarrhea. (P-value=0.0001) From the observations done in the markets during the survey period, 52% of the visits revealed unclean toilets with 48.3% observations revealing presence of open drains. More than half 53.1% of the mothers/caregivers had food not covered. They never washed their hands before feeding the children. This contributed to the cases of diarrhea reported among the children. Proper hand washing is reported to be almost as effective as improvement in water quality alone (ACF, 2005).

Exposure to diarrhea causing agents is frequently related to use of contaminated water and to unhygienic practices in food preparation and disposal of excreta. Washing hands with soap or ash at critical times can reduce the number of diarrheal cases (Curtis, V. 2003). Interventions promoting the hygiene practice of washing ones hands with soap tend to achieve greater reduction in diseases and those that promote several different behaviors (Caincross and Valdamanis, 2007).

The role of confounding variables, mostly related to behavioral issues, becomes particularly important when considering the prevalence of diarrhea among these children. There were many traders operating in the market thus causing a strain in the already strained facilities in the markets. Generally, communal toilets do not offer water for hand washing and this may also influence the occurrence of diarrhea.

The toilets in the markets were charged an entry fee which the mothers claimed is very high because they also had to pay the daily charges of operating in the market sheds. In respect to
this, they changed the children’s diapers and tucked them in the same bags where the feeds were. Mothers in several occasions when they have no packed lunch for the children purchased food prepared by other food vendors within the markets which they shared amongst themselves and the children. The food vendors often kept cooked food at environmental temperatures for prolonged periods of time and heated it only slightly before serving thus making it unsafe for consumption.

4.9.2 Food consumption patterns.

In regard to food availability and consumption patterns the main source of food for most households was purchasing (47.1%). Fig 4.3.2 shows that over 62.3% of the households had the adult women going without food while adult men (21.5%) followed whereas only 6.3% and 9.9% were children below five years and children over five years consecutively. The consumption of Protein-rich foods (meat, milk, fish poultry and eggs was highest among the age group of 36-37 months. This feeding practice is likely to explain why we had lower stunting levels 3.4% among the same group as compared to 25.7% among the age group 12-23 months (Table 4.6).

The marital status of the mothers/caretakers revealed a significant association with the number of meals taken during times of food shortages (P-0.01). The married mothers/caregivers had more than three meals as compared to the widowed and the divorced. This could be due to the fact that the married have a spouse who helps in supplementing the households’ source of food. However the findings of the study did not tally with a report by Chesire where the marital status did not influence the nutritional status of the children (Chesire, 2007). Almost half of the households had five members. During
food shortage 52.3% children below five years had three meals. Only 12.6% of the children afforded to take four meals. There was association between number of children under five years in household and the number of meals they took during food shortage (P-value=0.007). About 9% of mothers/caregivers with two children below five years provided four meals in a day as compared to 1.1% of the mothers who had three children below five years.

There was association between cultural practices associated with food consumption and the number of meals that children took during food shortage (P-value=0.004). Only 5.4% of those that believed children should not be breastfed in public were capable of providing four meals in a day during times of food shortages. This means that the children are not able to acquire the rightful amounts of nutrients for growth thus compromising on their nutritional status.

The study population indicated that 39.1% of the respondents households had five members, about 20.3% had six members and 0.3% had two members. These findings are similar to KDHS 2008 survey which recorded that the mean Kenyan household size is 4.2 persons, slightly fewer than the mean household size of 4.4 persons found in the 2003 survey (KDHS, 2008). Household size was found to be significant with the number of meals for children under 5 yrs during food shortage (P value =0.0001). This means that the higher the number of family members the more the family pot is divided among many and thus the adequacy of the meals and nutrients was limited.
4.9.3 **Nutritional status of the study children.**

Overall 29% of the children were stunted a figure below the 35% reported in the 2008 Kenya Demographic and Health Survey. Higher proportions (34%) of male children aged 5-59 months were stunted compared with 24.3% of female children. Stunting levels were highest (25.7%) in children age 12-23 months a similar age group that recorded higher percentages (33.7%) of diarrhea cases (table 4.5.1). This observation that the prevalence of stunting in the age group 6-11 months of life is low but increasing with age was similar to findings of a survey conducted in 2000 in Tharaka district. This could be attributed to poor weaning and complementary feeding practices leading to an inadequate energy and protein intake as well as reduced attention to the children (ANP, 2000).

