RISK FACTORS ASSOCIATED WITH MORBIDITY STATUS OF
PRE SCHOOL CHILDREN IN MUKURU SLUMS, NAIROBI,
KENYA.

By

ROP JEPKOSGEI JULIE (B.Sc.)

Reg.No.157/5023/2003

DEPARTMENT OF PUBLIC HEALTH

A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE
OF MASTERS OF PUBLIC HEALTH IN THE SCHOOL OF
HEALTH SCIENCES OF KENYATTA UNIVERSITY.

APRIL, 2009
DECLARATION

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

Signature .................................................. Date 06/05/09

Rop Jepkosgei Julie

SUPERVISORS APPROVAL

We confirm that the candidate under our supervision carried out the work reported in this thesis.

Prof. Judith Waudo
Department of Foods, Nutrition and Dietetics
Kenyatta University
Signature .................................................. Date 7/5/09

Dr. Margaret Keraka
Department of Public Health
Kenyatta University
Signature .................................................. Date 7/5/09
DEDICATION

To my loving grandparents, late Cherosei and late Tapkurgoi. Their contribution to education for all their children and grandchildren was and will always be cherished and remembered. God rest their departed soul in peace.
# TABLE OF CONTENTS

- DECLARATION .......................................................... ii
- DEDICATION .................................................................. iii
- ACKNOWLEDGEMENTS ...................................................... iv
- TABLE OF CONTENTS ....................................................... v
- LISTS OF TABLES .......................................................... viii
- LISTS OF FIGURES .......................................................... ix
- ACRONYMS .................................................................. x
- ABSTRACT .................................................................. xi

## 1.0 INTRODUCTION .......................................................... 1

1.1 Background Information .................................................. 1
1.2 Statement of Problem .................................................. 4
1.3 Justification ................................................................. 5
1.4 Research Questions .................................................... 5
1.5 Hypothesis ................................................................. 6
1.6 Objectives of the Study ................................................ 6
   1.6.1 General objective ................................................. 6
   1.6.2 Specific objectives ............................................... 6
1.7 Significance of the Study .............................................. 6
1.8 Operational Framework .............................................. 7
1.9 Operational Definitions of Terms .................................. 8

## 2. LITERATURE REVIEW .................................................... 9

2.1 Global Nutritional Status of Children ................................ 9
2.2 Nutritional Requirements of a Preschooler ........................ 9
2.3 Nutrition and Health .................................................. 11
2.4 Global Burden of Childhood Illnesses ............................ 12
2.5 Water and Sanitation .................................................... 13
2.6 Health Care Seeking Practices ...................................... 14
   2.6.1 Immunization ..................................................... 14
   2.6.2 Growth Monitoring ............................................ 15
   2.6.3 Health care seeking during illness ....................... 16

## 3. MATERIALS AND METHODS ......................................... 18

3.1 Study Area .............................................................. 18
ACKNOWLEDGEMENTS

Honour and glory be to the Almighty God for giving me the ability and strength throughout the study period, without which I could not have made it.

I am very grateful to my supervisors, Professor Judith Waudo and Dr. Margaret Keraka for their dedication, encouragement and guidance throughout the study period. I also thank lecturers of Public Health department for all their assistance.

I am also indebted to the mothers and children of the selected villages of Mukuru slums for being very cooperative during data collection.

Special thanks go to my family for being there for me, especially my mother Susan Rop for having faith in me that I can make it and for investing so much in my education. Many thanks go to my dear son Kibet who had to cope with my busy schedule in pursuit of this degree.

I am very grateful to my friend Jacquie, who provided much needed assistance during the data analysis process and generally throughout the study period. I also thank Simon, Juddie, Peninah, Jp, and all my friends for their help, support, motivation and encouragement.

Last but not least, I wish to thank all those who contributed to this work in one way or another and are not mentioned, I do appreciate all your individual inputs.

To you all, I say, thank you and may God Almighty bless you abundantly.
4.8.3 Access to Toilet or Latrine and Diarrhoea Morbidity among the Pre School Children ................................................................. 54
4.8.4 Waste Disposal and Diarrhoea Morbidity among Pre school Children ........ 56

5. CONCLUSIONS AND RECOMMENDATIONS .................................................. 58

5.1 Introduction ...................................................................................... 58
5.2 Conclusions ..................................................................................... 58
5.3 Recommendations .......................................................................... 60
5.4 Recommendations for Further Research ........................................ 61

REFERENCES ....................................................................................... 62

APPENDICES ......................................................................................... 67

APPENDIX 1: QUESTIONNAIRE ................................................................. 67
APPENDIX 2: MAP OF THE STUDY AREA ...................................................... 74
APPENDIX 3: RESEARCH AUTHORIZATION LETTER .................................. 75
# LISTS OF TABLES

<table>
<thead>
<tr>
<th>Table 3.1</th>
<th>Proportionate sampling</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 4.1</td>
<td>Socio-demographic characteristics of pre school children in Mukuru slums</td>
<td>29</td>
</tr>
<tr>
<td>Table 4.2</td>
<td>Distribution of pre school children who got sick two weeks prior the study by age in months in Mukuru slums</td>
<td>32</td>
</tr>
<tr>
<td>Table 4.3</td>
<td>Distribution of pre school children who got sick two weeks prior the study by gender in Mukuru slums</td>
<td>33</td>
</tr>
<tr>
<td>Table 4.4</td>
<td>Nutritional status of the children by age</td>
<td>36</td>
</tr>
<tr>
<td>Table 4.5</td>
<td>Nutritional status of the preschool children by gender</td>
<td>36</td>
</tr>
<tr>
<td>Table 4.6</td>
<td>Percentage distribution of pre school children weekly frequency of consumption of food in Mukuru slums</td>
<td>37</td>
</tr>
<tr>
<td>Table 4.7</td>
<td>Adequacy of energy, protein, iron, calcium, vitamin A and vitamin C among pre school children in Mukuru slums</td>
<td>42</td>
</tr>
</tbody>
</table>
# LISTS OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.1</td>
<td>Operational framework</td>
<td>7</td>
</tr>
<tr>
<td>Figure 4.1</td>
<td>Percentage of pre school children who got sick two weeks prior the study</td>
<td>31</td>
</tr>
<tr>
<td>Figure 4.2</td>
<td>Prevalence of reported illnesses in two weeks prior the study among pre school children in Mukuru slums</td>
<td>31</td>
</tr>
<tr>
<td>Figure 4.3</td>
<td>Types of snacks given to the preschool children</td>
<td>43</td>
</tr>
<tr>
<td>Figure 4.4</td>
<td>Type of toilet/latrine used in the selected households in Mukuru slums</td>
<td>55</td>
</tr>
<tr>
<td>ACRONYMS</td>
<td>Definition</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>ACC/SCN</td>
<td>Administrative Committee on Co-ordination/Sub Committee on Nutrition (United Nations)</td>
<td></td>
</tr>
<tr>
<td>AED</td>
<td>Academy for Educational Development</td>
<td></td>
</tr>
<tr>
<td>AMREF</td>
<td>Africa Medical Research Foundation</td>
<td></td>
</tr>
<tr>
<td>APHRC</td>
<td>African Population and Health Research Centre</td>
<td></td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organisation of the United Nations</td>
<td></td>
</tr>
<tr>
<td>KEPI</td>
<td>Kenya Expanded Programme on Immunization</td>
<td></td>
</tr>
<tr>
<td>KDHS</td>
<td>Kenya Demographic and Health Survey</td>
<td></td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
<td></td>
</tr>
<tr>
<td>MUAC</td>
<td>Middle Upper Arm Circumference</td>
<td></td>
</tr>
<tr>
<td>NCHS</td>
<td>National Centre for Health Statistics</td>
<td></td>
</tr>
<tr>
<td>PEM</td>
<td>Protein Energy Malnutrition</td>
<td></td>
</tr>
<tr>
<td>RDA</td>
<td>Recommended Dietary Allowances</td>
<td></td>
</tr>
<tr>
<td>ROK</td>
<td>Republic of Kenya</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>Standard Deviation</td>
<td></td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
<td></td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children Fund</td>
<td></td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
<td></td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
<td></td>
</tr>
<tr>
<td>g</td>
<td>Grams</td>
<td></td>
</tr>
<tr>
<td>IU</td>
<td>International Units</td>
<td></td>
</tr>
<tr>
<td>kcal</td>
<td>Kilocalories</td>
<td></td>
</tr>
<tr>
<td>mg</td>
<td>Milligram</td>
<td></td>
</tr>
</tbody>
</table>
ABSTRACT

Children have the right to a caring, protective environment and to nutritious food and basic health care to protect them from illness and promote growth and development. Despite numerous health interventions in developing countries, the health status of children under five years has continued to deteriorate. In Kenya, children in slum areas have lower survival rates compared to their counterparts in other parts of the country. The high prevalence of common childhood illnesses is a critical issue for slum children. The purpose of the study was to determine risk factors associated with morbidity status of the pre school children in Mukuru slums, Nairobi. The study employed a descriptive cross sectional survey research design. The study population included the caregivers with pre school children aged between two to five years. Simple random sampling was used to obtain four villages of study and to choose the households with children aged two to five years. For each selected household, a pre school child and the caregiver was purposively sampled. Pre-tested questionnaires were used to collect data. Food frequency questionnaire and 24-hour food recall was used for dietary assessment. Anthropometric measurements were taken to determine the nutritional status of the pre-school children. Data was coded, entered and analyzed using Statistical Package for Social Sciences programme. Nutri Survey computer program was used to calculate anthropometric indices and for 24-hour recall analysis. The results of the study indicated a high morbidity burden of 69.2% among pre school children. The findings further revealed a poor nutritional status of pre school children with 21%, 9% and 29.6% being underweight, wasted and stunted respectively. Dietary assessments disclosed that most of the children did not meet Recommended Dietary Allowance (RDA) for kilocalories, iron, calcium, vitamin A and vitamin C. However, RDA for proteins was fairly met. Some of the risk factors that were found to be associated with the morbidity status of pre school children included high prevalence of under nutrition, inadequate intake of vitamin C and A, discontinuation of growth monitoring once the children attained age of nine months, partial immunization, lack of access to safe drinking water, inadequate water for domestic use, inadequate sanitary facilities and lack of basic health care during illness. Ministry of Health should sensitize the caregivers of pre school children on health benefits of having the children fully immunized, seeking health care during illness, routine growth monitoring and treating drinking water. Awareness on affordable local foods rich in essential nutrients for pre school children should be done by health and nutritional professionals. Health care services should be made accessible by the government to the pre school children in the urban slums. The City Council of Nairobi should ensure provision of adequate water, healthy sanitation, drainage and proper waste disposal systems in the slums. The findings of this study provide useful information to the policy makers involved in child health programmes to formulate strategies that seek to address the problem of high child morbidity in the slums.
1.0 INTRODUCTION

1.1 Background Information

Pre school children are the most vulnerable populations, they face unusually high health risks as they grow. This is because their immune systems are still developing and they are completely reliant on others for their survival. The obstacles to optimal health are greatest for children born into poverty because they are most likely to be exposed to infectious disease and unclean water, and at the greatest risk of malnutrition (Lerey, 2002). Although infectious diseases are the major killers of children, malnutrition contributes to 60 percent of more than ten million child deaths each year (Lerey, 2002). In Kenya, the most important health problems among children are related to parasitic infection, low immunization rates, malnutrition, water and sanitation (Ministry of Health (MOH)/WHO, 2004).

