NUTRITIONAL KNOWLEDGE OF MOTHERS AND NUTRITIONAL STATUS OF THEIR CHILDREN 6-59 MONTHS UNDER MALEZI BORA PROGRAMME IN KAWANGWARE SUB LOCATION, DAGORETTI, NAIROBI COUNTY

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DECLARATION

This dissertation is my original work and has not been presented for a degree in any other University

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DEDICATION

This dissertation is dedicated to my loving husband, Julius Gichana, my only daughter Joan Mokeira, my sons Tom Frank and Steve Bosire who sacrificed to intercede for me when the waters were stormy, to my husband especially for being understanding and supportive financially, socially and emotionally. May the almighty grant them mercy and grace.

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ACRONYMS AND ABBREVIATIONS

ANC: Antenatal Care

CHW: Community Health Workers

HC: Health Centre

HCC: Health Centre Catchment

HDDS: Household Dietary Diversity Score

HFA: Height for Age (HAZ)

MoH: Ministry of Health

MUAC: Mid Upper Arm Circumference

NCHS: National Center for Health Statistics

SD: Standard Deviation

UNICEF: United Nations Children's Fund

VAS: Vitamin A Supplementation

WFA: Weight for Age (WAZ)

KAP: Knowledge, Attitude and Practice

CBO: Community Based Organizations

DNO: District Nutrition Officer

PMTCT: Prevention of Mother to Child Transmission

OPERATIONAL DEFINITIONS

Anthropometry: The study and technique of taking body measurements, especially for use on a comparison or classification basis. It refers to the measurement of the human individual for the purposes of understanding human physical variation.

Childcare Practices: For this study refers to the practices of caregivers in the household which translate to food and nutritional security and health care resources into a child's growth and development.

Complementary food: Foods given to a child in addition to breast milk usually introduced between 4-6 months of age

EPI-Info: A series of micro computer packages used to assess nutritional status such as height for age, weight for height and weight for age.

Household: Refers to one person who lives alone or a group of persons, related or unrelated who share food or make common provisions for food and other essentials for living.

Knowledge: Refers to verbalized or demonstrated ability to reproduce from memory facts and principles.

Nutrition Status: Refers to whether or not the child is underweight, stunted or wasted.

Underweight: Refers to having low weight for age mainly due to chronic under nutrition or acute malnutrition (WAZ)

Wasting: Refers to having low weight for height according to WHO standard with a <-2 SD mainly due to acute malnutrition (WHZ)

Z score or standard deviation: The deviation of anthropometric value(s) for an individual child from the median value of the reference population. World Health Organisation (WHO) divided by the standard deviation of the reference population.

Dependency ratio: The sum of all persons under 15 years or over 64 years of age, divided by the number of persons age 15-64, multiplied by 100

Nutrition knowledge: is defined as the understanding of different types of food and how food nourishes the body and influences health.

ABSTRACT

Malezi Bora is a program by the Ministry of Health that ensures heightened promotion of routine and far to reach areas. In the programme, mothers are given nutritional knowledge to help them utilize the health facilities and services provided to ensure continued growth and normalcy in nutritional status of their children. This study was therefore designed to determine the nutritional knowledge of mothers and nutritional status of their children 6-59 months under Malezi Bora programme in Kawangware, a slum in Nairobi. A cross-sectional survey was carried out with 300 mothers as respondents using a structured questionnaire to collect information on their nutritional knowledge. Then 322 children 6-59 months were assessed for nutritional status using anthropometric measurements.

Results showed that the age composition of the study population had more persons less than15 and more than 15-65 years for both sexes in the household. Majority of mothers were married. Most of them were housewives. Majority had attained primary and secondary levels of education. The study indicates that majority of mothers interviewed had knowledge of Malezi Bora programme although most of them did not have knowledge of the any activities of the programme. The prevalence of stunting (Height-for-age) among the children was 25.4%, wasting (weight-for-height) was 4% and underweight (weight-for-age) was 7.1%. Severe stunting was significantly ($p<0.03$) higher among males compared to females.

The study concluded that mothers' nutritional knowledge exists but it is low. Generally the nutritional status of the children was normal, except for stunting which was significantly higher than wasting and underweight, though lower than the national coverage.

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

 Malezi Bora is (Swahili word for Good Nurturing) a program by the Ministry of Health that ensures heightened promotion of routine services and far to reach areas. The program addresses different themes each year. These include growth monitoring, immunization, vitamin A supplementation, antenatal care, prevention of mother to child transmission (PMTCT) of HIV/AIDS, reproductive health and anything which concerns a mother and child. Malezi Bora was adopted in Kenya by the Ministry of Public Health and Sanitation in partnership with UNICEF in 2007 (Kariuki, 2010). The main objective of the programme was to intervene on the declining child survival in Kenya through countrywide mobilization for increased utilization of routine child survival services. The programme advocates that children under five years old are taken to health centres and hospitals for routine services. Mothers are given nutrition education and pregnant women immunized against tetanus and all these services are provided free. UNICEF carries out the monitoring of implementation of Malezi Bora and helps in providing feedback to the ministry. UNICEF supports social mobilization for the Malezi Bora Weeks and works closely with the Ministry of Public Health and Sanitation to ensure the required drugs and other equipment are available at all the health facilities (Kariuki, 2010)).

The Malezi Bora programme weeks aims to sensitize and educate the public on free health and nutrition services available to infants, expectant and breast feeding mothers in all government health facilities countrywide. It aims to increase the utilization and improve delivery of routine evidence based health and nutrition services, thus propelling Kenya towards achieving the Millennium Development Goals (Mburu, 2008).

Malezi Bora program, is a shift from past programmes where health interventions such as immunization were delivered mainly through outreach campaigns. Instead, mothers are being encouraged to routinely take their children to their local health facilities (Mwabe, 2012). In 2007 Ministry of Health (MoH) ceased using National Immunization Days for delivering child survival (CS) interventions and instead integrated them within routine services using fixed health facilities. Malezi Bora activities include an intensive campaign twice a year; two weeks in June and November to encourage caregivers take children to fixed health sites and reach out to the community (Kabaka, et al., 2007)

The other partners of Malezi Bora include Kenya's Religious and Faith groups, who represent the Inter-Religious Council of Kenya (IRCK), the Religious Groups use their networks to mobilize Kenyans of all faiths to turn up for services at the health facilities, both during the Malezi Bora weeks and other relevant functions during the year. The groups also participate in the monitoring of Malezi Bora implementation strategy in different parts of the country (Mburu, 2008). In the years prior to Malezi Bora initiation, Kenya had achieved high Vitamin A Supplementation coverage of up to 80%, though in 2007 a drop was noticed due to transition from using National Immunization Days to fixed health facilities. Dagoretti district in Nairobi registered coverage of 26.7% of 6-11 months during the year (Kabaka et al., 2008).

Dagoretti District Health and Management Team (DHMT) in partnership with stakeholders like Aphia plus African Medical Research Foundation, Uchumi, World Vision, Concern Worldwide, Provincial Medical Officer (PMO), Health Workers and the Community do participate in the implementation of the program. Malezi bora activities in the district are an elaboration of malezi bora services, PMTCT, reproductive health, vitamin A supplementation, maternal and neonatal care, postnatal care, breastfeeding, paediatric Hiv

care, free medical camps to too hard to reach areas, continuous medical education (CME) to health workers on maternal nutrition, active case finding by the CHWs in the community and health talks at the health facilities. The source of the information was a report not yet published.

A study on Knowledge, Attitude and Practice (KAP) for Infant, Young, Child Feeding (IYCF) in the Urban Slums of Nairobi and Kisumu, Maternal Nutrition Knowledge which is the key focus of malezi bora was low with most mothers (<60%) unable to name any vitamin A rich natural or fortified food sources. Dietary diversity of children between 6 and 23 months was limited and consumption of animal protein foods and fruits were particularly low (Worldwide, 2011).

1.2 PROBLEM STATEMENT

Maternal Nutrition Knowledge is a key focus of Malezi Bora nutrition and health programme although previous studies show that this information was limited. The dietary diversity was low among children particularly with regard to low intake of animal protein source foods which are essential for their growth, development and maintenance. Most mothers were unable to name any Vitamin A rich natural or fortified food sources essential for disease prevention and strengthening of immunity of children. The low nutritional knowledge of mothers is capable of leading to poor nutritional status of their children, translating into low achievement of the programme objectives, that of curbing declining child survival and poor nutritional status of the children.

1.3 STUDY JUSTIFICATION

To contribute to the nutrition knowledge of mothers through enhancing nutrition education under Malezi Bora programme by sensitization and mobilization. The purpose of the study

was to assess nutritional knowledge and nutritional status of children 6-59 months under the programme. The results of the study would be useful in programme planning strategies, assessment and evaluation to achieve their objectives and to enhance mothers' nutrition knowledge, improve perception on the importance of immunization and antenatal services. Mothers would better utilise the health facilities that offer routine child survival services, leading to good nutrition of the children, reduce child morbidity and mortality. Vitamin A Supplementation is a very essential child survival service for child growth and protection from frequent infections if received after every six months up to five years of age.