Stunting reflects long term effects of malnutrition in a population and is not sensitive to recent, short term changes in dietary intake. Table 4.3.1 shows that most children were able to consume foods from the different food groups and this explained why their stunting levels were slightly lower than the figure reported nationally. Stunting levels were higher (36%) among mothers/caretakers aged below thirty years. Mothers/caretakers above thirty six years had only 0.6% cases of stunting. Association between the Age of mother/caretaker and stunting levels was significant P-value=0.01, \( \chi^2=13.23, \) DF=4. This was attributed to the fact that the older mothers/caregivers are more mature and thus they may take keen interest in ensuring their children feed properly and adequately. The results of this study showed that among the children who were currently not being breastfed, more than half (59.3%) were fed three times a day with 26.4% being fed two times and only 14.3% being fed more than four times in a day. This was below the WHO recommendations whereby non-breastfed should at least have four or more feeds in a day. However the study population being a low
socio-economic setting might have limited the number of feeds available to the children in a day. WHO recommends that in addition to complementary feeding, children should be breastfed up to at least twenty four months or more when the child is fully weaned. The median duration for any breastfeeding among Kenyan children is 21 months (KDHS 2008).

The study revealed that most mothers started complimentary feeding before the age of six months thus exclusive breastfeeding was not done. A study carried out in Addis also concluded that exclusive breastfeeding beyond four months of age was among the principle risk factors associated with nutritional well-being of children (Gugsa, 2001).

Nationally, 16% of children under five years are underweight (low weight for age) while the proportion severely stunted is 4.6% (KDHS 2008). Overall 19.5% of the study children were underweight. This higher percentage was attributed to the fact that the children spent most of their time in the market place with their mothers/caregiver and thus there was limited attention on the feeding times as the mother were busy attending to the buyers. Also the breastfeeding was not done on demand as the mother couldn’t leave the buyers un-attended so as to breastfeed the child. In this case the children were treated secondary to their trading.

The proportion of underweight was highest (13. %) in the age group 12-23 months which was slightly above the figures (12 %) of the same age group in the KDHS 2008 survey. Underweight levels were lowest (3.4%) in the age group 6-11 months, the same group that indicated lower incidences of diarrhea (Table 4.9). Cases of underweight were more prevalent with children in the younger age groups. This could be explained by the fact that as a child grows older, he/she is considered slightly mature and left to search for foods for themselves as compared to the younger ones who depend on their mother/caretaker. Ideally
these children are still young as they are still below the age of five years and thus they still require optimum care from their mothers/caretakers.

Nutritional status as measured by wasting or low weight for height revealed that wasting levels among the study population was 7.6% a figure higher than the 4% reported among children below five years in Nairobi (KDHS 2008). Results from the study indicated that some energy giving foods such as Ugali and porridge were withheld from the children due to the belief that they could choke or caused constipation (Fig 4.12). This inversely affected the nutritional status of the children as the child is deprived off the benefits from the energy giving foods and as well this influenced the higher wasting levels reported in this study. Wasting levels were higher (6.3%) in the age group 12-23 months the same age group that reported higher cases (9.1%) of watery stool. In Bangladesh a prospective cohort study showed that diarrhea disease was found to retard weight gain and slow linear growth (SCN, 2000) as is also the case in the results from this study.

The findings therefore rejected the hypothesis (H0) that food handling practices and consumption patterns has no association with diarrhea morbidity and nutritional status of the children.
CHAPTER FIVE:
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is a summary of the results of this study which was carried out in Toi and Muthurwa markets of Nairobi District to establish the diarrhea morbidity and nutritional status among the pre-school children of hawking mothers. A summary of the major findings of the study is made and conclusions and recommendations presented based on the findings.

5.2 Summary and implication of the major findings

The main objective of the study was to assess the diarrhea morbidity and nutritional status among the pre-school children of hawking mothers in Nairobi city markets.

From the findings of this study malnutrition and particularly wasting is a wide spread problem of public health significance. This is precipitated by many factors such as unfavorable breastfeeding practices, untimely complementary feeding practices, education levels and the general low socio-economic status of the mothers/caretakers. In general, prevalence of stunting was lower but the prevalence of wasting was higher. Stunting is generally associated with low socio-economic status, which is the case in the study group.