The most vulnerable children are the one’s living in slums, this is according to a survey that was conducted by African Population and Health Research Centre (APHRC, 2002a) in Nairobi slum that show that Nairobi’s slum children have a greater risk of dying at younger ages than those from rural areas. It also revealed that informal settlements children have a 55% higher risk of dying before five years of age. The foregoing gives an indication that the disease burden in these areas is very high as compared to other parts. Nutritional status plays a vital role in deciding the health status particularly in children. This is because nutritional deficiencies lead to a wide range of childhood illnesses and consequently increased mortality (Pelletier et al, 1995). Nutrition plays a major role during the pre school period and it is critical for the optimal physical growth and
development and good health and as such it represents an important public health issue. Proper nutrition involves eating of foods that supply the correct quantity and quality of nutrients required by the body. These are proteins, carbohydrates, vitamins, fats and minerals. Water and roughage are also required to aid in digestion (Rofles and Whitney, 1993). Under nutrition remains a severe public health problem in many developing countries; 32 percent of children under five years are stunted (UNICEF, 2007). Food consumption pattern of a pre school child is significant to his or her nutritional status since it determines primarily all essential nutrients in the diet. Children need a diet that consists of a variety of foods which provide nutrients in the body that function in a number of ways to keep the body in a healthy state (Oniang’o et al, 1988).

A survey carried out among pre school children in Ghana revealed that the myriad nutritional problems associated with the area were as a result of poor diet quality coupled with inappropriate dietary intake. The diets of the children in the community had very little diversity, the food eaten were predominantly cereals and legumes with little or no intake at all of animal products (Klemesu et al., 1995). The quality of food and the amount of valuable micronutrients it supplies contribute to improved child health (Gopalan, 2000).

Pre-school children are most vulnerable group who are likely to suffer from malnutrition and infections since they need a great deal of nutrients mainly proteins and energy foods as they are growing at a very fast pace and they depend on others for food and they have a weak immune system respectively (Rofles and Whitney, 1993). Vitamins and minerals
are required for regulation of body processes and immunity. In events where quality and quantity of the daily diet is inadequate, the child will be unable to replenish body stores, thus growth and physical fitness will be affected (Poleman and Peckenpaugh, 1991). The outcome of under nutrition leads to reduced work performance, slowed growth and development, low immunity to disease and a lower cognitive ability and school performance. In Kenya, malnutrition is the most important public health and welfare problem among infants and young children as 30 percent are chronically malnourished, 20 percent are underweight and 6 percent are wasted (UNICEF, 2007). It is also, the most important cause of morbidity and mortality in children under five years (MOH, 2002). A study by Wang’ombe et al., (2005), in a Nairobi slum revealed that under nutrition is one of the major problems among pre school children in urban slums.

There are still other key issues facing children in Kenya besides adequate nutrition that have impact on health status, they include water and sanitation. These conditions determine the spread of communicable diseases among children in urban setting (MOH/WHO, 2004). Although significant progress has been made in recent decades, between 1 and 2 million children still die each year from diseases directly related to water and sanitation (Murray and Lopez, 1996). Children living in informal settlements are denied the right to adequate clean water and appropriate sanitation. Only 11% of the urban poor in Nairobi have access to piped water connection, 80% pay more for water than the middle and upper income classes and more than 56% do not have access to adequate sanitary facilities, whatever toilets available, they are inadequate with more than 150 persons per toilet (APHRC, 2002b). Moreover, drainage is poor and the few existing
are often blocked as they serve as dumping sites for solid waste including faecal matter. In addition, appropriate health seeking practices are crucial in determination of a child’s health status (UNICEF, 1998). These practices include immunization, growth monitoring and other care services for instance, seeking treatment during illness. Children of urban poor have less access to health care services, only 48% are fully immunized (APHRC, 2002b).

1.2 Statement of Problem

Despite numerous advances and improvements in child health globally, children living in slums are generally at a greater risk of morbidity and mortality than in other places. According to CBS (2003), the mortality of children under five years in Kenya continued to increase from 112 per 1000 in 1998 and 115 in 2003. The majority of these deaths result from acute respiratory infections, diarrhoea, measles, malaria and malnutrition or a combination of these conditions (CBS, 2003). Children living in slums are generally at greater risk of morbidity and mortality than in other places. A study by APHRC (2002a) in Nairobi revealed that the under five mortality rate in slums is 151 per 1000 live births which is 2.5 times higher than the average of the city. Malnutrition is the most important risk factor of mortality for a number of childhood illnesses (WHO, 2005). Nutrition plays a key function in determination of individual’s ability to overcome illness. In Kenya, malnutrition still remains a major public health problem among children under five years (MOH/WHO, 2004). Other factors such as water and sanitation, and access to health care services are key in determination of morbidity status of an individual. The high prevalence of common childhood illnesses is a critical issue for slum children. It is in
view of this that a research was carried out to determine risk factors associated with morbidity status of pre school children in Mukuru slums, Nairobi, Kenya.

1.3 Justification

Early health and nutrition influence the outcome in terms of childhood growth and development and disease in later life. Reducing the common childhood illnesses results to improved child health and sets foundation to life time wellbeing. Having a child who is sick repeatedly impacts on the parents in various ways: the parents spend money and time on treatment, mothers who work suspend the work to care for the sick child and diverting family resources to provide care to a sick child may have implications on the provision of other basic necessities such as food. In addition, improved health status of the pre school children can help in attainment of the millennium development goals especially the goal of reducing child mortality.

1.4 Research Questions

1) What are the morbidity patterns of pre-school children in Mukuru slums?
2) What is the nutritional status of pre school children in Mukuru slums?
3) What are the food consumption patterns of pre school children in Mukuru slums?
4) What is the relationship between nutritional factors, water and sanitation, and health care seeking practices and morbidity status of pre school children in Mukuru slums?
1.5 Hypothesis

There are no risk factors associated with morbidity status of pre school children in Mukuru slums.

1.6 Objectives of the Study

1.6.1 General objective

The general objective of the study was to establish risk factors associated with morbidity status of pre school children in Mukuru slums.

1.6.2 Specific objectives

1) To determine the morbidity patterns of pre school children in Mukuru slums.

2) To determine the nutritional status of pre school children in Mukuru slums.

3) To establish food consumption patterns of pre school children in Mukuru slums.

4) To examine the relationship between nutritional factors, water and sanitation, and health care seeking practices and morbidity status of pre school children in Mukuru slums.

1.7 Significance of the Study

It is envisaged that ultimately the findings of this study will provide useful information to the Ministry of Health, Non-governmental organizations and institutions involved in child health programmes to formulate strategies that aim to address the problem of high child morbidity in the slums.
1.8 Operational Framework

A number of factors influence the morbidity status of a pre school child for this reason an operational framework was developed for this study to give guidance (Figure 1.1). A slight change in the independent variables will subsequently lead to a change in the dependent variable which is the morbidity status of the child. For example, poor nutritional status will lead to increased risk of morbidity. Background variables also influence independent variable and consequently dependent variable. For instance, reduced income will lead to poor water and sanitation conditions (lack of enough money to access adequate and safe water) thus increased risk of morbidity. However, in this study, background variables were used to describe socio-economic as well as demographic factors of the study population.

<table>
<thead>
<tr>
<th>Background Variables</th>
<th>Independent Variables</th>
<th>Dependent Variables (Outcome)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio economic and demographic factors:</td>
<td>Nutritional factors:</td>
<td>Morbidity status</td>
</tr>
<tr>
<td>- Marital status</td>
<td>- Nutritional Status (Stunting, Wasting, Underweight, MUAC).</td>
<td></td>
</tr>
<tr>
<td>- Occupation</td>
<td>- Food consumption (Energy and nutrient adequacy of diets, Food frequency).</td>
<td></td>
</tr>
<tr>
<td>- Income</td>
<td>Water and sanitation:</td>
<td></td>
</tr>
<tr>
<td>- Source of cooking fuel</td>
<td>- Improved sanitation</td>
<td></td>
</tr>
<tr>
<td>- Education</td>
<td>- Water availability and treatment</td>
<td></td>
</tr>
<tr>
<td>- Number of household members</td>
<td>Health care seeking practices:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Immunization of children</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Growth monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Seeking treatment during illness</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1.1: Operational Framework
1.9 Operational Definitions of Terms

**Morbidity status:** Assessed by the reported prevalence of morbidity symptoms such as fever, cough/colds, difficult in breathing and diarrhoea in the two weeks prior the study. It is also a measure of health status.

**Diarrhoea:** Three or more liquid or semi liquid stools per day.

**Pre school child:** A child between two and five years.

**Nutritional status:** State of health as a result of the quality and quantity of food consumed. That is stunting, wasting and underweight.

**Food consumption patterns:** Types of foods eaten and the quality and quantity of foods consumed over a period of time.

**Risk factor:** Anything that increases the likelihood of developing a disease. For this study, refers to nutritional factors, environmental factors and health care seeking practices.

**Health care seeking practices:** Attempt made by the mother to obtain treatment from a health provider outside home during illness and also to take the child for regular growth monitoring and immunizations.
2. LITERATURE REVIEW

2.1 Global Nutritional Status of Children

Worldwide, the percentage of under fives suffering from wasting, stunting and underweight are 11%, 31% and 25% respectively (UNICEF, 2007). According to UNICEF, (2007), in developing countries, children under five years who are underweight, wasted and underweight are 26%, 11% and 31% correspondingly. Two thirds of all malnourished children in the world live in Asia and another one fourth live in Africa. In sub-Saharan Africa, 38 percent of children under five years are stunted. The worsening of the underweight situation is in sub-Saharan Africa; Eastern Africa is the sub region experiencing the largest increase in prevalence and number of underweight children. Northern Africa is the sub region where the number of underweight children is decreasing (ACC/SCN, 2004). In Kenya, Children under age of five years, who are stunted, wasted and underweight, are 30%, 6% and 20% respectively (UNICEF 2007). In urban areas, particularly among the poor, PEM continues to be among the most prevalent form of malnutrition (Wang’ombe et al., 2005).

2.2 Nutritional Requirements of a Preschooler

The goal of good nutrition in the early years is for normal physical growth development and to promote good health therefore children nutritional needs should be meet. Appropriate quality and quantity of foods are essential components of optimal nutrition for children hence health. Basic nutritional needs of children are similar to the nutritional needs of other family members; however amounts needed differ because of age (Rofles and Whitney, 1993). It is therefore vital that a child is given foods from four main food
groups on a daily basis: bread, cereals, rice, pasta; vegetables and fruits; milk, yoghurt and cheese; and meat, poultry, fish, dry beans and peas and eggs (Hashim, 2003). It is at pre school period that nutrient requirements are relatively high for growth and development, to regulate body processes and to combat infections.

Specific nutrients need emphasis during this period, these are proteins, energy, minerals and vitamins such as vitamin A, C, iron, calcium, Zinc (Corinne, 1986). Additionally, Fibre and water are needed as they play a role in digestion by moving food down the digestive tract and prevention of constipation and for regulation of body functions respectively. Fat is also necessary in a child’s diet since it provides extra calories and needed nutrients (Rofles and Whitney, 1993).

Protein is essential to provide building material for tissue growth and other components of the body. Animal protein is better than plant protein because it is easily digested, is used better and performs their main function in more effective way. In developing countries, there is little access to animal protein because they tend to be expensive (Onian’go, 1988). The sources of protein include: milk, meat, fish, poultry, egg, cheese, dry beans, peas, nuts and legumes.