1.4 OBJECTIVE

1.4.1 Overall objective

To assess maternal nutritional knowledge and nutritional status of their children 6-59 months under Malezi Bora programme in Kawangware Sub-Location, Dagoretti District, Nairobi County.

1.4.2 Specific objective

1) To establish the socio-demographic and socio-economic characteristics of the households.
2) To determine the nutritional knowledge of mothers.
3) To determine the nutritional status of the children 6-59 months.
4) To determine the morbidity of children 6-59 months in Kawangware sub-location

1.5 HYPOTHESES

1. The mothers possess significant nutrition knowledge to influence positively the nutritional status of children.

2. The nutritional status of the children 6-59 months is normal.

CHAPTER TWO: LITERATURE REVIEW

2.0 INTRODUCTION

This chapter reviews existing information on Malezi Bora and the improvement of child nutrition through growth monitoring and promotion, child immunization, child nutrition, Vitamin A Supplementation for children under five years, causes and prevalence of malnutrition, methods of assessing nutritional status of children, maternal nutrition knowledge and methods of monitoring and evaluating nutrition programs.

2.1 GROWTH MONITORING AND PROMOTION

Growth Monitoring (GM) is the process of following the growth rate of a child in comparison to a standard by periodic, frequent anthropometric measurements in order to assess growth adequacy and identify faltering early. Growth Monitoring and Promotion (GMP) is a prevention activity comprised of GM linked with promotion (usually counselling) that increases awareness about child growth; improves caring practices; increases demand for other services, as needed; and serves as the core activity in an integrated child health and nutrition program, when appropriate (Griffiths & Rosso, 2007). Growth Monitoring, particularly of infants and young children, is widely regarded as an essential element of primary health care and in a recent survey 154 of 178 ministries of health reported that they monitor child growth (Ashworth, et al., 2008). Most growth monitoring programmes use weight charts to provide a graphic representation of a child's weight-for-age.An undernourished or sick child will have a slower rate of weight gain than a well-nourished,healthy child (Ashworth, et al., 2008).

2.1.1   Methods of Growth Monitoring

The most widely promoted method of growth monitoring is weighing and charting growth, since weight gain is believed to be the most sensitive indicator of growth and is universally applicable, this method is favoured by UNICEF (Lofti, 1988). Among other techniques, measuring Mid Upper Arm Circumference (MUAC) is claimed to be the easiest and cheapest alternative to weighing and has been recommended for use at the home and village levels whenever regular and frequent weighing is not possible (Lofti, 1988).

2.1.2   Objectives of Growth Monitoring

Growth monitoring provides a diagnostic tool for health and nutrition surveillance of individual children and to instigate effective action in response to growth faltering (Ashworth, et al., 2008). It teaches mothers, families and health workers how diet and illness can affect child growth and thereby stimulate individual initiative and improved practices. It also provides regular contact with primary health-care services, and so facilitates their utilization (Ashworth, et al., 2008). Growth monitoring can serve as an entry point for community mobilization and social action, especially when growth monitoring data are aggregated and used for community-level assessment and analysis of child malnutrition, targeting supplementary feeding and reporting prevalence of underweight (Ashworth, et al., 2008).

2.1.3   Importance of Growth Monitoring and Promotion

The main anticipated benefits in developing countries are: reduction in under nutrition, morbidity and mortality among young children. There is early intervention when growth faltering is more easily remedied (Ashworth, et al., 2008). The families are motivated and enabled to take effective action, nutrition and health counselling tailored to individual needs. There is opportunity to assess remedial actions, greater self reliance and self-esteem, greater

utilization of preventive health-care services, fewer referrals for curative care (Ashworth, et al., 2008).

2.2 IMMUNIZATION

Immunization is key to achieving the Millennium Development Goals (MDGs), especially the goal to reduce deaths among children under five years old (MDG 4). Reducing these deaths means providing more children, not only vaccines, but also with life-saving drugs, ant malarial bed nets, schooling, sanitary living conditions, clean water, and other essentials that are mostly taken for granted in the better-off parts of the world. It also means addressing the global imbalance in spending on health, where developing countries-with 85% of the world's population-account for only 12% of global spending on health (WHO, 2009).

Over the past decade, immunization programmes have added new and underused vaccines to the original six-diphtheria, tetanus, pertussis, measles, polio and tuberculosis-given to young children. They include vaccines against hepatitis B, *Haemophilus inflenzae* type b (Hib) disease, mumps, pneumococcal disease, rotavirus and rubella (WHO, 2009). Immunization averts an estimated 2.5 million child deaths a year, but despite the successes, millions of children in developing countries-almost 20% of the children born every year-do not get the complete immunizations scheduled for their first year of life (WHO, 2009).

2.3 CHILD NUTRITION

The locus of poverty and under nutrition among children appears to be gradually shifting from rural to urban areas, as the number of the poor and undernourished increases more quickly in urban than in rural areas. In sub-Saharan Africa, a 2006 study showed that disparities in child nutrition between rich and poor urban communities were greater than those between urban and rural areas (Fotso, 2007).

Under nutrition is a concetrated problem of low national priority. 80% of the world's undernourished children are living in just 20 countries (Pradmore and Hill, 2009). Better nutrition translates into a stronger and healthier population with greater opportunities of breaking the cycle of poverty and achieving better quality of life (Azzari, et al., 2011).

2.4 NUTRIENT SUPPLEMENTATION FOR CHILDREN UNDER FIVE YEARS

Vitamin A is an essential nutrient for the proper functioning of the immune system and the healthy growth and development of children. Insufficient intake of vitamin A in children can dramatically increase the risk of death, blindness, and illness, especially from measles and diarrhoea (UNICEF, 2012). Nutrient supplementation for children under five years pertains mainly to administration of vitamin A because the nutrient has been ascertained to be of public health concern in most underdeveloped countries of the world. Vitamin A supplementation refers to the percentage of children ages 6-59 months old who received at least one high-dose vitamin A capsule in the previous six months (UNICEF, 2012).

Vitamin A deficiency is a major contributor to the mortality of children under five. Improving the vitamin A status of deficient children through supplementation enhances their resistance to disease and can reduce mortality from all causes by approximately 23 per cent. Guaranteeing high supplementation coverage is therefore critical, not only to eliminating vitamin A deficiency as a public-health problem, but also as a central element of the child survival agenda (UNICEF), 2007).

 The delivery of vitamin A in Kenya has been integrated into routine health services, for example through biannual 'special days" where supplementation is combined with other child survival interventions such as de-worming or nutrition education. Vitamin A supplements are also commonly distributed as part of the Expanded Program on Immunization, particularly at

nine months with the measles vaccinations (UNICEF, 2012). Vitamin A supplementation coverage rate (% of children ages 6-59 months) in Kenya was 62% in 2010. The highest figure of coverage over the past 11 years has been 91% in 2002, while the lowest has been 22% in 2007 (UNICEF, 2012)

Table 1: Vitamin A Supplementation coverage in Kenya for 10 years up to 2010

Year	Percentage
1999	80.00
2001	90.00
2002	91.00
2003	33.00
2004	63.00
2005	69.00
2007	22.00
2008	27.00
2009	51.00
2010	62.00

Source: United Nations Children's Fund, State of the World's Children (2010)

In the years prior to Malezi Bora implementation, Kenya had achieved high VAS coverage of up to 80%. VAS coverage dropped for all age groups, the drop being most significant in the 12-59 month age range. More children received VAS during the period when communications about the availability of health services were intensified but the overall results show that migrating campaign style child survival interventions and integrating them with routine health services using fixed posts has led to loss of coverage (Kabaka et al., 2008). According to Kenya Demographic and Health Survey 2008-2009 vitamin A coverage reduced to 62%.

2.4.1 Methods of Assessing Vitamin A Deficiency

Xerophthalmia classification was traditionally used to identify populations with vitamin A deficiency. Currently; night blindness and dark adaptometry have been proposed as population assessment methods. Serum and breast milk retinol concentrations are used to identify vitamin A deficiency risk. Retinol binding protein (RBP) and serum retinol are used to determine if serum retinol concentrations are depressed by infection. Other methods are relative dose response and modified relative dose response tests (Tanumihardjo, 2004).

2.4.2 Consequences of Vitamin A Deficiency in Children

Vitamin A deficiency (VAD) is a major public health nutrition problem in the developing world (Keith and West, 2002). It especially affects young children, among whom deficiency can cause exophthalmia and lead to blindness, limit growth, weaken innate and acquired host defences, exacerbate infection and increase the risk of death (Keith and West, 2002). It is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections. It is also becoming clear that VAD can extend through school age and adolescent years into adulthood (Keith and West, 2002).

2.5 MALNUTRITION OF CHILDREN

Child malnutrition can manifest itself in several ways. It is commonly assessed through measurement of a child's weight and height, as well as through biochemical and clinical assessment (UNICEF, 2013). Indicators based on weight,heght and age are compared to internationl standards and are most commonly used to assess the nutritional status of a population (UNICEF, 2013). Child malnutrition is also the most pressing problem of the world, damaging both children and the nations. Significant proportion of deaths of young

children Worldwide is due to malnutrition and efforts to reduce malnutrition should be a policy priority (Wijesinghe, 2010).