Diarrhea morbidity precipitated by factors such as poor food handling and hygiene practices, unhygienic market sanitation and water supply and overcrowding is also of public health concern among this study population.

5.3 Conclusion

5.3.1 Diarrhea morbidity

There are a complex set of interactions between multiple risk factors and diarrhea outcomes that have been addressed in this survey. However, when located within the context of the
market environment, the complexities involved in characterizing the health effects of interrelated risk factors become apparent and lead to the conclusion that poor food and water hygiene practices and sanitation results in a higher prevalence of childhood diarrhea morbidity in the study areas. This strengthens the need for appropriate interventions within the household and the market environment.

5.3.2 Food consumption patterns

Proper and timely complementary feeding practices and continued breastfeeding until the second year of life reduces the risk of malnutrition in children.

5.3.3 Nutritional status

Malnutrition among children of hawking mothers is a problem despite the government effort of trying to reduce the levels of malnutrition among the under five children. Therefore a combined effort by the Mothers/caretakers, government and Non-governmental Organizations is of ultimate importance in reducing the poor nutrition situation and diarrhea outcome among this population. In addition, surveillance needs to be done continually and information about the nutritional status and diarrhea morbidity of the population gathered regularly to help in proper targeting and timely interventions by the stakeholders.

5.4 Recommendations

Regarding food consumption the Ministry of Public Health and Sanitation should plan and implement intensive health education programmes to change incorrect beliefs especially those related to food consumption and to educate mothers/caretakers about the relationship between sanitation and diarrhoea.
Regarding diarrhoea morbidity Public health officers should educate mothers/caretakers identify safer and affordable household water treatment and storage systems so as to support major reductions in the number of diarrhea cases.

On Nutritional status the mothers/caretakers should intensify their income searching efforts so as to improve their household food security and nutritional status of the children.

5.5 Further research

1. There is need for a national survey targeting the under five children of hawking mothers to ascertain the magnitude of diarrhea and under nutrition among this group. This will help in lowering the mortality associated with diarrhea and nutrition.

2. Studies on mothers’ understanding of the links between various risk factors and childhood diarrhea need to be carried out.
REFERENCES


APHRC (2008) Urbanization, Poverty and Health Dynamics Study, APHRC, Nairobi, Kenya


Kenya food security report 2005. (www.kfs.org)


MOH (2005) *Household health expenditure and utilization survey,* Nairobi; MOH and USAID


Nestle, (March 1996) food and nutrition brief Switzerland: Nestle.


Water and Environmental Health at London and Lourghborough (2005), *The child health; millennium development Goal,* WEDC, United Kingdom.


APPENDICES

APPENDIX I: INTERVIEW GUIDE
INTERVIEW GUIDE FOR ASSESSING DIARRHEA MORBIDITY AND NUTRITIONAL STATUS AMONG PRE-SCHOOL CHILDREN OF HAWKING MOTHERS IN NAIROBI CITY MARKETS.

Name of Interviewer: .................................................................
Date: ...........................................................................

SOCIO-DEMOGRAPHIC INFORMATION OF MOTHER/CARETAKER
Q1. Age of Mother/caretaker (complete years): ..........................................................
Q2. Household size: .................................................................
Q3. Number of children under five years in her household: ..................................
Q4: Mother's/Caretaker's level of education (circle only one)
   1. None (No schooling)
   2. Primary
   3. Secondary
   4. College and above
Q5. Mother's/Caretaker's main occupation (circle only one)
   1. Salaried Employment
   2. Business/Petty trading
   3. Casual Labour
   4. Others (Specify): ..................................................................................................
Q6. Marital Status of Mother/caretaker
   1. Single
   2. Married
   3. Separated
   4. Divorced
   5. Widowed
Q7. Household main source of income (Circle only one)
   1. Salaried employment
   2. Casual work/Labour
   3. Small Business/Petty trading
   4. Others (Specify): ..................................................................................................
FOOD AVAILABILITY AND CONSUMPTION

Q8. Main source of food for household
   1. Purchase
   2. Remittance/gifts
   3. Begging
   4. Others (Specify)

Q9. Are there times you skip meals in your household?
   1. Yes
   2. No

Q10. If yes, how often (If No skip)
   1. One to Two days
   2. Three days to One week
   3. More than One week

Q11. If yes which household members skip meals?
   1. Children under five years
   2. Adult Men
   3. Adult Women
   4. Children over five years

Q12. In times of food shortage how many meals do children under five years eat in a day including breakfast?