Energy requirements increase rapidly because they are growing quickly and becoming more active. To achieve this energy intake in younger children, foods which are high in energy ought to be eaten in little and frequent meals because they do not have enough stomachs to cope with large meals (Poleman and Peckenpaugh, 1991). The sources of
energy giving food include: cereals: - millet, sorghum, maize, rice, wheat; roots and tubers: - cassava, potatoes, yams, arrowroots; fruits: - bananas, pumpkins; sugar-refined, brown sugar and honey. Minerals and vitamins are required to regulate body activities and for prevention from any form of infection. Pre school children are at a stage where they are prone to infections as they explore the environment a lot and at the same time their immunity that they had acquired earlier from their mothers is diminishing and consequently need to develop it again (Hashim, 2003).

According to Oniang’o et al (1988), it is difficult for a prescholer to eat enough in three meals to provide the nutrients and calories they need. In addition, the stomach is too small to take in all that is required unless he or she feeds more than three times a day. Therefore it is important that a nutritious and energy giving snack is offered between meals to provide the extra calories and nutrients needed in the body. Some of the nutritious snack foods include dry cereals with milk, vegetable sandwiches, fruit and vegetables juices, yoghurt, chapatti, mandazi, porridge, bread, boiled egg, cassava or sweet potatoes and any left over food from the family pot.

2.3 Nutrition and Health.

Nutrition is equally critical for child health and survival. One of the eight essential elements of primary health care is the promotion of adequate nutritional states (Nan, 1991). Good nutrition is necessary for body growth, for maintaining or restoring health and for the brain’s and nervous system’s growth and functioning. Inadequate nutrition has significant consequences as malnourished children have lowered resistance to
infection, they are likely to die from common childhood ailments like diarrhoeal diseases and respiratory infections and those who survive, frequent illness saps their nutritional status, locking them into a vicious cycle of recurring sickness and faltering growth (Beaton et al, 1990). Three quarters of the children who die from causes related to malnutrition are mildly or moderately undernourished, showing no outward sign of their vulnerability (UNICEF, 2006). Under nutrition affects both the body's immunological and non immunological defences thus increase the incidence, severity and duration of common childhood disease such as diarrhoea, acute respiratory infections and measles. A study by Wang'ombe et al., (2005) among children under five years in an urban slum of Nairobi showed some relationship between children nutritional status and morbidity.

2.4 Global Burden of Childhood Illnesses

Childhood illnesses especially that afflict children under five years of age comprise about 29 percent of the global burden of disease (Black et al, 2003). Acute respiratory tract infections (mainly pneumonia), diarrhoea, malaria, measles and malnutrition, together with problems and infections arising at birth or in the first weeks of life, are the main causes of death in children under five years of age (WHO, 2005). In Sub Saharan countries, the major causes of morbidity amongst children under five years have been documented as acute respiratory infections and diarrhoea (UNICEF, 2006). In Kenya, the major causes of morbidity and mortality in children under the age of five years are malaria, acute respiratory infections, diarrhoea, measles, malnutrition, skin infections and intestinal worms. They contribute to over 70% of the deaths in this age group and up to 60% of the under fives dying of the above diseases are usually malnourished
(MOH/WHO, 2004). In addition, results from CBS (2003), revealed that coughs, fever and diarrhoea are the most common causes of child morbidity in Kenya. A study conducted by APHRC (2002a) in Kenya, revealed that morbidity risks for all major childhood illnesses are higher for slum children compared to elsewhere in the country.

2.5 Water and Sanitation

Water and sanitation is one of the primary drivers of public health. Water and sanitation access and equity are very important issues in ensuring children’s quality of life (UNICEF, 1998). Child mortality and morbidity have been associated with poor water quantity and quality and lack of sanitation (USAID, 2004). Globally, 88% of diarrhoeal diseases are attributed to unsafe water supply and inadequate sanitation (WHO, 2004). Water and sanitation improvements have significant effects in populations and health by reducing a variety of disease condition and in turn lead to reduced morbidity and mortality and improved nutritional status. Improved water supply reduces diarrhoea morbidity by 21% and improved sanitation reduces diarrhoea by 37.5% (WHO, 2004). Increasing the quantities of water allows better hygiene practices and raising the quality of drinking water reduces the ingestion of pathogens (Swindale et al, 1999). Lack of access to adequate water contributes to deaths and illness, especially in children. Thus, the improvement of access to water is a crucial element in the reduction of under-five mortality and morbidity, particularly in poor urban areas (UNICEF, 2006).

The most important source of water contamination in developing countries is human faeces, due to the lack of adequate sanitation facilities. Today, about 2.4 billion people do not have access to even a simple latrine. Children face dangerous health risks when they
come into contact with contaminated water through washing, bathing or drinking. Unsanitary conditions and practices at the household level, such as absence of sanitary latrines, unsafe waste disposal and unhygienic behaviour in childcare and food preparation, create a dangerous environment with health risks to children (UNEP, 2002)

Contaminated water contributes to outbreaks of disease but too little water makes it difficult to maintain the sanitary conditions that prevent contamination and which are essential for controlling the endemic disease that contributes so heavily to repeated illness and death in many children (Esrey et al, 1991)). For instance, results from a study carried out in rural Bangladesh and Niger showed that faecal contamination leading to diarrhoeal disease is highly correlated to dirty hands a good indicator of accessibility of water supplies than the quality (Henry and Rahim, 1990).

Adequate access to clean water and adequate sanitation facilities for all people irrespective of their living conditions leads to an environment free of diseases.

2.6 Health Care Seeking Practices

2.6.1 Immunization

Each year, 1.7 million children die from diseases that could have been prevented with readily available vaccines. Children who are immunized are protected from the dangerous diseases, which often lead to disability or death (UNICEF, 2002). The main objective of immunization is to produce a specific immunological defence against infection without significant risks to the recipient and thus reduce morbidity and mortality caused by
immunizable disease (KEPI, 1990). Immunizations are available against several childhood illnesses these are: Diphtheria, Pertusis, Tetanus, Poliomyelitis, Measles, Hepatitis B and Haemophilus influenza type b (can cause meningitis and pneumonia). High immunization coverage against childhood diseases has been reported to be a safeguard for better nutrition and health (Devi and Geervan, 1994). However, a study by APHRC (2002a) in informal settlements of Nairobi revealed that less than half of the children in the slums are fully immunized and it has lead to a high prevalence of common childhood illnesses in these areas.

2.6.2 Growth Monitoring

Growth monitoring is a regular measuring, plotting and interpretation of a child’s growth in order to counsel or take action when abnormal growth is detected with the aim of improving the child’s health. Growth monitoring is crucial as they help unearth health and nutrition problems for timely intervention. Growth monitoring and promotion is one of the most useful tools available in infant and young child health, because it provides quick and easy information to detect disease early and to monitor the nutritional status of the child. Unfortunately, caregivers of infants and young children often show a lack of correct knowledge and incorrect practices around growth monitoring and promotion. The result is the late detection of disease and malnutrition thus impacting negatively on the health and welfare of the infant and young child.

Growth monitoring services in Kenya is integrated with immunization services at the child welfare clinics. At the child welfare clinic, the child is usually weighed and the
weight plotted on the growth chart (Road to Health card). The growth curved is then discussed with the mother and counselling is given. If the child shows growth faltering, the child is referred to a physician (Lufti, 1992). Growth faltering in children is a warning sign of health and/or nutritional problems. Growth monitoring should continue until the child is five years of age (Vaughan et al, 1997). However, most mothers or caregivers discontinue taking the children for growth monitoring immediately after the measles vaccine thus opportunities for monitoring is lost, whilst it is at this stage that malnutrition is at its pick (Rhodes, 1988).

2.6.3 Health care seeking during illness

It refers to action taken when dealing with an illness. The practice of appropriate health seeking has a great potential to reduce the occurrence of severe and life-threatening child illnesses (Taffa et al, 2005). Though excess child morbidity and mortality in the slums is mostly a result of constant exposure to infections, it is as well affected by the health seeking behaviours (Timus and Lush, 1995). Such associations between behaviour and health outcome enhance the viability of reducing the occurrence of life threatening diseases through improved child care practices even among the urban poor (Taffa et al, 2005). In Kenya, the results of a study by APHRC indicated that children in the slum have less access to the health care during illness (APHRC, 2002b). Health care seeking during illness in both urban and rural communities is influenced by lack of access to and high cost of health care (Thind and Cruz, 2003). In addition perceived illness severity, maternal recognition on certain signs and symptoms of child illness and proximity to the
health facility have been cited as a critical factors in determining health care seeking behaviour (Mbagaya et al, 2005).

A study by Mbagaya et al, (2005) that was carried out in Western Kenya among children under five years revealed that the decision to seek help was often precipitated by the impairment of the child’s daily activities or fear of severity. Evidence from Demographic and Health Surveys show that the urban poor in sub-Saharan Africa have less access to health services and consequently exhibit higher mortality rates (Caldwell and Caldwell, 2002). Due to poor access to public health facilities, expensive private for profit facilities that operate informally using untrained professionals serve as alternative sources of health care services in informal settlements leading to unfair share of morbidity and mortality from largely preventable causes (APHRC, 2002b).
3. MATERIALS AND METHODS

3.1 Study Area.

The study was carried out in Mukuru slum, Nairobi, Kenya (Appendix 2). The choice to carry out research in Mukuru was arrived at from observation of high morbidity among children in the area. Mukuru slum is situated along the Ngong River to the East and Nairobi’s industrial area to the North. It is divided into four parts namely: Mukuru Kaiyaba, Mukuru Kwa Njenga, Mukuru Nyayo and Mukuru Kwa Reuben which are spread out along Ngong River. The settlements are temporary or semi permanent and are subjected to continual demolition either by the civil authorities or when there is security tenure by the owners. The area is conspicuously cosmopolitan due to the presence of many people with diverse socio economic and cultural as well as religious background. Mukuru Nyayo which was conveniently chosen for the study is made up of eight villages namely: Mariguini, Kisii, Kisii site, Hazina, Hazina market, Maasai, Fuata Nyayo and Shimo la Tewa.

3.2 Study Design

A cross sectional study design was used for this study. A cross sectional study was suitable because the study covered a large area and the data was being collected at one point in time.

3.3 Study Population

The study population consisted of pre school children aged between 2 to 5 years who had lived in Mukuru slums for a minimum period of one year. This age group was used since they are the most vulnerable populations in the society and thus face usually high health
risks as they grow and are completely reliant on others for their survival. Mothers of the pre school children were respondents.

3.3.1 Inclusion Criteria

i. Pre school children who were in the age bracket (2-5) years.

ii. Pre school children’s caregivers who were willing to participate in the study.

3.3.2 Exclusion Criteria

i. Pre school children who were not in the age bracket (2-5) years.

ii. Pre school children’s caregivers who were not willing to participate in the study.

3.4 Sampling Procedure

Mukuru Nyayo was conveniently chosen from the four parts that make up Mukuru slum. The interest of doing research in Mukuru Nyayo was developed due to the problem of high morbidity as observed by the researcher during field practicum in a clinic located within the slum. Simple random sampling was employed to obtain four villages to be included in the study from a list of eight villages of Mukuru Nyayo and also to choose the pre school children from a sampling frame that constituted a list of households generated for the study with children aged 2-5 years of each village. Proportionate sampling technique was used to determine the respective number of households to be sampled from each village. For each selected household, a pre school child and the mother was purposively sampled. In cases where a household was having more than one child aged between 2-5 years, the youngest was chosen because he or she is the most vulnerable.
3.5 Sample Size Determination

The total sample size was determined by use of Fisher et al. (1998) formula recommended by Mugenda and Mugenda (1999) as effective for social sciences. Where; \( N \) = the desired sample size for target population > 10,000, \( Z \) = normal standard deviation corresponding to 95% confidence interval, that is 1.96, \( P \) = Proportion of the population estimated to have desired characteristics, in this case two week morbidity of children under five years was used. Therefore, the proportion of children under five years that were ill in a study done by APHRC (2002a), in Nairobi slums which was 68 % was used, \( q = 1 - p \) (1-0.68=0.32), \( d \) = degrees of accuracy desired (0.05), \( D \) = design effect (1), hence;

\[
N = \frac{Z^2 P q D}{d^2}
\]

Calculation: \( (1.96^2 \times 0.68 \times 0.32 \times 1) / 0.05^2 = 334 \) pre school children.