Malnutrition prevails everywhere around the world and both developed and developing countries are suffering from malnourishment (Khan et al., 2010). Malnutrition is a public health problem and is associated with among other factors literacy of mother, household wealth index and morbidities (Farid-Ul- Hasnain, 2010). Therefore, improving socio-economic condition along with literacy of mothers and preventing infections through personal hygiene might help in improving the nutritional status of children (Farid-Ul-Hasnain, 2010). Malnutrition is characterized by under nutrition a major concern in developing countries. The aetiology of malnutrition is complex and multi-factorial; it is usually a consequence of inadequate dietary intake (Farid-Ul- Hasnain, 2010). Malnutrition is insufficient, excessive or imbalance consumption of dietary energy and nutrients. It manifests in different forms, such as under nutrition, over nutrition and micronutrients malnutrition. Malnutrition in early childhood is associated with functional impairment in adult life as malnourished children are physically and intellectually less productive when they become adults (Babatunde, et al., 2011). Malnutrition in Sub-Saharan Africa contributes to high rates of childhood morbidity and mortality. However, little information on the nutritional status of children is available from informal settlements (Olack, et al., 2011). Currently,195 million under-five children are affected by malnutrition 90% of them live in sub-Saharan Africa and South Asia.At least 20 million children suffer from severe acute malnutrition (SAM),and another 175 million are undernourished (Olack, et al., 2011).

2.5.1 Prevalence of Malnutrition in Children

The global prevalence in children under the age of 5 has declined 36 per cent over the past two decades-from an estimated 40 per cent in 1990 to 26 per cent in 2011 (UNICEF, 2013).

Prevalence of malnutrition among under-five children is very high in many developing countries of the World (Babatunde, et al., 2011). In developing countries, approximately 183 million children are underweight-for-age, 67 million are underweight-for-height (wasted), and 226 million are low height-for-age (stunted). An estimated 230 million under-five children are believed to be chronically malnourished in developing countries. In Sub-Saharan Africa, 41% of under-five children are malnourished and deaths from malnutrition are increasing on daily basis in the region (Foluke et al., 2011). The 2008 Kenya Demographic and Health Survey showed that 35.3% of under-five children were stunted nationwide, 6.7% were wasted, and 16.3% were underweight (KNBS, 2010).

Levels and trends in child malnutrition from 1990-2011 show that the global prevalence of stunting has decreased 36% from an estimated 40% in1990 to 26% in 2011. The global prevalence of underweight has declined 37% from 25% in 1990 to 16 (UNICEF, 2012).

A study carried out in Mathare one of the larger slums in Nairobi with an estimate population of 423,000 people, realised a severe acute malnutrition (SAM) prevalence of 0.2% translating into a caseload of 169 cases requiring treatment at the one government health centre serving the area (Schofield, 2009). Chronic malnutrition as measured by stunting rates was a significant problem in the slums representing a loss of both physical and mental potential for affected children. Compared to Nairobi Province as a whole (18.7% stunting), children in the slums sampled (32.7% stunting) were two times more likely to be stunted indicating a high level of disparity in nutritional outcomes across Nairobi Province (Schofield, 2009).

2.5.2   Causes of Child Malnutrition

The UNICEF conceptual framework defines malnutrition and captures the malt factorial causality of under nutrition. Nutritional status is influenced by three broad factors: food,

health and care. Optimal nutritional status results when children have access to affordable, diverse, nutrient-rich food; appropriate maternal and child-care practices; adequate health services; and a healthy environment including safe water, sanitation and good hygiene practices (UNICEF, 2013). These factors directly influence nutrient intake and the presence of disease. The interaction between under nutrition and infection creates a potentially lethal cycle of worsening illness and deteriorating nutritional status (UNICEF, 2013).

Food, health and care are affected by social,economic and political factors. The combination and relative importance of these factors differ from country to country. Understanding the immediate and underlying causes of under nutrition in a given context is critical to delivering appropriate,effective and sustainable solutions and adequately meeting the needs of the most vulnerable people (UNICEF, 2013).

The global conceptual framework of the causes of malnutrition presents a useful generalized understanding of how malnutrition and/or child death are the *outcomes* of a multispectral development problem that can be most effectively analyzed in terms of immediate, underlying and basic causes (Figure 1). This framework has become one of the most familiar images within the international nutrition community over the past decade and has helped foster improved understandings and dialogue about the nature and causes of malnutrition. The *immediate* causes of malnutrition and child death are the mutually reinforcing conditions of inadequate dietary intake and infectious disease; the *underlying* causes are household food insecurity, inadequate maternal and child care, and inadequate health services and health environment; and the *basic* causes include formal and non-formal institutions, Political, economic, and ideological structures and systems—representing the perennial political, economic, and institutional conflicts that public nutrition programs must work within (Benson, 2005)

A diagram titled with levels on the right: Manifestations, Immediate Causes, Underlying Causes, Basic Causes. Top oval: "Malnutrition / Death". Box: "Inadequate Dietary Intake ⇄ Disease". Three ovals: "Insufficient Household Food", "Inadequate Maternal/ Child Care", "Insufficient Health Services/ Unhealthy Environment". Oval: "Resources and Control: Human, Economic and Organizational". "Political and Ideological Superstructure", "Economic Structure", oval: "Potential Resources".

Source: UNICEF, 1991

Figure 1: Conceptual Framework of the Cause of Malnutrition

2.5.3   Consequences of Malnutrition in Children

Child malnutrition impacts cognitive function and contributes to poverty through impending individual's ability to lead productive lives. In addition, it is estimated that more than one-third of under-five deaths are attributable to under nutrition (UNICEF, 2012).

Undernutrition can cause various diseases such as blindness due to vitamin A deficiency and neural tube defects due to folic acid deficiency (UNICEF, 2013).

Malnourished children have a delayed motor development and lower cognitive function and school performance. In adulthood, individuals who were malnourished as children have impaired work capacity and worse reproductive performance. Malnutrition can have negative effects not only on those afflicted but also on their offspring (Schroeder, 2008).

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2.6 METHODS OF ASSESSING NUTRITIONAL STATUS OF CHILDREN

The methods of assessing nutritional status of children are; anthropometric methods, biochemical tests, clinical signs and symptoms and dietary assessment methods used either alone or more effectively in combination. Increasingly, nutritional assessment systems are now applied to define multiple lives of nutrient status and not just the level associated with a nutrient deficiency (Gibson, 2005). Thus, only anthropometric and dietary methods were used in this study because they yield satisfactory results within due ceiling of the available resources.

Anthropometry is the most useful tool for assessing the nutritional status of children. There are many anthropometric indicators in use, such as mid upper arm circumference (MUAC), weight for age, weight for height and body mass index. Most of these indicators need to be used along with specific reference tables, e.g. National Center for Health Statistics (NCHS) tables, for interpreting data (Hasan, et al., 2011). Anthropometry measurements are widely used in the assessment of nutritional status, at both the individual and population levels. One of the main advantages is that anthropometric measurements may be related to past exposure, to present procession to future events (Gibson, 2005). Anthropometry measurements are of two types. One group of measurements assesses body size; the other group determines body composition (Gibson, 2005).

2.7 MATERNAL NUTRITIONAL KNOWLEDGE

Mothers are the foremost providers of primary care for children. Their understanding of basic nutrition and health measures strongly influence the care they provide (Appoh, 2005). Household socio-economic characteristics also determine to a large extent the nutritional status of children and a positive relationship between socio-economic status and the ability of

mothers to provide adequate food and primary care has been observed (Appoh, 2005. The aspects of nutrition knowledge include; age for introducing solid foods into a child's diet and the type of solid foods to introduce, frequency of child feeding, diet during diarrhoea and the mother's perceptions of her own child's nutritional status. Mothers' practical nutrition knowledge is important for child outcome (Appoh, 2005).

Maternal nutrition knowledge substitutes for schooling, particularly at lower levels of income and schooling (Block, 2007). Promoting maternal nutrition knowledge may represent an important avenue for improving diet in children from socio-economically disadvantaged neighbourhoods (Williams, et al., 2012)

2.7.1 Methods of Evaluation of Mothers Knowledge

The evaluation of mothers knowledge can be based on Bloom's taxonony of the learning process (Martnez, et al., 1996). According to Bloom,learning follows a sequential process from theory to practice. Knowledge is said to occur when an individual is able to reproduce a specific piece of informatiom. Next comes understanding,which is divided into three levels: translation,in which an individual will be able to rephrase the information acquired; interpretation,meaning that a certain mental process takes place in such a way that a given piece of knowledge receives treatment that makes it appear in a new to the individual; and extrapolation,which involves prediction of a given happening, based on undersanding the information that the individual already has (Martnez, et al., 1996). Another method of evaluation in community participation through identifying determinants of Knowledge,Attitude and Practices of the relevant topic (Hejazi, et al., 2010).