Q13. How does the household survive during shortage of food? (Circle all that apply)
   1. Skip meals
   2. Splitting of family
   3. Begging
   4. Borrowing
   5. Others (Specify)

Q14. What is the actual food intake by children aged 6-59 months in your household.

Q15. What cultural practices are associated with food consumption in relation to children in your household?

Q16. What is the source of fuel for cooking in your household?
   1. firewood
   2. charcoal
   3. paraffin oil
4. Others (specify)........................................................................................................................................

DIARRHOEA AND NUTRITIONAL STATUS OF THE CHILDREN.

Q17 When do you consider a child to have diarrhoea?.................................................................

Q18a. What causes diarrhoea?...........................................................................................................

Q18b Has there been episodes of diarrhoea in your household?
   1. Yes
   2. No

Q19a. Has this child suffered from diarrhoea in the last two weeks?
   1. Yes
   2. No

Q19b. If yes, in your opinion, what was the cause of the diarrhoea? (explain briefly)
   ........................................................................................................................................................

Q19c. If yes what was the texture of the stool? (circle the one that applies)
   1. Loose
   2. Watery
   3. Watery with blood

Q20. When this child is sick do you seek medical assistance?
   1. Yes
   2. No

Q21. If yes, where do you go (If no Skip, Circle all that apply?)
   1. Traditional healers
   2. Private clinic/Pharmacy
   3. Public health facility (Health centre/Dispensary/Hospital)
   4. Self treatment
   5. Others (Specify)............................................................................................................................

Q22(a). Are you currently breastfeeding this child (Youngest child)?
   1. Yes
   2. No

Q22(b). If yes, how many times in a day do you breastfeed the child?
   ........................................................................................................................................................

Q23 If not breastfeeding, how old was the child when you stopped breastfeeding?
   (age in months).....................................................................................................................................
Q24 At what age was the child given food/drink other than breast milk? (Actual age in months)..........................................................................................................................

Q 25 How many times do you feed the child in a day other than breast milk?
..........................................................................................................................

Q26 Do you withhold any food from your child?
1. Yes
2. No

Q27 If yes what food do you withhold and why?
<table>
<thead>
<tr>
<th>Type of food</th>
<th>Reason for withholding</th>
</tr>
</thead>
<tbody>
<tr>
<td>.........................</td>
<td>..........................................................</td>
</tr>
</tbody>
</table>

Q28 Do you take this child for growth monitoring(GMP)?
1. Yes
2. No

Q35 If yes How often do you take the child for GMP?
..........................................................................................................................

WATER AND ENVIRONMENTAL SANITATION

Q29 Source of drinking water. .................................................................

Q30a Is the water treated?
1. Yes
2. No

Q30b If yes what form of treatment?(circle the main method)
1. Filtering
2. Herbs
3. Chemicals
4. Others..............................................................................................................

Q31a How do you store your water for drinking?................................................

Q31b What method do you use to remove water?
1. dipping into it
2. pouring out

Q32a Do you have a latrine in this market?
1. Yes
2. No

Q32b If yes which type?
1. Pit
2. Flush toilet
3. Others..............................................................................................................

Q32c If no, where do you relieve yourself?.................................................................
**Q33 CHILD ANTHROPOMETRY**

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Sex</th>
<th>Weight in kg</th>
<th>Height in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**34: OBSERVATION CHECKLIST FOR THE MARKET**

<table>
<thead>
<tr>
<th></th>
<th>YES=1</th>
<th>NO=2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilet present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of toilet floor (clean)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(dirty)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of open drains (with dirty water)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(with clean water)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste littered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage collection points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food seen covered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washing hands before feeding the child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child wearing footwear all the time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water supply (covered)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(uncovered)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX II: STUDY LOCATION MAPS

Map of Nairobi (study area)

Map of Kenya
APPENDIX III: MARKET ENVIRONMENT