Table 3.1: Proportionate sampling

<table>
<thead>
<tr>
<th>Sampled village</th>
<th>Number of households with children between 2-5 years</th>
<th>No. of sampled households with children between 2-5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuata nyayo</td>
<td>1875</td>
<td>165</td>
</tr>
<tr>
<td>Masaai</td>
<td>561</td>
<td>50</td>
</tr>
<tr>
<td>Hazina</td>
<td>600</td>
<td>53</td>
</tr>
<tr>
<td>Mariguini</td>
<td>750</td>
<td>66</td>
</tr>
<tr>
<td>Total</td>
<td>3786</td>
<td>334</td>
</tr>
</tbody>
</table>
3.6 Data Collection

This study utilized two data collection procedures, standardized, piloted questionnaires (Appendix 1) and anthropometric data which complemented each other. A community health worker with a form four level of education was recruited as a research assistant.

3.6.1 Maternal Questionnaire

The questionnaire was administered to the selected mothers of pre school children. The questionnaires were interviewer administered and were conducted in a language best understood by both researcher and participants. The items in the questionnaire were based on the objectives and purpose of the study. The instrument consisted of demographic and socioeconomic information, health and sanitation information and a food frequency questionnaire and a 24-hour recall, to describe patterns of food consumption of the selected child.

3.6.2 Children’s Anthropometric Data Form

Anthropometric data which included weight, height and age and Middle upper arm circumference (MUAC) were collected to determine the nutritional status of the preschool children. These four variables were developed into indices of nutritional status. The instrument was attached to the questionnaire. The researcher filled in the anthropometric data of the child after weighing, measuring the height and MUAC as well as verifying his or her age. The sex of the child was also indicated.
3.6.2.1 Weight

A bathroom weighing salter scale was used to obtain weight measurement. Two readings were taken to the nearest 0.1 kg for each child, shouting loudly and the average recorded on the questionnaire. The child stood on the centre of the scale with minimum clothing and without shoes and socks. The bathroom scale was pre-set on the zero mark before each child was measured and the child was asked to stand upright on the balance without any support.

3.6.2.2 Height

Height measurements were taken using a standardized height board with an adjustable head piece. The children were asked to remove shoes and stand on the board with their backs on to the measuring board with their feet together and legs straight. Additionally, they were asked to stand upright and look straight ahead. The headboard was lowered gently, crushing the hair and making contact with the top of the head. Two readings were taken to the nearest 0.1 cm and the average recorded.

3.6.2.3 MUAC

MUAC measurements were taken using a MUAC tape on the left arm. The tip of the shoulder and the tip of the elbow of the child were located. The child was asked to bend the arm at the elbow to make a right angle then the tape was placed at the tip of the shoulder and pulled down to the tip of the elbow. The total measurement was divided by two to get the mid point which was subsequently marked. The arm was gently
straightened and the measuring tape was wrapped around the marked mid point. Two measurements were taken to the nearest 0.1 cm and an average computed for each child.

3.6.2.4 Age
Mothers were asked to recall the date of birth of their children. The same was also confirmed from the child’s clinic card. Local events calendar was used in cases where mothers were not able to recall the date of birth.

3.6.3 Anthropometry Indices
Child growth is internationally recognized as an important public health indicator for monitoring nutritional status and health in populations. Growth assessment is the single measurement that best defines the health and nutritional status of children, because disturbances in health and nutrition, regardless of their aetiology, invariably affect child growth (Cogil, 2003). The most commonly used anthropometric indexes for assessing child growth are weight-for-height (wasting), height-for-age (stunting) and weight-for-age (underweight). They are calculated from the age, height and weight data are weight-for-height, height-for-age and weight-for-age. These measures are expressed in the form of Z-scores, which compare a child's weight and height with those of a similar child from a reference healthy population. Middle upper arm circumference is also used in assessing child growth.
3.6.3.1 Underweight

It is influenced by the height and weight and is thus a composite measure of stunting and wasting. It reflects the long term nutrition and health experience of an individual in absence of wasting and stunting. Underweight is defined as low weight for age at < -2 standard deviations of the median value of the NCHS/WHO international growth references (ACC/SCN, 2000).

3.6.3.2 Stunting

Stunting is an indicator of past growth failure. It is associated with a number of long-term factors including chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices and poverty. Stunting is defined as low height for age at < -2 standard deviations of the median value of the NCHS/WHO international growth references. Severe stunting is defined as < -3 standard deviations (ACC/SCN, 2000).

3.6.3.3 Wasting

Wasting is the result of a weight falling significantly below the weight expected of a child of the same length or height. Wasting indicates current or acute malnutrition resulting from failure to gain weight or actual weight loss. Causes include inadequate food intake, incorrect feeding practices, disease, and infection or, more frequently, a combination of these factors. Wasting is defined as low weight for height at < -2 standard
deviations of the median value of the NCHS/WHO international growth references. Severe wasting is defined as $<-3$ standard deviations (ACC/SCN, 2000).

3.6.3.4 Mid- Upper Arm Circumference (MUAC)

It is relatively easy to measure and a good predictor of immediate risk of death. It is used for rapid screening of acute malnutrition from the 6-59 month age range. A cut-off of 11.0 cm can be used for screening severely malnourished children. Those children with MUAC below 12.5 cm are classified as moderate and severe (Cogil, 2003). Mid-upper arm circumference (MUAC) as a measure of nutritional status ought to be used with caution since it is not sensitive enough to detect all cases of malnutrition.

3.6.4 Secondary Data Sources

Review of admission records, immunization cards and child health cards was carried out to obtain information on the children’s ages and to complement health information given by mothers on immunization, growth monitoring and morbidity.

3.7 Data Quality Control

Data validity and reliability was achieved through pre-testing of the data collection instruments before the actual study in a population very similar to the one used in the actual study, training and close supervision of enumerator by the principal investigator, calibration of anthropometric instruments before each measurement was taken, calibration of the household food measures to quantify amounts of food consumed and data cleaning. Pre-testing the instruments enhanced clarity and flow of the items.
Additionally, communication problems for confusing questions were noted and questions corrected or rephrased.

3.8 Ethical Consideration

Prior to the study, clearance was sought from Kenyatta University Graduate School and Ministry of Education, Science and Technology. Informed consent was sought from the subjects and confidentiality was maintained on all the information and data collected.

3.9 Data Management and Analysis

Data from the study was coded, entered and analysed using SPSS programme. Where, Descriptive statistics: frequencies and percentages were used to describe data. Bar charts, tables and pie charts were used to present data. Chi-square was used to establish the relationship between independent and dependent variables. Nutri Survey computer program was used to calculate anthropometric indices as weight for age, height for age, weight for height and MUAC using the growth reference curves developed by the National Centre for Health Statistics. The children were classified as normal or malnourished with -2SD Z scores being used as the cut off points. The pre school children who fell below minus two standard deviation (≤-2SD) of weight for age, weight for height and height for age were considered to be underweight, wasting and stunting respectively, and those above minus two standard deviation (≥-2SD) were considered nourished. The Z scores were transferred into SPSS for further analysis.
MUAC measurements were also used to classify children into categories of nutritional status. The children were classified as normal or malnourished with 12.5 cm being used as the cut off point, for those who had MUAC measurements below 12.5 cm were classified as malnourished while those who had MUAC measurements above 12.5 were classified as normal. MUAC is only recommended for use with children between one and five years of age. This is because children grow a lot during this age and the size of their upper arm changes very little thus change in size of a child’s upper arm is due to change in his or her nutritional status.

Additionally, Nutri Survey was used to analyse 24-hour recall to determine kilocalorie, micro and macro nutrient intake of the selected preschool children. To assess the pattern of food intake, the intake of food items in one week was categorized into never in a week, once a week, 2 to 3 times in a week and 4 to 7 times in a week. The consumption of food items was classified into four groups depending on the number of times consumed in a week. The consumption of a food item at least 4 to 7 times a week was considered high consumption, 2 to 3 times a week was considered moderate, once a week was considered low and never in a week was considered very low consumption of the food item.
4. RESULTS, INTERPRETATIONS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of the study as well as discussion. The results of each of the four objectives are presented under the following headings: characteristics of study population, morbidity patterns of pre school children, nutritional status of pre school children, dietary intake of preschool children, relationship between nutritional factors and morbidity status of pre school children, relationship between health care seeking practices and morbidity status of pre school children and relationship between water and sanitation, and diarrhoea morbidity among pre school children.

4.2 Characteristics of Study Population

Most of the mothers were married (89.2%) and only a few were single (6.9%). The rest were either separated or widowed. Majority of the mothers were housewives (68.9%), 22.2% were self employed and 8.9% were employed. A greater number of mothers (58.7%) had primary level of education, 37.5% had secondary level of education and 3.9% had no education. Most households had less than five members (56.3%) while 43.7% had more than six members. Over half of the households (55.4%) had a monthly income between 2501 and 5000Kshs, 38% had between 1000 and 2500Kshs and 6.6% had above 5000Kshs. On food expenditure, 48.8% spent between 1001 and 2500Kshs on food per month, 48.2% spent less than 1000, 2.7% spent between 2501 and 5000 and 0.3% spent above 5000. The main source of cooking fuel in the selected households was kerosene 85.6%, charcoal 13.8% and others used fuel 0.6% for instance firewood.
The table below outlines socio-demographic characteristics of pre school children in Mukuru slums.

Table 4.1: Sociodemographic Characteristics of Pre School Children in Mukuru Slums

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Proportions in percentage (n=334)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital status</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>6.9</td>
</tr>
<tr>
<td>Married</td>
<td>89.2</td>
</tr>
<tr>
<td>Divorced</td>
<td>3.3</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.6</td>
</tr>
<tr>
<td>Level of education of the mother</td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>3.9</td>
</tr>
<tr>
<td>Primary</td>
<td>58.7</td>
</tr>
<tr>
<td>Secondary</td>
<td>37.4</td>
</tr>
<tr>
<td>Total monthly income</td>
<td></td>
</tr>
<tr>
<td>1000-2500</td>
<td>38.0</td>
</tr>
<tr>
<td>2501-5000</td>
<td>55.4</td>
</tr>
<tr>
<td>Above 5000</td>
<td>6.6</td>
</tr>
<tr>
<td>Occupation of the mother</td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>8.9</td>
</tr>
<tr>
<td>Self employed</td>
<td>22.2</td>
</tr>
<tr>
<td>Unemployed</td>
<td>68.9</td>
</tr>
<tr>
<td>Occupation of the father</td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>76.3</td>
</tr>
<tr>
<td>Self employed</td>
<td>10.2</td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.6</td>
</tr>
<tr>
<td>Not applicable</td>
<td>12.9</td>
</tr>
</tbody>
</table>

A total of 334 pre school children aged between 2-5 years were selected for the study.