2.8 METHODS OF EVALUATING NUTRITION PROGRAMS

Monitoring and evaluation can be divided into three parts: monitoring (a process management tool), evaluation (to measure programme performance and impact) and participatory monitoring (community-based) (Ismail, et al., 2005). Monitoring is the periodic and routine collection of information throughout th life of the programme to determine whether programme delivery is proceeding smoothly. It is first and foremost a management tool for programme staff,but also provides essential information to understand and explain the results of programme evaluation (Ismail, et al., 2005). Evaluation attempts to determine and document,as systematically and as objectively as possible,the relevance,effectiveness and impact of a programme in the light of its objectives (Ismail, et al., 2005). Participatory monitoring is a system where the communities monitor their own progress towards achieving their own specific developmental goals. For this, it is recommended that community groups be encouraged to establish a simple system of participatory monitoring that relates closely to their own identified priorities and activities (Ismail, et al., 2005).

CHAPTER THREE: STUDY DESIGN AND METHODOLOGY

3.1 STUDY DESIGN

A cross-sectional survey using a structured questionnaire to collect qualitative and quantitative data was used. The information was collected from mothers who were respondents of whom each represented a household with children 6-59 months old to assess maternal nutritional knowledge and nutritional status of children in a city slum.

3.1.1 Study Site

The area of study is Kawangware sub-location, in Kawangware location, Dagoretti District. Dagoretti district lies in the western part of Nairobi County. The district has a population of 350,102 residents according to 2009 Kenya population census, 17% of the population account for children under five years. The district is well covered with health facilities, 4 City Council, numerous private clinics, Community Based Organizations (CBO) and Faith Based clinics. Kenyatta National and Mbagathi district hospitals are also located in the district. This information was obtained from the District Nutrition Officer (DNO) of dagoretti district. Kawangware sub-location is situated between Naivasha road, Kawangware road and Gitanga road.

3.1.2 Population in the Study Area

Kawangware location has a population of 128, 956, while Kawangware sub-location has a population of 77,374. Kawangware is the largest Location in Dagoretti District with about 6,000 households. This information is available at the District commissioner's office.

3.1.3 Administrative and Political Structure

Kawangware is in Dagoretti Division, Dagoretti District under the district commissioner. Administratively, the division falls under a District Officer's control. The division has six

locations; Waithaka, Mutuini, Uthiru/Ruthimitu, Kawangware, Riruta and Kenyatta/Golf Course that are overseen by a Chief. Locations are further divided into twelve sub-locations, each having a sub-chief. Dagoretti Constituency is also represented by a Member of Parliament and 8 City Council wards elect their own Councillors (Weru, 1998).

3.1.4   Services Available

There are two boreholes used as water points, and a 20 litre can usually costs as much as Kshs.5.Afew other water points have been erected by landlords, charging Kshs.3,but supplies are normally available only once a week. The plots have either toilets or latrines. Drainage is poor and the settlement is very muddy in the rainy seasons. Shared toilets, poor garbage disposal, no social gathering places or playgrounds for children, electricity supply to a few, children attend government educational facilities at kawangware or Muslim village. Private schools are available which charge Shs 4000-4500 per year. Health facilities available to the residents are Kawangware Dispensary (Nairobi City Council) which provides medical services, for a fee of Kshs.20 to 40.Additionally, there are five private clinics and numerous chemists or drug shops (Weru, 1998).

3.1.5 Economic   Activities

Some residents own mini-markets, wholesale and retail businesses; others are employed as casual labourers or are salaried workers. Daily earnings vary widely, from a minimum of Shs 100 up to 3,000.Majority of residents are self-employed as small-scale business persons or work as casual labourers and unemployed (Weru, 1998).

3.2 METHODOLOGY

3.2.1 Study Sample

The study sample was 300 households each with a mother and 322 children under-five years 6-59 months of age. The difference between the number of households and the number of children is due to the fact that some households had more than one child under five, and both were taken for the study.

3.2.2 Sample Size Determination

Sample size was calculated using Fischer et al (1991) formula as follows:

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

Where **N**= the desired sample size

z= the standard normal deviation which is 1.96 at 95% confidence interval

p= proportion of, mothers with inadequate nutritional knowledge in Mathare slums Nairobi Province estimated at 75 % (Schofield, 2009)

q=1-p the proportion of mothers with adequate nutrition knowledge.

d= the degree of accuracy desired set at 5%

Therefore;

$$N= \frac{(1.96)^2(0.75\times0.25)}{0.05^2}$$

=**288**

Plus 5% attrition=**302** households each with a mother with a child 6-59 months, however, 300 households were considered adequate sample for the study.

3.2.3 Sampling Procedure

The study was carried out in Kawangware sub-location, Kawangware location in Dagoretti division, Dagoretti District in Nairobi County. Kawangware sub-location was purposively selected due to convenience.

Purposive	Nairobi County
Purposive	Dagoretti district
Random Sampling	Waithaka location / Ngando location / Kawangware location / Ruthimitu location / Mutuini location / Course Golf location
Random Sampling	Kawangware sub-location / Gatina sub-location
Random Sampling	Magedonia village / Kabiro village / Coast village / Stage two village
Random Sampling	Household 75 / Household 75 / Household 75 / Household 75

Figure 2: Sampling Procedure

3.2.4 Inclusion Criteria

All the children under five years living in a household were included in the sample and measured. If two eligible children were found in a household, both were included for example

twins. This was extremely important as it ensured that every child had the same chance of being selected, which was a basic principle of the survey design. All mothers with children under five years were interviewed too.

3.2.5   Exclusion Criteria

Children over five years and households that declined request to participate.

3.3 RESEARCH INSTRUMENTS AND TOOLS

3.3.1 Questionnaire: Structured and Pre-tested

A structured questionnaire was used and it was divided into two parts; Quantitative and Qualitative; Quantitative data included socio demographic and socioeconomic characteristics, Seven days food frequency, dietary diversity and anthropometric measurements such as weight and height/length. Qualitative data included maternal nutritional knowledge. Pre testing was done on 30 households from a sub-location not included in the study. During the pre-test, time taken to complete a questionnaire was noted; sequence of questions, understanding of questions by the respondents and the way field assistants asked the questions were also noted by the principal investigator. The pre-test results were used to modify the tools accordingly. Pretesting perfected the research assistant's skills on data quality management and in administering the questionnaires.

3.4 RECRUITMENT AND TRAINING OF FIELD ASSISTANTS

The recruitment of field assistants was advertised verbally through the area Chief and Sub-Chief. The criteria for recruitment consisted of good conduct and reliability, attainment of secondary level of education, ability to read and write, communication skills, Community Health Workers (CHWs) and ladies had an added advantage for they have better skills of

handling children. The training took two days and areas covered were; study objectives, the use of survey equipments, interviewing techniques and anthropometric measurements and filling the questionnaire. The whole team went through the questionnaire to understand its contents for uniformity in interpretation of the questions. They were trained on good behaviour and courtesy as they visited households. This included dress code, no receiving or making calls during the interviews, no smoking or drinking or faking data and no discussion about information gathered from other households.

3.4.1   Ethical and Human Rights Consideration

Research clearance was sought from the Dean's Office Faculty of Agriculture, University of Nairobi. Informed consent was sought from the District Administrators, the District Commissioner of Dagoretti District, and the Chief for Kawangware Location and Assistant-Chief for Kawangware Sub-Location before undertaking the research. Consent was also sought from the respondents and children before administering the questionnaire, after clearly explaining the objectives of the study. The information obtained from the respondents was handled with confidentiality. The choice of respondents was respected in case they decide not to participate.

3.5 DATA COLLECTION

3.5.1 Demographic Data

 Demographic and socio-economic data on the household was collected using the questionnaire. Data on maternal marital status, educational levels and age, occupation of the parents, source of income, sex and age of the child and the size of the household was collected.

3.5.2   Qualitative Data: Nutritional Knowledge

Nutritional knowledge data was collected using a structured questionnaire from mothers. The information collected was nutrition messages such as household consumption of proteins especially animal source and vitamin A rich foods, nutrition activities and deworming. . Using the mean score and standard deviation, a knowledge z-score was computed and used to group the respondents into three knowledge groups of low, medium and high knowledge score.

3.5.3   Anthropometric Measurements

Height – Measurement based on recumbent length or standing height. Length measurement for children under 2 years (over 85 cm) of age and height measurement for others. The Length or height was measured and reported to the nearest 0.1cm length/height. Height Board of the United Nations Children Funds (UNICEF) was used by the field workers after undergoing training to measure the height of children. Readings of heights was taken to the nearest centimetre and height for children above 2 years.

Weight- Weight measurement was reported to the nearest 0.1 kg. Ideally, weight was determined with the child wearing no clothing or just wears one layer of undergarments. The weight was measured using hanging plastic pants and a Salter scale for measuring weight of children

MUAC- Mid-upper arm circumference was taken for 6-36months using the left arm. The arm was bent at the elbow to make a right angle. The tape was placed at zero which is indicated by the two arrows, on the tip of the shoulder and the tape was pulled to the tip of the elbow. The midpoint of the arm was marked with a pen. The arm was then straightened, the tape placed around the marked area and the reading taken twice to get an average.

Age determination- Information on age was obtained from a written birth card or similar document, with verbal information on date of birth from the mother. Age was calculated in months to at least one decimal place.