The majority of the pre school children were male (52.4%) while female were 47.6%. Pre school children aged 24 to 29 months accounted for 20.4%, 30 to 35 months accounted for 14.7%, 36 to 41 months accounted for 23.7%, 42 to 47 accounted for 9.9%, 48 to 53 accounted for 13.5% and 54 to 59 accounted for 18%.
4.3 Morbidity Patterns of Pre School Children

Morbidity was assessed through two week prevalence of ill health prior the study. Figure 4.1 illustrates the percentage of pre school children who got ill two weeks prior the study. The majority of the pre school children (69.2%) were reported to have been ill in two weeks preceding the study in Mukuru slums. The results of this study reported slightly a higher percentage of children who were ill two weeks prior the study than in a study carried out by APHRC (2002a), in the slums of Nairobi which was 68%. Figure 4.2 presents the prevalence of reported morbidity symptoms in the previous two weeks to the study among pre school children aged 2 to 5 years. Cough/cold and diarrhoea were the very commonly reported symptoms with a prevalence of 47.3% and 13.2% respectively. The results of the study on morbidity patterns of pre school children concurred with the findings of a study by Taffa et al, (2005), which revealed that coughs and colds, fever, diarrhoea, skin problems and eye disease made up the top five causes of morbidity in the slums of Nairobi. Also, results from CBS (2003), pointed out that coughs, fever and diarrhoea are among the most common symptoms associated with fatal episodes of infectious diseases in Kenya. A serious cough might indicate an acute respiratory illness while malaria and common childhood infections are usually accompanied by fever. According to Ministry of Health (MOH) reports the major causes of morbidity and mortality in children under the age of five years are malaria, acute respiratory infections, diarrhoea, measles, malnutrition, skin infections and intestinal worms (MOH/WHO, 2004).
Figure 4.1: Percentage of preschool children who got sick two weeks prior the study

Figure 4.2: Prevalence of reported illnesses in two weeks prior the study among preschool children in Mukuru slums.
Table 4.2 shows the percentage of pre school children who got sick two weeks to the study by age brackets. The findings of the study indicated that most of the preschool children (18%) who got ill two weeks to study were in age group 36-41 months followed by age group 24-29 months. This gives an indication that this age group is most vulnerable to infections. Their vulnerability could be due to their poor nutritional status as revealed by the nutritional assessment results reported latter in this study. This information is useful for intervention programmes addressing issues of child health in this area.

Table 4.2: Distribution of pre school children who got sick two weeks prior the study by age in months in Mukuru slums

<table>
<thead>
<tr>
<th>Morbidity status of the pre school children two weeks prior the study</th>
<th>Percentage of pre school children in age in months n=334</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24-29</td>
</tr>
<tr>
<td>Got sick</td>
<td>14</td>
</tr>
<tr>
<td>Did not get sick</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 4.3 presents percentage of pre school children who got sick two weeks prior the study by gender. The results of the study further revealed that male children (boys) formed a high proportion of children who got sick two weeks prior the study than their female (girls) counterparts. This fact could be explained by their nature of being more mobile and more likely to explore the environment and in so doing, they may be attracted to play in standing water or drainage ditches or rummage around in piles of garbage.
Table 4.3: Distribution of pre school children who got sick two weeks prior the study by gender in Mukuru slums

<table>
<thead>
<tr>
<th>Morbidity status of the pre school children two weeks prior the study</th>
<th>Percentage of pre school children by Sex (n=334)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Got sick</td>
<td>37</td>
</tr>
<tr>
<td>Did not get sick</td>
<td>15</td>
</tr>
</tbody>
</table>

4.4 Nutritional Status of pre school children in Mukuru slums

4.4.1 Underweight (WAZ)
Underweight is manifested by a deficit in total body mass than the expected for age. Analysis of anthropometric data results indicated that 21% preschool children were underweight. The level of underweight of the pre school in Mukuru slum is comparable to the Kenyan national figure of 20% and lower than the global figure of 25% among under fives (UNICEF, 2007).

4.4.2 Wasting (WHZ)
Wasting reflects the body weight relative to height and refers to low weight for height. The findings of the study showed that 9% were wasted. The results of the study regarding wasting were higher than the nationwide figure of Kenya which stands at 6% among children under five years (CBS, 2003). The results were also comparable to the global number of 11% among under fives (UNICEF, 2007).

4.4.3 Stunting (HAZ)
Stunting is shortness in height which refers to low height for age and may reflect variation in growth or deficit in growth. Results of the study indicated that 29.6% under
study were stunted. The outcome of the study showed similar figure of stunting than the national (30%) and global figure which stands at 31% among children under five years (UNICEF, 2007).

4.4.4 Middle Upper Arm Circumference (MUAC)

MUAC is a good predictor of immediate risk of death and is used for rapid screening of acute malnutrition for children between 6-59 months. Using mid upper arm circumference (MUAC) measurements for children aged 24-59 months, 6.6% of the pre school children were malnourished (MUAC<12.5 cm) and about 93.4% were normal (MUAC>12.5 cm). The findings of the study revealed a high proportion of pre school children who were malnourished as per MUAC than a study done by Waudo et al, (2005) in wetlands of Lake Victoria basin which was 5.3%. Results of the nutritional status by mid-upper arm circumference (MUAC) showed a small percentage of children being malnourished as compared to other indicators of nutritional status that showed a larger percentage of children being malnourished. MUAC should therefore be used with caution since it is not sensitive enough to detect all cases of malnutrition. It is potentially suited for screening admissions to feeding centres during emergencies although can be used as substitute to identify children who are at risk of dying (Cogil, 2003). This could be the reason why most of the nutritional surveys carried among under fives have not utilized this indicator for example, Kenya Demographic and Health Survey and African Population and Health Research Centre surveys.
Generally, on the contrary to an earlier study conducted in Central Plateau of Haiti among under fives that indicated that the percentage of stunted and wasted children being 23% and 5% respectively, the current study found that a higher percentage of the pre school children were stunted (29.6%) and wasted (9%) respectively. However, the percentage of pre school children who were underweight tallied at 21% from both studies (AED, 2003). The inadequate intake of macronutrients mainly energy and micronutrients such as calcium, iron and vitamin A as reported latter in this study could be the reason of the high prevalence of stunting, underweight and wasting among pre school children. It is at the pre school period that the children are growing quickly and are more active thus need high energy intake to replenish body stores. Micronutrients are also required to regulate body activities, promote child development and prevent any form of infection which may eventually lead to malnutrition.

4.4.5 Nutritional Status of the Children by Age

As regards to the age bracket that was mostly hit by malnutrition, the results of the study found out that children in age bracket 36-41 months were the mostly underweight and was closely followed by the children in age group 24-29 months while the children in age group 24-29 months were the most wasted followed by age group 36-41 months. The study further showed that children in age group 36-41 months were mostly stunted. Age group 36-41 months was also found to be the most malnourished as per the MUAC cut off points for under fives (Table 4.4). The results of the study therefore give an indication that it is at this age bracket (36-41 months) that the pre school children are vulnerable to malnutrition. This could be explained by the fact that there could be a younger child in
the family thus all the attention is shifted to the younger sibling leading to neglect of the preschooler and also high prevalence of morbidity symptoms among children of this age group as reported earlier in the study.

Table 4.4: Nutritional status of pre school children by age

<table>
<thead>
<tr>
<th>State of nutritional status</th>
<th>Percentage of pre school children in age in months (n=334)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24-29</td>
</tr>
<tr>
<td>Underweight</td>
<td>5</td>
</tr>
<tr>
<td>Wasting</td>
<td>3</td>
</tr>
<tr>
<td>Stunting</td>
<td>4</td>
</tr>
<tr>
<td>Malnourished by MUAC</td>
<td>2</td>
</tr>
</tbody>
</table>

4.4.6 Nutritional Status of the Pre School Children by Gender

A total of 334 pre school children were selected to participate in the study. The findings of the study showed that male children were the most underweight while the females were the most stunted, wasted and malnourished regarding MUAC cut off points (Table 4.5). The high percentage of underweight male children could be explained by the fact that a high proportion of pre school children who got sick two weeks prior the study were male. Sickness results to loss of appetite thus reduced intake of nutrients and malabsorption of nutrients leading to under nutrition. On the other hand, the high proportion female pre school children who were stunted, wasted and malnourished as per MUAC could be due to the high priority given to males over females regarding access to nutritious food in many African cultures.

Table 4.5: Nutritional status of the preschool children by gender

<table>
<thead>
<tr>
<th>Sex</th>
<th>Proportions in percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Underweight</td>
</tr>
<tr>
<td>Male</td>
<td>12.6</td>
</tr>
<tr>
<td>Female</td>
<td>8.4</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
</tr>
</tbody>
</table>
4.5 Dietary intake of preschool children in Mukuru slums

4.5.1 Food Consumption Patterns of Preschool Children

A food frequency questionnaire was administered to the mothers of preschool children to determine the foods consumed by the preschool children and the rate at which they were consumed.

Table 4.6: Percentage distribution of preschool children weekly frequency of consumption of food in Mukuru slums

<table>
<thead>
<tr>
<th>Food item</th>
<th>Frequency of consumption for week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 - 7 times (High)</td>
</tr>
<tr>
<td>Ugali</td>
<td>79.0</td>
</tr>
<tr>
<td>Rice</td>
<td>68.1</td>
</tr>
<tr>
<td>Potatoes</td>
<td>41.9</td>
</tr>
<tr>
<td>Beans</td>
<td>4.5</td>
</tr>
<tr>
<td>Peas</td>
<td>1.2</td>
</tr>
<tr>
<td>Green grams</td>
<td>2.1</td>
</tr>
<tr>
<td>Beef</td>
<td>6.6</td>
</tr>
<tr>
<td>Liver</td>
<td>1.2</td>
</tr>
<tr>
<td>Fish</td>
<td>6.4</td>
</tr>
<tr>
<td>Eggs</td>
<td>5.8</td>
</tr>
<tr>
<td>Kales</td>
<td>85.6</td>
</tr>
<tr>
<td>Traditional</td>
<td>10.5</td>
</tr>
<tr>
<td>vegetables</td>
<td></td>
</tr>
<tr>
<td>Cabbages</td>
<td>69.0</td>
</tr>
<tr>
<td>Ripe bananas</td>
<td>21.1</td>
</tr>
<tr>
<td>Oranges</td>
<td>19.8</td>
</tr>
<tr>
<td>Avocados</td>
<td>26.0</td>
</tr>
<tr>
<td>Tea with milk</td>
<td>87.1</td>
</tr>
<tr>
<td>Milk</td>
<td>62.3</td>
</tr>
<tr>
<td>Porridge</td>
<td>75.7</td>
</tr>
</tbody>
</table>

4.5.1.1 Consumption of carbohydrates

Carbohydrates are the major sources of calories in the diet. The results indicate that ugali (maize flour) was the mainly consumed food item by the preschool children. This could
be explained by the fact that maize is a staple food in Kenya. Ugali, rice and porridge were highly consumed in 4-7 times a week by 79%, 68.1% and 75.7% respectively while potatoes showed a high consumption in 2-3 times a week by 44%. These findings concur with findings by Waudo et al, (2005) who reported the similar patterns in a study conducted in wetlands of Lake Victoria basin.

4.5.1.2 Consumption of Proteins

Protein is essential to provide building material for tissue growth and other components of the body. A variety of both animal and plant protein foods were consumed by the children. Plant sources were beans, peas and green grams while animal protein sources included beef, liver, fish, milk and eggs. The results indicate that the main source of animal proteins among the pre school children was milk whereas beans were the main source of plant protein. Milk was consumed by many pre school children (62.3%) in 4-7 times a week while beans and green grams were consumed by 38.9% and 35.3% pre school children respectively in 2-3 times a week. The results also indicated a low consumption of beef, fish and eggs and a very low consumption of liver and peas. The results of this study agrees with the findings of a study by Waudo et al (2005) that indicated that milk was the mostly consumed animal protein while eggs consumption was low. Low consumption of animal protein specifically beef, fish, eggs and liver may possibly be due to low household income among the selected households for the study. All the selected households obtained their food by buying thus purchasing power influenced the consumption of proteins. This is supported by a study by Wathome (1990) that was undertaken in urban Nakuru that illustrated an increase in consumption of food
items like beef with income. In addition, a study by Mishra, (2001) disclosed that a high proportion of children did not consume diets rich in protein due to low purchasing power.