3.6 DATA MANAGEMENT AND ANALYSIS

3.6.1 Data Quality Control

The investigator closely supervised the field assistants and the supervisors to obtain good quality data. All the questionnaires were checked for completeness before releasing the interviewees at the end of each day. In the field storage of data materials and questionnaires were in secure plastic folders. There were meetings with the enumerators and supervisors on daily review and was able to deal with any issues arising. Data entry was done every evening. Also good quality data was obtained by pre-testing the tools before actually administering the tool to the target population. The field assistants were adequately trained to ensure quality data collection and the scales were checked for accuracy and calibrated every morning using standard known weights in this case a kilogramme of beans was used. Each day before leaving the field, each team leader reviewed and signed all forms to ensure that no pieces of data had been left out. Team leaders and survey supervisor recorded all important points in a notebook as soon as possible (e.g. during breaks or at the base in the evening), including observations, ideas, problems, actions taken and the rationale for such decisions. Each note contained the date, location, and names of relevant people.

There were evening and morning meetings, survey team members were encouraged to regularly discuss their experiences and findings together. This brought out important points, and sometimes revealed where survey methods needed to be modified.

3.6.2 Data Management

Data entry templates were developed before data collection using; Statistical Package for Social Sciences (SPSS).

3.6.3 Data Analysis

The data was entered and analysed using Statistical Package for Social Sciences (SPSS v16) and MS Excel. Data from open-ended questions were pre-coded before entry. Weight and height were converted to weight-for-age, weight-for-height and height-for-age using WHO Anthro (v for personal computers (v 3.2.2). The indices were expressed as z-scores using the international reference population (Onis, 2003). Children were classified as stunted, wasted or underweight if the respective z-scores fell below -2SD of the reference population for the age and sex (WHO, 2009).

Descriptive statistics (means, percentages, standard deviations and range) were computed for demographic and socio-economic data. Analysis was stratified by age, sex, knowledge score, and other characteristics. A P-value of <0.05 was considered significant in all the analyses. A chi-square and independent t-tests type of statistics was used for comparison of prevalence stunting, underweight and wasting between different groups.

CHAPTER FOUR: RESULTS

4.0 INTRODUCTION

This chapter presents results of the study conducted in Nairobi's Kawangware slums. The results are organised as per the objectives of the study. The objectives of the study were as follows: to establish the socio-demographic and socio-economic characteristics of the households of the study children; to determine nutritional knowledge of mothers; to determine the nutritional status of the children 6-59 months and to determine child morbidity.

4.1 SOCIO DEMOGRAPHIC CHARACTERISTICS OF THE HOUSEHOLDS

A total of 300 households were finally included in the survey. Table 2 describes the distribution of the study households by size. The mean household size was 4.2 (SD= 1.2). The largest household had 9 members while the smallest had 2 members. Majority of the households 37.6% had 4 members, 31.1% had 3 members,14.3% had 5 members respectively and only 1 household 0.3% had 9 members.

Table 2: Distribution of the sample population by size of household

Household size	Frequency	Percent	Cumulative Percent
2	5	1.6	1.6
3	100	31.1	32.6
4	121	37.6	70.2
5	46	14.3	84.5
6	31	9.6	94.1
7	14	4.3	98.4
8	4	1.2	99.7
9	1	.3	100.0
Total	**322**	**100.0**	

4.2 SOCIO- DEMOGRAPHIC CHARACTERISTICS OF THE MOTHERS

The survey included one respondent who were mothers for children 6-59 months from each household and in total 322 children were studied too. The youngest child was 6 months old, while the oldest was 59 months old. The mean age of the children was 27 months (SD, 14), of the households studied, 93.2% had 1 child aged below five years old, and 6.5% had two children while 0.3% had 3 children below five years, accounting for the difference between the number of households and that of the children studied

4.2.1 Distribution of Mothers by Marital Status

Table 3 shows the distribution of mothers by marital status. Majority of the mothers in the study were married 88.5%, while a few single 10.2%, separated 0.6%, divorced 0.3% and widowed 0.3%.

Table 3: Distribution of mothers by marital status

	Frequency	Percent (N= 322)
Married	285	88.5
Single	33	10.2
Separated	2	.6
Divorced	1	.3
Widowed	1	.3
Total		**100.0**

4.2.2 The Age Composition of the Study Population

The age composition of the study sample population was 30% of children 6-59 months while mothers of the children were 54.3% ages 15-45 and only 0.07% were aged above 65 years. The dependency ratio of the study sample population was 83%. The dependency ratio was

calculated by getting sum of all persons under 15 years, divided by the number of persons age 15-64, multiplied by 100.

4.2.3 Mother's Occupation

Figure 3 shows the occupation of the mothers of the children in the study. Most of the mother's 57%) were housewives, while few were self employed 21%, casual labourers 9%, salaried employees 9% and unemployed 4%.
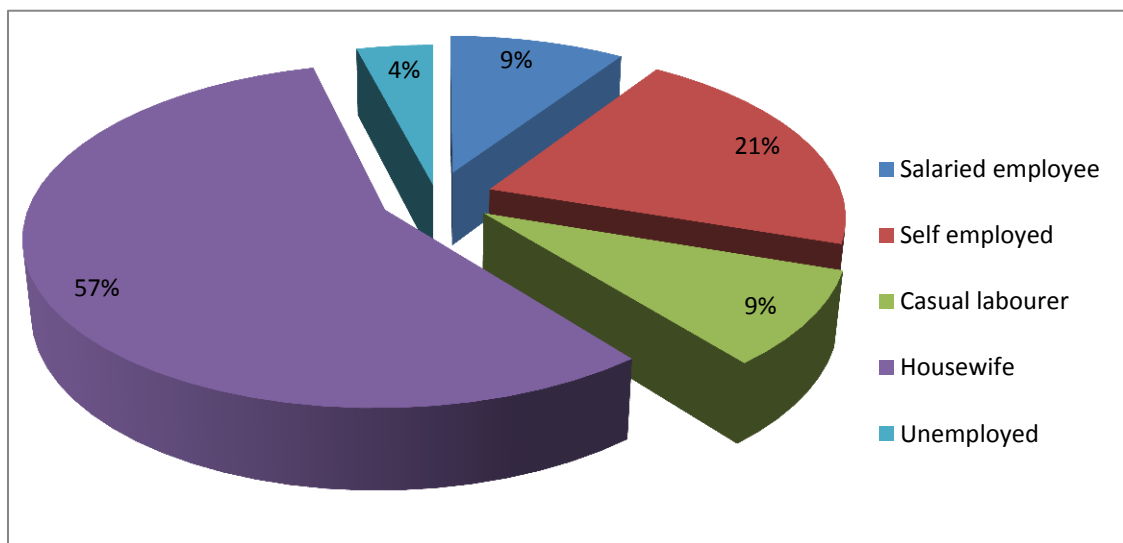
Figure 3: Distribution of Mothers by Occupation

4.2.4 Father's Occupation

Most of the fathers in the study were salaried employees 45%, while 36.6% were casual labourers, self employed 16.8%, unemployed 1.2% and farmers 0.3%.

4.2.5 Education of Mothers and Fathers

Figure 4 shows the distribution of mothers and fathers by educational status. Up to 37% of the mothers had attained secondary education, while 33.9% had completed primary school, 16.8% dropped out of primary school. Only 7.1% of the mothers had gone past secondary

school and those with no education were 5%. Most of the fathers had secondary education 55.3%, while 25.2% completed primary school, 12.7 had gone past secondary education, 5.6% dropped out at primary and not educated 1.2%.
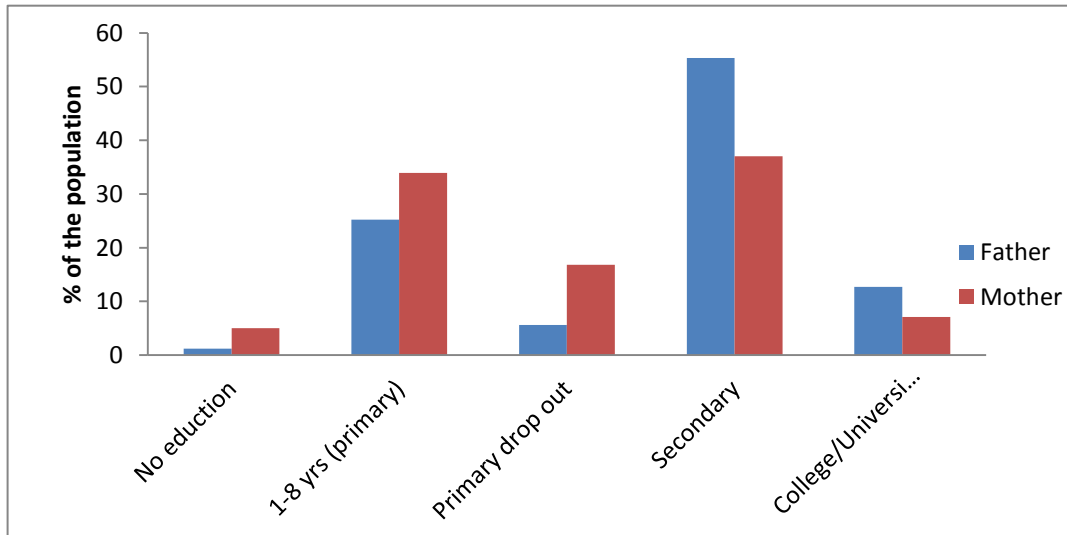
Figure 4: Distribution of the Mothers and Fathers by Education

4.3 SOCIO-ECONOMIC CHARACTERISTICS OF THE MOTHERS

4.3.1 Household's Main Sources of Livelihood

Table 4 shows distribution of the study children by the household's main source of livelihood. The main source of livelihood for the study sample was salaried/waged employment 50.6%, casual labour 37%, trade 10.2%, gifts 0.9%, casual and trade 0.6%, begging 0.3% and remittances 0.3%.