4.5.1.3 Consumption of Fruits and Vegetables.

Vegetables and fruits are the main source of micronutrients and fibre in a diet. The main types of vegetables consumed by the children were kales, traditional vegetables and cabbages. Kales and cabbages showed a high consumption during 4-7 times a week by 85.6% and 69% respectively. The rest of the vegetables (traditional) which include pumpkin leaves, cowpeas leaves (kunde), black night shed (managu) and amaranthus (Terere) were rarely consumed. The mothers attributed the low consumption of traditional vegetables as the bitter taste of the vegetables, believe that the traditional vegetables cause stomach upsets and lack of the traditional vegetables in the local market. Still, the findings give an indication of inclination towards consumption of exotic vegetables as compared to the traditional vegetables among the pre school children in this area. These findings concur with findings of a study undertaken by Waudo et al (2005), among pre school children living in wetlands of Victoria basin that traditional vegetables were the least consumed among pre school children.

The main kinds of fruits consumed by the pre school children were bananas, oranges and avocados. The results showed a consumption of 65.4% for bananas, 69.8% for oranges and 58.1% for avocados in 2-3 times a week. Oranges were the mostly consumed during 2-3 times than bananas and avocados because they were on season at the time of the study. The results of the study further indicated that a majority of the preschool children
(66.8%) ate most of the foods with only 33.2% not eating most of the foods. The reasons given varied from allergies, culture to dislike. For instance, liver and eggs were not given to some of the preschool children due to food taboos. The findings of the study further revealed that all the sampled preschool children were not given food supplements.

4.5.2 Nutrient intakes of the preschool children

A 24-hour recall was administered to the mothers of the preschool children in order to establish the type of foods eaten and to determine the quality of the diet in terms of protein, carbohydrates, energy, vitamin A, C, calcium and iron. This is because they are reckoned important to health and are strong pointers of nutrition during preschool period. The study sought to find out whether the daily average intake of the nutrients of each child was adequate as compared to RDA for age. Adequacy of nutrient intake was determined by calculating the daily average intake of nutrients of the index child and comparing it with the RDA for age (Table 4.7).

4.5.2.1 Energy intake

Adequacy of kilocalorie intake was determined by calculating the daily average intake of kilocalories of the index child and comparing it with the RDA while taking age into consideration. The 24-hour recall analysis revealed that most of the preschool children (68%) did not meet their RDA for kilocalories. The findings of the study were in agreement with the results of a study done in Kenya that Kenyan children have inadequate intake of energy (Bwibo and Neumann, 2003). Inadequate intake of energy
may possibly be attributed to insufficient intake of food among the pre school children and also consumption of snacks not rich in energy.

4.5.2.2 Protein intake

Adequacy of protein intake was determined by calculating the daily average intake of proteins of the index child and comparing it with the RDA for age. The results revealed that a half of the preschool children (51.8%) consumed diets that enabled them meet their RDA for proteins. The findings of the study was slightly lower than the results of a study by Waudo et al, (2005) that indicated that 70.2% of pre school children in wetlands of Lake Victoria Basin consumed proteins above the RDA in the three countries surveyed. Additionally, the findings of the study differed with a study undertaken by Mishra, (2001) in India among preschool children that revealed that a large proportion of children did not received adequate protein in diet.

4.5.2.3 Micronutrient intake

Adequacy of micronutrient intake was determined by calculating the daily average intake of the given nutrients namely iron, calcium, vitamin A, and vitamin C of the index child and comparing it with the RDA for age. The findings of the study disclosed that a large percentage of the children did not meet their RDA for vitamin A (69.5%), vitamin C (61.1%), calcium (87.4) and iron (69.2%). The findings of the study agreed with the results of a previous study that Kenyan child have inadequate intake of micronutrients such as calcium, zinc, vitamin A, iron and riboflavin (Bwibo and Neumann, 2003). The
low intake of micronutrients could be attributed to low consumption of dark green leafy vegetables which are rich in micronutrients.

Table 4.7: Adequacy of energy, protein, iron, calcium, vitamin A and C intake among pre school children in Mukuru slums

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Adequate</th>
<th>Inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>32</td>
<td>68</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>51.8</td>
<td>48.2</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>30.8</td>
<td>69.2</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>12.6</td>
<td>87.4</td>
</tr>
<tr>
<td>Vitamin A (IU)</td>
<td>30.5</td>
<td>69.5</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>38.9</td>
<td>61.1</td>
</tr>
</tbody>
</table>

4.5.3 Frequencies of Meals

The number of meals given to a child is very important to their health. Preschool children ought to be given five meals in a day because they do not have enough stomachs to cope with big meals and to meet their high need of nutrients. These include breakfast, mid morning snack, lunch, afternoon snack and supper. Most pre school children (62.9%) took four meals a day, 31.7% took three meals a day and the rest 5.4% took five meals a day. The mothers who gave their children three meals a day cited lack of finances to purchase enough food as a barrier to giving five meals in a day. Therefore, they are compelled to give the three main meals in a day.

4.5.4 Snacks

Majority of pre school children (67.4%) were given a snack in between meals and only 32.6% were not given. Snacks given included chips, porridge, fruits, bread, mandazi and
food leftovers (Figure 4.3). The results further disclosed that food leftovers were mostly given as a snack followed by chips. Chips have a lot of fat and are not healthy for the pre school children. However, the mothers found it convenient as they were readily available from the food vendors.

![Graph showing types of snacks given to pre school children](image)

**Type of snack**

**Figure 4.3: Types of snacks given to the pre school children**

Snacks are very important in children’s diet because they supplement the main meals and provide extra kilocalories. This is because it is not easy for a preschool child to eat enough food in three meals to provide the nutrients and calories needed by the body for normal functioning. For instance, it is during this period that the child experiences a rapid growth and is very active, thus more energy is needed and it can only be achieved by giving a nutritious and energy giving snack. More to the point, the stomach is too small to take in all that is required unless he or she feeds more than three times a day. Therefore it is important that a nutritious and energy giving snack is offered between meals.
4.5.5 Special Food Given During Illness

During illness the child is suppose to be given protein foods such as milk, beef, eggs among others as they play a role in building and repair of worn out tissues. In addition, a lot fruits and vegetables should be given to help boost the immunity. During sickness, (35%) caregivers modified the diet for the pre school children by either giving them food as per the appetite of the child or according to medication. Some mothers denied certain foods because they believed that they would interfere with the drug function. Very few caregivers reported to have modified the diets by increasing the consumption of proteins, vegetables and fruits. The findings of the study showed that the meals for 65% of pre school children were not modified. When asked the reason why they did not modify the diets a larger proportion of respondents reported that they did not see the benefit of modifying the meals during illness. This gives an indication that the mothers were ignorant of nutritional requirements of pre school children. However, few respondents said that they lacked finance to purchase food stuffs to modify meals during illness.

4.6 Nutritional factors and morbidity status of Pre school Children.

4.6.1 Nutritional status and Morbidity status of pre school children

4.6.1.1 Underweight and Morbidity status of the pre school children

The morbidity status of the child can be affected by weight for age (underweight). The chi square test showed significant association between underweight and the preschool children who got ill in two weeks prior the study ($p = 0.002, \chi^2 = 9.498, df = 1$). This means that the morbidity status of the pre school children was influenced by the children being underweight. A large proportion of pre school children (84%) who were
underweight got sick two weeks prior the study period. This can be backed by the fact that children who are underweight have a low resistance to infections due to the poor immunity.

4.6.1.2 Wasting and Morbidity Status of Pre school Children

The morbidity status of the child can be affected by weight for height (wasting). The chi-square results showed significant relationship between wasting and the pre school children who got ill two weeks prior the study ($\chi^2 = 3.877$, df = 1, p = 0.044). This implies that the morbidity status of the preschool children was influenced by the children being wasted. Wasting indicates a current or acute malnutrition resulting from failure to gain weight thus wasted children are weak and have a compromised immunity that make them susceptible to illness.

4.6.1.3 Stunting and Morbidity Status of Pre school Children

The morbidity status of the child can be influenced by height for age (stunting). Significant association was observed with regard to stunting and children getting ill in two weeks period prior the study (p = 0.003, $\chi^2 = 8.948$, df = 1). This denotes that the morbidity status of the preschool children was influenced by the children being stunted. This could be explained by the fact that stunting is an indicator of deficit growth that has failed to reach genetic potential thus the immunity system of the stunted child is usually poor and is prone to sickness.
4.6.1.4 MUAC and Morbidity Status of Pre school Children

There was no significant association between MUAC assessment results and the children who got sick two weeks prior the study period ($p = 0.184, \chi^2 = 1.769, \text{df} = 1$). This indicates that the preschool children morbidity status was not influenced by being malnourished as per MUAC.

Children’s health is reflected in their nutritional status. WHO has identified being underweight as one of the top ten risks to health in the world. Under nutrition affects the immunity of the child, as a result, it increases the incidence, severity, and duration of common childhood diseases, such as diarrhoea, acute respiratory infections, and measles. Malnutrition can also lead to frequent illness weakening the health status of malnourished children locking them into a vicious cycle of recurring sickness and growth faltering. Reviews have also confirmed that malnutrition impairs the body’s defence against diseases and therefore infection which is rampant in developing regions of the world mostly occurs among malnourished children (Berg, 1987). A study carried out in a Nairobi among under fives harmonized well with the results of this study that there is some association between children’s nutritional status and morbidity (Wang’ombe et al, 2005).

4.6.2 Nutrient intake and morbidity status of Pre school Children.

The beneficial effects of protein on growth, health and cognitive function and immunity are well documented. Cross tabulations results showed significant relationship between protein intake and the morbidity status of the pre school children. This means that protein intake had influence on determining the morbidity status of the children ($p = 0.026, \chi^2 =$
4.976, df =1). A large proportion of the pre school children (64%) who had inadequate protein intake as per their RDA got sick two weeks prior the study. Proteins are essential for providing material for tissue growth and other components of the body hence during illness it plays a role in building and repair of worn out tissues. Pre school children who had poor intake of proteins were at risk of malnutrition which weakens their immune system resulting to high susceptibility of infections.

Vitamin A is fundamental for immunity function, growth, proper skin development, proper eye function and tooth bud formation. Chi square test on vitamin A intake and morbidity status disclosed that there was significant relationship between vitamin A intake and morbidity status meaning vitamin A intake influenced the morbidity status of the pre school children (p=0.001, $\chi^2$ =11.981, df=1). Sixty three percent (63%) of the children who had inadequate intakes of vitamin A got sick two weeks prior the study. Inadequate intake of vitamin A impaired the immune function of the pre school children increasing their vulnerability to infections. The findings of this study concur with FAO inference that a diet adequate in vitamin A reduces risk of respiratory and gastrointestinal infections (WHO/FAO, 2004).

Vitamin C is crucial for tissue formation and increases iron absorption in the body which is essential for immunity. Chi square test showed significant relationship between vitamin C intake and morbidity status of the children. This imply that the vitamin C influenced the morbidity status of the children (p=0.000, $\chi^2$=21.519, df=1). A large number of children (60%) who had inadequate intake of vitamin C got sick two weeks prior the
study. Inadequate intake of vitamin C reduces the immunity function in the body. As a result pre school children with inadequate intake of vitamin C were prone to infections due to their weak immune system.

Chi square tests showed no significant relationship on energy intake \( (p=0.800, \chi^2 = 0.064, df =1) \), Iron intake \( (p=0.334, \chi^2 = 0.932, df =1) \) and calcium intake \( (p=0.291, \chi^2 = 1.113, df =1) \) and morbidity status of the pre school children.

4.7 Health Care seeking practices and Morbidity Status of pre school Children

4.7.1 Immunization Status and Morbidity Status of Pre school children

According to WHO's recommended schedule for immunization, a 12-month-old child should be fully immunized. The researcher recorded the information on immunization from the child's health card and completed it with maternal recall when the card was either unavailable or incomplete. Two indicators that are fully immunized and partially immunized were derived for all index preschool children in the study sample to determine whether or not they were fully immunized (since all index pre school children were older than 12 months, they should all have been fully immunized based on the WHO schedule of immunizations).

Majority of the pre school children (69.2%) were fully immunized and the rest 30.8% were partially immunized. High coverage of vaccination was attributed by the proximity of health facilities to the slum. In agreement with previous studies, the present study shows that children living in communities where outreach clinics were within 2 miles
were likely to be immunized than those that live farther away (Pelletier et al, 1995). However, the findings of the study conflicted with the results of a study done by APHRC (2002b) in informal settlements of Nairobi that indicated that 48% of the children in the slums were fully immunized.

The results of the study showed significant relationship between immunization status of the children and the pre school children who got sick in two week period to the study (p = 0.001, $\chi^2 = 10.722$, df = 1). This implies that immunization status has a relationship with the morbidity status of the pre school children. This is supported by the results of the study that showed that 81% of the partially immunized pre school children got sick in two weeks prior the study. Immunization creates immunological protection against disease thus reduced morbidity. Therefore the partially immunized pre school children are at risk of contracting infections.

Immunization is one of the most important and cost effective intervention that health systems can provide and is essential to save children’s lives. This is because it creates artificial immunity to common childhood infections. Immunization coverage in Kenya for the major vaccine preventable diseases have risen significantly since the launching of the expanded programme on immunization in 1974 and this could be the reason why the majority (69.2%) of the sampled pre school children were immunized. However, it was noted in this study that in spite of a high proportion of the pre school children being immunized there was a high morbidity. This means that the morbidity status of the pre school children was influenced by other factors e.g. poor nutritional status and sanitation as reported by the findings of the study.
4.7.2 Growth Monitoring and Morbidity Status of Pre school Children

Growth monitoring is a key component of child survival as they help uncover health problems at hand for appropriate intervention. A large proportion of the mothers (86.8%) no longer took their pre school for growth monitoring and only a few (13.2%) took them for growth monitoring once the child attained the age of nine months. This is because the mothers did not appreciate the value of growth monitoring and discontinued it once the immunization schedule was completed. It was further noted that the few pre school children who were taken for growth monitoring were below two and half years. In agreement with results of a survey in South Africa, the present study shows that the coverage of health facility based growth monitoring is low and biased to the younger children (Schoeman et al., 2000).

Chi square results showed a significant association between the pre school children who were taken for growth monitoring and children getting sick two weeks prior the study (p = 0.000, \( \chi^2 = 67.379, \text{df} = 1 \)). This means that growth monitoring influenced the morbidity status of the preschool children. Eighty four percent (84%) of the pre school children (n=44) who attended child welfare clinics for growth monitoring never got sick two weeks prior the study. This is validated by the fact that growth monitoring enables detection of abnormal growth and helps unearth health and nutrition problems for timely interventions. Growth monitoring helps detect faltering growth that weakens pre school children immunity system increasing their vulnerability to illnesses. A study carried out in Malawi among under fives coincided with the results of this study that growth
monitoring leads to reduced morbidity and mortality of the children under five years (Cole-King, 1985).

Growth monitoring has been advocated worldwide as one of the key elements of child survival and primary health care strategies and as an excellent tool for assessing the growth and development of a child in order to detect the earliest changes and bring about appropriate responses to ensure that growth continues uninterrupted (Morley, 1973). However, growth monitoring depends on the mother’s ability to understand and interpret growth charts correctly. It is enhanced by effective follow up activities such as appropriate advice, improved feeding and medical care when indicated (Garner et al, 2000).

4.7.3 Health Care seeking during Illness and Morbidity Status of pre school Children

Health care seeking during illness is a very important aspect in child health. Mothers health seeking behaviour varied from purchasing the over counter drugs, taking the child to the health facility to doing nothing. Among the pre school children who were sick (n=231), only 41.1% were taken to a health facility for treatments while the rest 58.9% were not taken, they were either treated with over counter drugs or no action was taken. A large proportion of mothers who took their children for medical care during illness visited the dispensary within that area owned by catholic nuns. They reported that they preferred the dispensary due to its minimal charges as compared to other health facilities.
within the locality, the warm reception and hospitality given by the nuns who serve them, the proximity to their homes and the high quality of services offered at the dispensary. Health seeking was influenced by lack of funds, most mothers did not take their children to a health facility for treatment due to inadequate finances, so whenever the child was sick they attempted to self treat with over the counter drugs based on knowledge on symptoms, information from the mass media, friends, neighbours, availability of drugs and their price and drugs having been previously prescribed by medical personnel. They reported that they preferred over counter drugs from the chemist as they found it cheap. In addition, the perception of severity of disease and the length of the illness influenced the action of the mothers to seek treatment in a health facility. Disease such as diarrhoea and fever were considered severe thus treatment was sought while coughs and colds were considered mild thus little or no action was taken, medical care in such cases were only sought when it was critical for instance, when the child was unable to eat or play. Furthermore, the longer the illness the more likely a mother sought help from a health facility.

The results of the study revealed that a small percentage of mothers took their children for medical care during illness and owing to the fact that the practice of appropriate health seeking has a great potential to reduce the occurrence of severe and life-threatening child illnesses, the prevalence of high morbidity among the pre school children in the area can be equated to the lack of proper treatment during illness.
4.8 Water and Sanitation, and Diarrhoea Morbidity among pre school Children

4.8.1 Consumption of Treated Water and Diarrhoea Morbidity among pre school Children

Over half of the mothers (65.9%) did not treat drinking water and only 34.1% treated drinking water by either boiling or by use of commercial treatments. A large proportion of the mothers declared that due to lack of finance they were not able to treat their water by either boiling or use of commercial treatments because they had other most important pressing needs than water treatment. Significant association was noted between consumption of treated drinking water and pre school children suffering from diarrhoea two weeks prior the study period ($p = 0.017, \chi^2 = 5.734, df = 1$). This means that consumption of treated water by the preschool children influenced diarrhoea morbidity. A large proportion (82%) of pre school children who had diarrhoea (n=44) two weeks prior the study consumed untreated water. Water treatment improves the quality of drinking water as a result aid in reducing the ingestion of pathogens hence results to better health.

4.8.2 Water Adequacy and Diarrhoea Morbidity among pre school Children.

The main source of water was the tap. There was no provision for piped water to individual households and all the mothers (100%) reported that they obtained water for domestic use from the taps that are fixed at the specific points at a fee of two shillings per twenty litres. When asked whether the water was adequate for domestic use, most mothers (61.4%) said that the water was inadequate while 38.6% said that the water was adequate for their domestic consumption.
Significant relationship was observed between adequacy of water for domestic use and pre school children suffering from diarrhoea two weeks to the study period ($p = 0.003$, $\chi^2 = 8.932$, df $= 1$). This indicates that water adequacy influenced the diarrhoeal morbidity. A high percentage (80%) of pre school children who suffered diarrhoea ($n=44$) two weeks prior the study were from households with inadequate water. Access to adequate water has a considerable health benefit to households and more important than the quality of water in maintaining children’s health. This is because too little water makes it difficult to maintain the sanitary conditions that prevent contamination and much more essential for controlling the prevalent diseases that contribute so heavily to repeated illness and death of many children. The results of the study concurred with a review of epidemiological studies that found that increase in water quantity lead to reduced illness (Esrey et al., 1991).

4.8.3 Access to Toilet or Latrine and Diarrhoea Morbidity among the Pre School Children

More than half of the households (57.5%) had access to a toilet or latrine facility whereas (42.5%) had no toilet or latrine facility. The two types of latrines or toilet facilities used by the respondents were mainly the flush toilets without water which were used by 16.8% of the households and pit latrines which were used by 40.7% of the households. Forty two percent 42.5% of the respondents, who had no toilet/latrine facility, used other means such as the “flying toilets’ which faeces were wrapped in a paper and thrown into the river or open trenches (Figure 4.4). Very few children had access to either a latrine or toilet, they used potties which were later emptied into the latrines or polythene bags and
later disposed into the river or open drainages. Majority of the children (69%) defecated on the papers, 17% used potties and 14% had access to latrines or toilets. The pre school children had minimal access to the toilets or latrine because they were accessed at a fee of three Kenyan shillings per visit regardless of the age of an individual which the respondents reported to be quite expensive owing to the number of visits to the latrine or toilet per day by the child and economic hardships that they were going through. Most latrines were quite close to the households. The latrines and toilets as well served as bathrooms and for the respondents who did not have access to either a latrine or a toilet, they bathe in their houses.

Chi-square test showed significant relationship between access to a toilet or latrine used and diarrhoea morbidity two weeks prior the study (p = 0.017, $\chi^2 = 5.697$, df = 1). This pointed out that access to a toilet or latrine influenced the diarrhoea morbidity of the pre school children. A fairly high percentage (59.1%) of the pre school children who suffered diarrhoea (n=44) two weeks prior the study were from the households that had no access
to a toilet or latrine facility. The problem may possibly be due to unsanitary disposal of the human excreta especially the children faeces that lead to contamination of the environment putting the pre school children at risk of contracting infections. This is strongly supported by a study done in Sri Lanka and in Cebu in the Philippines, which outlined that unsanitary disposal of children's faeces, linked to the absence of adequate sanitary provision, was associated with a higher incidence of diarrhoea in young children (Mertens, 1992). Proper disposal of faeces, which is not guaranteed by the mere presence of latrines, is significant for the potential benefits of sanitation to become observable. Studies have shown that modest improvements in sanitation, such as pit latrines, results to better health, but major improvements in sanitation, such as flush toilets results in even larger health benefits (Swindale et al., 1999). This could explain the fact that in spite of access to latrines or toilets by a fairly high percentage of the households (57.5%), the health benefits were not realized.

4.8.4 Waste Disposal and Diarrhoea Morbidity among Pre school Children

There was no designed waste disposal system and everyone disposed waste in a way they considered best. Majority of the households (99.4%) disposed their waste into the river and very few (0.6%) disposed by burning. However, some scattered household trash indiscriminately near the houses primarily the plastic bags which were noticeable. A chi square test was not done on this variable because the environment was shared by all the respondents and the manner in which each household disposed the waste did not apply to an individual. However, the high morbidity burden among the children in the area could be attributed to inappropriate waste disposal. Improper waste disposal create more
opportunities for exposure to pathogens increasing the risk of developing illness especially among pre school children because they are more mobile and most likely to explore the environment and may be drawn to wade or play in standing contaminated water and drainage ditches or to scavenge in piles of garbage.

The findings of this study echoed other studies that poor hygienic and unsanitary household conditions are associated with a high prevalence of infections (Engle, 1992). The child morbidity has been associated with poor water quantity and quality and lack of sanitation. The risk factor for infections increases significantly when the water is unsafe and sanitary practices are inadequate. In the poorest countries and neighbourhoods unsanitary living conditions probably account for at least a half of the total burden of ill health (Satterthwaite, 1996).
5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study sought to establish the risk factors associated with the morbidity status of pre school children in slum villages of Nairobi, Kenya. In this chapter, major findings of the study which are based on the objectives are outlined. The recommendations drawn from the findings are presented.