Table 4: Distribution of the study children by household's main source of livelihood

	Frequency	Percent
Casual labour	119	37.0
Salaried or waged	163	50.6
Begging	1	.3
Gifts	3	.9
Trade	33	10.2
Remittances	1	.3
casual and trade	2	.6
Total	**322**	**100.0**

4.3.2 Household's Income Distribution

Table 5 shows the distribution of the total household income among the various basic uses. Most of the households earning 34.8% were used on food, house rent 22.8%, school fees 15.8%, health care 15.1% and savings 12.08%.

Table 5: Distribution of total household income by use

	Minimum (%)	Maximum (%)	Mean (%)	Std. Dev.
Food	10	70	34.8	10.13
School fees	0	45	15.8	9.16
Savings	0	55	12.08	9.37
Housing	1	45	22.8	7.31
Health care	2	70	15.1	7.13

4.4 MATERNAL NUTRITIONAL KNOWLEDGE

4.4.1 Knowledge of Malezi Bora by Mothers

The results of the study show that (78.9%) of the mothers interviewed had knowledge of Malezi Bora while the rest (21.1%) did not have any knowledge

4.4.2 Sources of Knowledge on Malezi bora

The results of the study show different sources of knowledge on Malezi Bora. The health facilities as a source had 47%, community health workers 20%, radio 20%, while those without any source were 10% and road show campaigns 3%.

4.4.3 Knowledge of Malezi Bora Activities by Mothers

Table 6 shows the results on knowledge of Malezi Bora activities by the mothers. Majority of mothers had knowledge of nutrition messages 42.2%, 41.9% were not aware of any activity, while mothers with knowledge of deworming were 10.2 and knowledge about vitamin A 5.6%.

Table 6: Knowledge of Malezi Bora activities by mothers

	Frequency	%
Vitamin A supp	18	5.6
Deworming	33	10.2
Nutrition Messages	136	42.2
Don't know	135	41.9
Total	**322**	**100.0**

4.4.4 Knowledge of Mothers on Sources of Vitamin A and Protein Foods

Table 7 shows the knowledge of mothers on sources of vitamin A and proteins. The response of mothers on the sources of vitamin A was 40.4% fruits, 19.6% vegetables and 36.3% did not know any source. The most mentioned sources of protein by mothers were beans 34.8%, meat 30.4%, meat and beans 10.2% while mothers without knowledge of any source were 24.2% respectively.

Table 7: Knowledge of sources of vitamin A and protein foods by mothers

Sources of vitamin A			Sources of proteins		
	Frequency	**%**		**Frequency**	**%**
Fruits	130	40.4	Beans	112	34.8
Vegetables	63	19.6	Meat	98	30.4
Fruits& Vegetables	10	3.1	Meat and beans	33	10.2
Ugali	2	0.6	Eggs	1	0.3
Don't know	117	36.3	Don't know)	78	24.2

4.4.5 Distribution of Nutritional knowledge Score by Mothers

Table 8 shows the mothers grading on three areas, knowledge of malezi bora activities, vitamin A sources and protein sources. The mean score on the three areas was 2.4 (Sd, 1.5) the least score was 0 while the highest score was 7. The mothers in the low score were 48%, medium score 50.2% and high score 1.9%.

Table 8: Distribution of Nutritional knowledge score by mothers

Knowledge group	Cut point (Z-Score)	Frequency	%
Low score	< 1.00SD	154	48.0
Medium Score	1.00 - 2.00SD	161	50.2
High Score	>2.00SD	6	1.9
Total		**321**	**100.0**

4.5 NUTRITIONAL STATUS OF THE CHILDREN

Anthropometric data weight, height and Mid Upper Arm Circumference (MUAC) of 6-59 months children was taken and used in the evaluation of the nutritional status of the children. Three indices were used in the evaluation of nutritional status; height-for-age (HFA) which measures stunting, weight-for-height (WFH) which reflects wasting, and weight-for-age (WFA) that reflects underweight.

4.5.1 Stunting (height-for-age) of Children

Table 9 shows the distribution of stunting of children. The children with moderate stunting were 18.3% while those with severe stunting accounted for 7.1%. A student's independent t-test found no significant difference in the mean height-for-age for male and female children ($p>0.654$, 95% CI). However, the prevalence of severe stunting was significantly higher among males 10.7% compared to females 3.3% ($\chi=7$, df=2, sig. <0.03, CI =95%). No significant difference was found in the prevalence of stunting between children whose mothers knew about malezi bora and those whose mothers did not know about malezi bora ($\chi=0.318$, df=2, sig. >0.853, CI =95%).

Table 9: Distribution of children by stunting

	Sex of child		
	Male (N= 169)	**Female (N= 153)**	**Total (N= 322)**
Severe	10.7%	3.3%	7.1%
Moderate	18.9%	17.6%	18.3%
Normal	70.4%	79.1%	74.5%
Total	**52.5%**	**47.5%**	**100.0%**

4.5.2 Underweight (weight-for-age) of Children

Table 10 show the prevalence of underweight defined by WAZ of <2SD as 7.14% of whom 2.5% were severely underweight while 4.7% were moderately underweight. A chi-square test on WAZ found a significant difference on the prevalence of underweight between the two gender (χ = 9.131, df =2, sig. < 0.010, CI =95%). The males were more underweight 10.7% than females 3.3%.

Table 10: Distribution of children underweight by sex

	Child gender	
Underweight	**Male (%) (N=169)**	**Female (%) (N = 153)**
Severe	10.7	3.3
Moderate	18.9	17.6
Normal	70.4	79.1
Total	**52.5**	**47.5**

4.5.3 Wasting (weight-for-height) of Children

Table 11 shows the distribution of wasting of the children by sex. 2.4% of males are moderately wasted while 2.0% of females are moderately wasted. The results of wasting in the studied children show that males are more wasted by 3.0 % than females 0.7%.

Table 11: Distribution of wasting in the children by sex

	Child gender	
	Male (%)	**Female (%)**
	(N= 169)	**(N=153)**
Severe	3.0	0.7
Moderate	2.4	2.0
Normal	94.7	97.4
Total	**52.5**	**47.5**

4.5.4 Mid-upper Arm Circumference (MUAC) of the Children

Table 12 show MUAC results, no child was found to be severely malnourished (MUAC <11.5cm), 3.4% were moderately malnourished while 6.8% at risk of being malnourished. A chi-square test found no significant difference in the risk of malnutrition using the MUAC assessment ($\chi = 0.479$, df = 2, sig. =.787, CI =95%).

Table 12: Distribution of MUAC in children by sex

Classification	Cut off points	Child gender		Total
		Male (N=169)	**Female (N=153)**	**(N =322)**
Severe	<11.5 cm	0%)	0%	0%
Moderate	11.5 -12.5 cm	3.6%	3.3%	3.4%
At risk	12.5 -13.5 cm	5.9%	7.8%	6.8%
Normal	≥ 13.5 cm	90.5%	88.9%	89.8%
Total		**52.5%**	**47.5%**	**100%**

4.5.5 Association Between Mothers' Knowledge and Wasting of Children

Table 13 shows the distribution of children by wasting and mothers' knowledge of Malezi Bora. The results show that the prevalence of wasting was 4% of which 1.9% was severely wasted while 2.2% were moderately wasted. A chi-square test found no significant difference in the prevalence of wasting between children whose mothers knew about malezi bora and those who did not know (χ =0.306, df = 2, sig. = .858, CI= 95%) as well as between the two gender (χ =2.214, df = 2, sig. = .299, CI= 95%).