5.2 Conclusions

The study showed that there was a high prevalence (69.2%) of pre school child morbidity in Mukuru slums. Coughs/colds and diarrhoea were the major causes of pre school child morbidity in Mukuru slums with a prevalence of 47.3% and 13.2% respectively.

There was a high prevalence of under nutrition among preschool children therefore it is a public health problem in Mukuru slums. The findings of the study revealed a poor nutritional status of pre school children with 21 %, 9% and 29.6% being underweight, wasted and stunted respectively. The proportions were higher than the acceptable rates of 11% for underweight, 2% wasted and 17%, stunting in a well-nourished population for stunting, underweight and wasting respectively (WHO, 1995). However, the MUAC cut off points pointed out a smaller percentage of the children (6.6%) being malnourished. MUAC measurements need to be used with caution since it is not sensitive enough to detect all the cases of malnutrition. The poor nutritional status of the pre school children would be attributed to high pre school child morbidity and also nutrient inadequacies. Though protein intake was found to be fairly adequate, the nutritional status of the pre
school children was poor because of inadequate intake of energy. Inadequate intake of energy leads to conversion of proteins to release energy limiting its effectiveness.

Dietary assessment of the preschool children revealed that the commonly consumed foods were carbohydrates with ugali being the mostly consumed. A majority of the children (67.4%) were given snacks in between meals. They included: chips, porridge, fruits, bread, mandazi and food leftover. As regards to diet adequacy for various nutrients, most of the children did not meet their RDA for kilocalories, iron, vitamin A, vitamin C and calcium. However, the RDA for proteins was fairly met.

Risk factors that were found to be significantly associated with morbidity status of the preschool children in Mukuru slums include:

i. The high prevalence of under nutrition. Malnourished pre school children had a weakened immune system that resulted to low resistance to infections.

ii. Inadequate intake of nutrients mainly protein, vitamin C and A. Inadequate intake of these nutrients impaired the immune system of the pre school children thus increased their vulnerability to infections.

iii. Discontinuation of growth monitoring once the children attained age of nine months. This denied the preschool children a chance of early detection of growth faltering that resulted to malnutrition as a result increased disease vulnerability.

iv. Partial immunization. Immune system of partially immunized children was compromised since they lacked immunological protection against diseases putting them at risk of contracting infections.
v. Lack of access to basic health care during illness. It led to occurrence of illnesses since the practice of appropriate health seeking has a great potential to reduce the occurrence of child illnesses.

vi. Lack of access to safe drinking water. Consumption of untreated water results to ingestion of pathogens that caused sickness mainly diarrhoea.

vii. Lack of adequate water for domestic consumption. Inadequate water made it difficult for the caregivers to maintain the sanitary conditions to prevent contamination that put the pre school children at risk of contracting sickness especially diarrhoea.

viii. Lack of access to a toilet or latrine facility or sanitary facilities. Inadequate sanitary facilities resulted to unsanitary disposal of human excreta that lead to environmental contamination putting the pre school children a risk of contracting infections in particular diarrhoea.

5.3 Recommendations

More awareness on local affordable foods rich in essential nutrients for the pre school children should be done to the caregivers by the health and nutritional professionals.

The Ministry of Health should sensitize the caregivers on importance of having the child fully immunized, routine growth monitoring, seeking treatment during illness and treating drinking water.
The government should ensure that health care services are accessible to the pre school children living in the slums or informal settlements.

The city council of Nairobi should ensure provision of adequate water, healthy sanitation, drainage and proper waste disposal systems. They should ensure that the landlords put up latrines or toilet or bathrooms before leasing out the houses and the toilets should accommodate the needs of the pre school children and ensure that those who violate the rule are dealt with firmly and effectively.

The government should come up with sustainable income generating projects that will enable increase in family income at the slums. Pre school children had inadequate access to sufficient food, nutrients intake, medical treatment during illness, safe drinking water, water for domestic consumption and sanitary facilities due to lack of finance.

5.4 Recommendations for Further Research.

Similar studies can be conducted in other slum settlements and areas for instance, in arid and semi arid areas.
REFERENCES


APHRC, (2002b). *The Nairobi’s Informal Settlement Needs Assessment Study (NISNAS)* Nairobi, APHRC.


seeking behaviour during child illness in a rural Western Kenya community. *African Health Sciences;* 5 (4): 322-327


APPENDICES

APPENDIX 1: QUESTIONNAIRE

I am Julie Jepkosgei, a postgraduate student at Kenyatta University undertaking a research as part of the requirement of the degree of Masters in Public Health. This study is aimed at determining risk factors associated with morbidity status of pre school children. I kindly request you to be truthful as possible in answering the questionnaire, any information provided will be treated with strict confidence and used solely for academic purpose. Your corporation will be greatly appreciated.

Questionnaire no. Date of interview

A. DEMOGRAPHIC AND SOCIO ECONOMIC INFORMATION

1. From which ethnic group do you come?

2. What is your marital status?
   - Single ( )
   - Married ( )
   - Divorced ( )
   - Widowed ( )

3. What is your occupation?
   - Employed ( )
   - Self-employed ( )
   - Unemployed ( )

4. What is your husband’s occupation?
   - Employed ( )
   - Self-employed ( )
   - Unemployed ( )

5. What is your religion?
   - Protestant ( )
   - Catholic ( )
   - African Traditional Religions ( )
   - Muslim ( )
   - Other (specify) ( )

6. What is your highest level of education?
   - No education ( )
   - Primary ( )
   - Secondary ( )
   - Tertiary ( )
   - Other (specify) ( )
7. What is your main source of cooking fuel?

1. Kerosene ( ) 2. Electricity ( ) 3. Gas ( )
4. Other (specify) .............

8. a). How many people including visitors, relatives and children reside in your household? .................................................................

9. a). Please indicate the income bracket in which your household total monthly income falls?

   1000 – 2500

   2501 – 5000

   Above

   b). How much of this do you spend on food per month? ......................

B. FOOD CONSUMPTION

10. What are the most common foods consumed by your preschool child? .........................

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

11. Which method do you use to feed your preschool child?

   1. When child asks for food ( )

   2. Leave food for child to feed him/herself ( )

   3. Follow feeding schedule ( )

   4. Others ( )

12. How many times in a day do your preschool child feed? .........................

13. How is food distributed during mealtime?

   1. On central plate. ( ) 2. Males eats first ( )
3. Children eat first ( )  4. Women eats first ( )

14. Do you serve your preschool child in the same plate with other children?

  1. Yes ( )  2. No. ( )

15. What type of snack do you normally give your preschool child?

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

16. Are there any foods that your pre-school child does not eat?

  1. Yes ( )  2. No. ( )

   If yes, which foods doesn’t he or she eat?..............................

   Please give the reasons..........................................................

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

17. a). Are there food restrictions for pre-school children in your culture?

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

   If yes, which foods are avoided?............................................

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

   Please give the reasons..........................................................

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

   b). Are there special foods recommended for consumption for the pre-school children? ..........................................................

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

   If yes, which foods.................................................................

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

   Please give the reasons..........................................................

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

18. Do you give food supplements to your preschool child?

  1. Yes ( )  2. No ( )
If yes, which type of food supplement does he/she take? 

What is the amount of food supplement taken? 

19. How is food obtained for your pre-school child? 

20. Which problems do you encounter in obtaining food for your pre-school child? 

21. **24-HOUR RECALL**
Please indicate what your child ate from yesterday, start with breakfast (past 24 hours).

<table>
<thead>
<tr>
<th>Time/Meals</th>
<th>Type of dish</th>
<th>Ingredients</th>
<th>Method of preparation</th>
<th>Amounts in grams</th>
</tr>
</thead>
</table>

Is this intake record typical of the usual patterns? 1. Yes ( ) 2. No ( )
If No, how does it differ? 


22. **FOOD INTAKE FREQUENCY**

How frequently does your child eat the following food items?

<table>
<thead>
<tr>
<th>Food</th>
<th>Number of times in a week</th>
<th>Doesn’t eat</th>
<th>Enough</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4-7 2-3 Once Never</td>
<td>1= Yes 2= No</td>
<td></td>
</tr>
<tr>
<td>Ugali</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green grams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabbage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional vegetables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bananas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oranges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumpkins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avocados</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paw paw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tea with milk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porridge</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**C. HEALTH AND SANITATION**

23. a). What is your main source of water for domestic use?

1. Rain ( ) 2. Borehole ( ) 3. River ( )
4. Tap ( ) 5. Other (specify) ..........................................................

b). Do you treat your domestic water?

1. Yes ( ) 2. No. ( )
c). Do you treat your drinking water?
   1. Yes ( )  2. No. ( )
   If yes, how? ........................................................................................................

d). Is the water adequate for domestic use?
   1. Adequate ( )  2. Inadequate ( )

24. What type of toilet does your household use?
   1. Flush without water toilet ( )  2. Traditional pit ( )  3. Ventilated improved toilet ( )  4. Bush or field ( )  5. Other ( )

25. How do you dispose your rubbish?
   1. Burn ( )  2. City council/commercial bin services ( )  3. Other, specify,...........

26. a). Has your child experienced any of the following in the past two weeks?
   1. Diarrhoea ( )  2. Cough/Colds ( )  3. Fever ( )  4. Difficult in breathing ( )
   5. Skin disease ( )  6. Other, specify ..............................................................

   b). Did you seek health care?  1. Yes ( )  2. No. ( )
   If yes, where did you seek healthcare? ...........................................................................

27. How could you describe the overall health of the child in question? ......................
........................................................................................................................................

28. Do you give your child any special food during illness?
   1. Yes ( )  2. No. ( )
   If yes, what foods? ........................................................................................................

29. What immunizations has the child received? (Confirm from the child health card).
   1. Fully immunized ( )  2. Partially immunized ( )  3. Not immunized ( )
30. Do you take your child to the clinic for weighing? (Confirm from the child health Card).

1. Yes ( ) 3. No. ( )

31. D. ANTHROPOMETRY INFORMATION

<table>
<thead>
<tr>
<th>Measurements</th>
<th>First reading</th>
<th>Second reading</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUAC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Age of the pre school child:.........................

Sex of pre school child:.........................
APPENDIX 2: MAP OF THE STUDY AREA
APPENDIX 3: RESEARCH AUTHORIZATION LETTER
APPENDIX 2: MAP OF STUDY AREA

NAIROBI ADMINISTRATIVE DIVISIONS

Inset: the map of Kenya showing the position of Nairobi

Location of Nairobi in Kenya

- The study area (Mukuru Slums)
APPENDIX 3: RESEARCH AUTHORIZATION LETTER

MINISTRY OF SCIENCE & TECHNOLOGY

Telegram: "SCIENCE TEC", Nairobi
Fax No.
Telephone No: 318581
When replying please quote
MOEST 13/001/36C 494/2

Rop Jepkoseg Julie
Kenyatta University
P.O. Box 43844
NAIROBI

Dear Madam

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on
"Nutritional Status and Risk Factors associated with the Health of Pre-
School Children in Mukuru Slums, Nairobi Kenya"

I am pleased to inform you that you have been authorized to carry out
research in Nairobi for a period ending 31st January 2007.

You are advised to report to the Provincial Commissioner and the Provincial
Director of Education Nairobi before commencing your study.

On completion of your research, you are expected to submit two copies of
your research report to this office.

Yours faithfully

B. O. ADEWA
FOR: PERMANENT SECRETARY

Copy to:
The Provincial Commissioner
Nairobi

The Provincial Director of Education
Nairobi