Table 13: Distribution of wasting in the children by sex and mothers' knowledge of malezi bora

	Child gender		Know about malezi bora		Total (%)
	Male (%) (N= 169)	Female (%) (N=153)	Yes (%) (N= 254)	No (%) (N= 68)	(N =322)
Severe	3.0	0.7	2.0	1.5	1.9
Moderate	2.4	2.0	2.0	2.9	2.2
Normal	94.7	97.4	96.1	95.6	96
Total	**52.5**	**47.5**	**78.9**	**21.1**	**100**

4.6 CHILD MORBIDITY

Figure 5 shows distribution of the study children by illnesses. The health of the children in the study population was assessed by asking whether the child had been sick for the two weeks preceding the survey date, 63.7% of the children were reported to have suffered from one or more of illnesses. The rest 36.3% did not show any signs in the previous two weeks preceding the survey date. Common cold was the most reported by most of the participants at 63.4% followed by febrile illness (suspected malaria) at 23.4 %. No significant difference was found between gender and prevalence of the different illnesses (p>0.05).
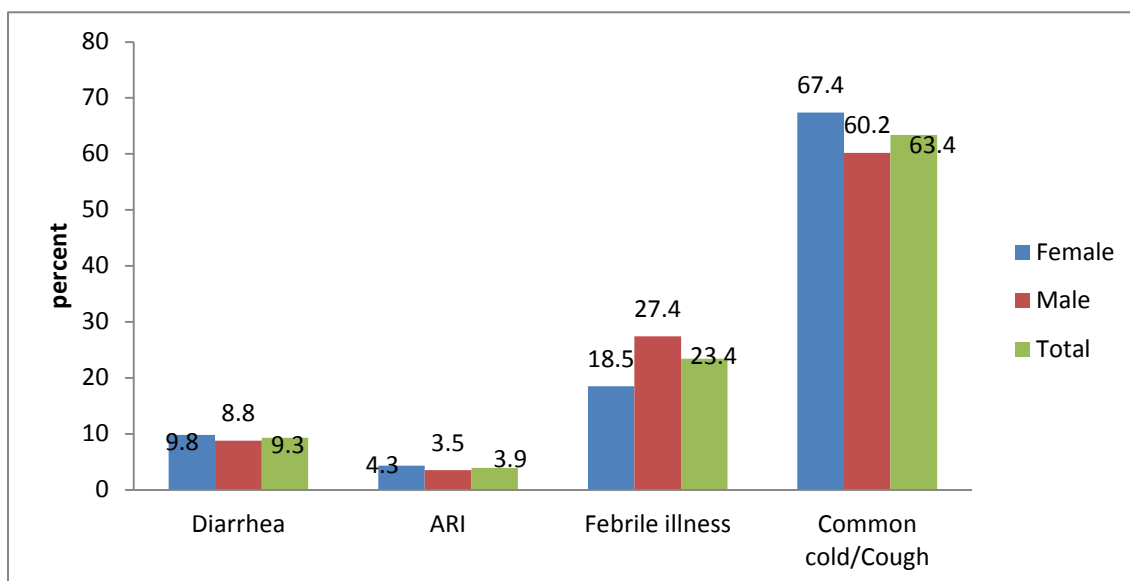
Figure 5: Distribution of the children by illnesses

4.1.1 Healthcare Sought During Illness

Table 13 show the distribution of the children by the type of healthcare sought during illness. The study population that utilized public health facilities were 14.6% while private facilities were 51.7%. There were those who used own medicine 16.1% while others never used any medication at all during illness in the reference period 14.1%.

Table 14: Distribution of the children by type of healthcare sought during illness

	Frequency	Percent
No assistance sought	29	14.1
Own medication	33	16.1
Private clinic/Pharmacy	106	51.7
Public health facility	30	14.6
Others	7	3.4
Total	**205**	**100.0**

4.1.1 Child Immunization Status, Vitamin A Supplementation and Deworming

Figure 6 show the immunization status in the study population. Those children who had received BCG/OPV0 were 99.4%, OPV/DPT1 were 99.1%, OPV2/DPT2 were 97.8%, OPV3/DPT3 were 96.3%, Measles 84.5% while Vitamin A was 60.9% and Deworming was 62.4%. There were no significant differences found between those children who are fully immunized and those not fully immunized for age (p>0.05). 81.1% of the children had received all the immunizations recommended for their respective ages. Only two children 0.6% did not receive the BCG immunization at birth. Although not considered as an immunization, vitamin A supplementation every six months and deworming every 3 months recorded the lowest numbers.
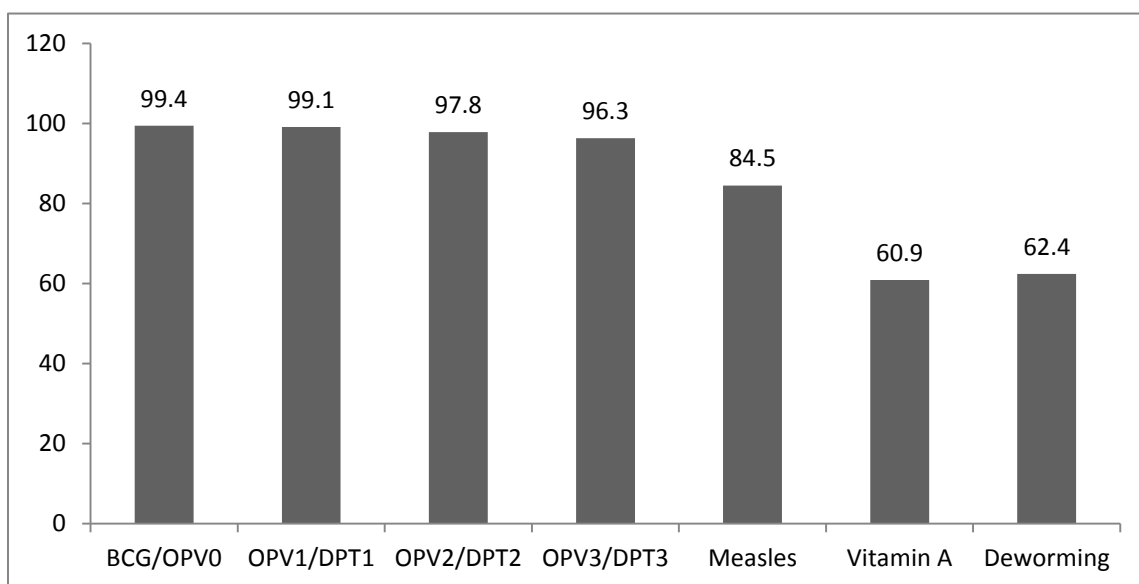
Figure 6: Immunization of the Children, Vitamin a Supplementation and Deworming

CHAPTER FIVE: DISCUSSION

5.1 SOCIO-DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

The demographic and socioeconomic characteristics identified in the study population were; Marital status of the mothers, Age composition of the study population, Parents occupation, Education of the parents, Household size, Household's main economic activities and Household's income use. Previous studies indicated that greater household income directly raise the ability to purchase sufficient quantities of nutritious foods (Miller & Rodgers, 2009). In a study carried out in Kwale, the demographic and socio-economic factors were implicated as the underlying causes of the poor nutritional status of children in Kenya (Adeladza, 2009).

The study showed that there were more women married hence upholding the moral values of the family and creation of conducive environment for upbringing of children. In a study by Kenya demographic health survey 2008-2009, 58 percent of the women were married (KNBS, 2010).

This study showed that age and sex were important demographic variables, where the distribution of the household population had more persons in the younger age groups for both sexes. According to a study by Kenya demographic health survey, the distribution of the household population had more persons in the younger age groups than in the older age groups for both sexes, with those age 0-19 accounting for more than half of the population (KNBS, 2010). The population distribution in this study has more persons in the younger age group than in the older age groups for both sexes. The dependency ratio of this study was 83%, a clear indication that there is a heavy burden to the household to be able to meet their

basic requirements especially adequate food and proper healthcare for all members in the family.

The current study indicates that the respondents who were mothers were housewives who dependent solely on their spouses to provide money for essential basic needs like food, shelter, clothing, while a few were self employed. There is need to empower women so as to be able to contribute to the family basket to easy straining in the household basic needs. According to 2008-2009 KDHS majority of women were employed and as compared to the unemployed (KNBS, 2010). The findings of this study show a big disparity between men and women in terms of employment an indication that men were the major breadwinners in most of the households. It was observed that most families were struggling to afford even a single day's meal, decent housing, clean water for use, proper healthcare for the household members, good sanitation and environmental hygiene which are essential for good nutritional status of children.

The study showed that more men had gone past secondary education compared to women and this may have contributed to men getting salaried jobs. Previous studies observed that education is a key determinant of the lifestyle and status an individual enjoys in a society (KNBS, 2010). In a study carried out in Kwale it was observed that a mother's education is closely linked to nutritional status of children. Children of no educated mothers are more likely to be underweight than those of secondary-educated mothers (p<0.05) which is consistent with numerous studies showing the importance of maternal education for child health and nutrition (Adeladza, 2009). In a previous study it was identified that greater education for mothers contributes to new skills, beliefs and choices about sound health and nutritional practices (Miller & Rodgers, 2009). Similarly a study in the Democratic Republic of Congo established that mother's education has a positive effect on child health in

developing countries (Emina, et al., 2011). The lack of attainment of appropriate education levels observed in the respondents who were mothers requires to be addressed if the nutritional status of children has to improve; indeed an educated woman has a positive impact to the household and national development.

The findings of this study show the mean size of the household as 4.2 people similar to a study carried out by Kenya Demographic and Health Survey in 2008-2009 (KNBS, 2010). Other studies have shown that more children in a household are associated with more competition for scarce resources, which could affect children's dietary intake, decrease access to medical treatment and increase their exposure to infectious diseases (Miller and Rodgers, 2009).

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living (Piya, et al., 2011). In this study it was observed that the main source of livelihood for households was employment either permanent or casual. The earnings of the study population were distributed among the various basic uses of the households. The study showed that the income earned by households respondents and spouses was not enough to enable them afford a diversified diet, proper housing, give their children good education and access appropriate healthcare and healthcare schemes like medical insurances. Previous studies in Pakistan showed that the sources of livelihoods were farming, wage earners, self-employed, business, remittances and casual labour (Urrehman & Rana, 2008)

5.2 MATERNAL NUTRITIONAL KNOWLEDGE

Nutrition knowledge is the understanding of different types of food and how food nourishes the body and influences health (Insel et al., 2003). Nutrition knowledge affects food choices and preparation, knowledge particularly given to women is a powerful weapon against

malnutrition since increased knowledge and skills enable women to earn higher incomes and thus enhance household food security and improve the quality of day to day care women gives themselves and all members of their household, especially children. It empowers women to make optimal choices for nutritious and safe food (Ongosi, 2010). Maternal nutrition knowledge has frequently been identified as an important target for nutrition promotion interventions (Laurens, et al., 2012).

In this study majority of the mothers interviewed had knowledge of Malezi bora while a few of them did not have any knowledge at all. The mothers who had knowledge of the programme were able to list different sources, health facilities and community health workers being the most mentioned. In the study a small percentage of mothers were aware of malezi bora activities while the rest of them did not know any activity. The study observed that the Malezi bora activities of interest were; vitamin A supplementation, deworming and nutrition messages. In this study it was observed that there is need to decentralise the malezi bora programme from the health facilities to the community level in order to involve those mothers who rarely or never access healthy facilities at all.

The study findings showed that majority of mothers were not aware of any vitamin A and protein source. The most mentioned sources were fruits and beans respectively. In a previous study in Sri Lanka it was realized that the knowledge of the mother regarding the importance of vitamin A was not satisfactory (Wijesinghe et al., 2010), while a study in Bangladesh determined that the children's nutritional habits are positively affected by higher nutritional knowledge of mothers (Faraque, et al., 2008). In another study, mother's nutritional knowledge was determined to increase in parallel with the education level (Variyam, et al., 1999). In this study it was observed that majority of households, children 6-59 years were not consuming foods that are rich in vitamin A and proteins especially animal sources due to low

income earned by the household, inadequate nutrition knowledge of mothers and cultural beliefs. Protein foods of reference like eggs were not given to children reason being that they would delay in speech.

Reports by Parul Christian and others revealed that a mother is the principal provider of the primary care that her child needs during the first six years of its life. The type of care she provides depends to a large extent on her knowledge and understanding of some aspects of basic nutrition and health care. It is understandable that her educational status has been reported to influence her child-care practices (Christian et al., 1988). Similarly, another study revealed that maternal nutrition knowledge was independently associated with nutritional status after the effects of other significant variables were controlled (Appoh & Krekling, 2005). In other previous studies mothers with higher levels of nutrition knowledge, acquired primarily outside of school, are able to choose a more diversified diet for their children and, broadly speaking, to utilize food more effectively (Francesco, 2010). In addition reports on maternal nutritional knowledge and the nutritional status of preschool children in Kibera slum area, by Waihenya and others (1996) revealed that most mothers had access to nutrition education and there was no significant relationship between the nutritional status of children and overall nutritional knowledge. This is because, nutritional knowledge alone is inadequate in ensuring young children's nutrition security and, hence, for nutrition education programmes to have a positive impact, facilitational strategies must be incorporated (Waihenya, et al., 1996).

5.3 NUTRITIONAL STATUS OF THE CHILDREN

The results of this study revealed that prevalence of stunting (Height-for-age) among the children was high. The prevalence of severe stunting was significantly higher among males compared to females. Previous studies in an informal settlement (kibera) in Nairobi showed

the prevalence of stunting among boys to be higher than among girls (Olack, et al., 2011). The current study shows no significant difference in the prevalence of stunting between children whose mother knew about malezi bora and those whose mothers did not know about malezi bora. According to KDHS 2008-2009 stunting of children under five years was higher nationally. Stunting reflects failure to receive adequate nutrition over a long period of time and is also affected by recurrent and chronic illness. Height-for-age, therefore, represents the long-term effects of malnutrition in a population and is not sensitive to recent, short-term changes in dietary intake (KNBS, 2010). Previous studies showed that girls and boys are almost likely to be stunted globally, but in sub-Saharan Africa stunting afflicts more boys than girls (UNICEF, 2013).

This study showed that the prevalence of Underweight (weight-for-age) was not different from the national statistics. There was no significant difference on the prevalence of underweight between males and females. A previous study by Kenya Demographic and Health Survey of 2008-2009 showed that underweight of children under five is lower than stunting (KNBS, 2010). In a report by UNICEF a ten per cent of children in the developing world are severely underweight (UNICEF, 2009).

In this study wasting or low weight-for-height was lower than stunting and underweight. In previous studies by KDHS 2008-2009 the percentage of children wasted was lower than stunting (KNBS, 2010). The study showed no significant difference in the prevalence of wasting between children whose mothers knew about malezi bora and those with no information of malezi bora. According to UNICEF a small percentage of children are wasted (UNICEF, 2009). Similarly, a study in Libya shows that stunting of children was higher than underweight and wasting (Adel et al., 2008). Previous reports showed that in sub-Saharan Africa, nearly 1 in 10 children under the age of five years were wasted in 2011 a prevalence that has decreased about 10 per cent since 1990 (UNICEF, 2013).

5.3 IMMUNIZATION OF THE CHILDREN

Immunization averts an estimated 2.5 million child deaths a year, but despite the successes, millions of children in developing countries-almost 20% of the children born every year-do not get the complete immunizations scheduled for their first year of life (WHO, 2009).

There were no significant differences (p>0.05 between those children who are fully immunized and those not fully immunized for age. Majority of children had received all the immunizations recommended for their respective ages. Previous studies by KDHS 2008-2009 showed that majority of children age 12-23 months were fully vaccinated at time before the survey (KNBS, 2010). This study revealed that the study population adhered to the immunization procedures of the children under five years promptly except for few who did not. Although not considered as an immunization, vitamin A supplementation every six months is preceded by the deworming three months before is carried out as routine.

5.4 CHILD MORBIDITY

The incidence of child morbidity has been shown to be higher in slums and peri- urban areas than in more privileged urban settings or, sometimes, even rural areas ((UNICEF, 2012). Child health remains one of the most popular development indicators because it measures the quality of life in developing countries (Konseiga, 2008). The findings showed that majority of children were suffering from different illnesses prior to two weeks before the study and common cold was the most reported by the mothers. This is as a result of poor housing conditions leading to congestion, poor sanitation and low social economic status, making it difficult for the parents to afford warm clothing for their children. Majority of the mothers sought treatment from both the public health facilities and private clinics. In the 2008-09 KDHS, most mothers sought advice or treatment for their children's illnesses from the health facilities (KNBS, 2010). Previous studies show that caretakers sought medical care more

frequently for diarrhoea symptoms than for coughing and even more so when the diarrhoea was associated with fever (Taffa and Chepngeno-Langat, 2005).

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Majority of mothers are married, most of them being housewives and majority had attained primary and secondary levels of education. The total household income is shared among basic needs with food and house rent taking the highest share as health care and savings take less.

The study concluded that mothers' nutritional knowledge exists but it is low.

Generally the nutritional status of the children was normal, except for stunting which was significantly higher than wasting and underweight, though lower than the national coverage.

Majority of children suffer from common cold and febrile illness, necessitating their mothers to seek treatment especially from private clinics than public health facilities. Majority of children had received their immunizations by the age of 24 months.

6.2 RECOMMENDATIONS

The study recommends the following:

There is need to educate women on allocation of income to health care services just as for food to improve on declining child survival and promote growth development.

The Ministry of Health to decentralise Malezi Bora programme from the health facilities to the community level nationally, through CHWs in order to involve all mothers who rarely or never access healthy facilities at all. There is need for creation of awareness to all mothers about the routine services offered at the health facilities.

Further studies based on the results of this study to be carried out to enable assessment and evaluation of the programme both internally and externally.

There is need for further study to establish the reasons why stunting is more prevalent than wasting and underweight in the current study, especially in males than females.

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Appendix 1: Study introduction and consent seeking

Hello? My name is ⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯ I am carrying out research on performance of malezi bora programme on improving the nutritional knowledge of mothers and nutritional status of children aged 6-59 months in Kawangware, Dagoretti District, Nairobi County.

Your household has been randomly selected from among many others. The information you give us will be treated confidentially and your name will not reflect in the main report. It is voluntary to take part in the survey, but we urge you to participate whole heartedly. Should you have any questions we will gladly answer you.

Respondent agreed to be interviewed

YES   NO

Signature of interviewee _____   Date _____

Appendix 2: Questionnaire

THIS IS A STUDY ON THE PERFORMANCE OF MALEZI BORA PROGRAMME IN IMPROVING THE NUTRITIONAL KNOWLEDGE OF MOTHERS AND NUTRITIONAL STATUS OF CHILDREN AGED 6-59 MONTHS IN KAWANGWARE, DAGORETTI DISTRICT, NAIROBI COUNTY

Identification

Province...................................... Location.............................Sub-location...........................

Name of Interviewer... Date of interview............./.........../2012

Respondent's name.. Sex: ☐FEMALE ☐ MALE

SECTION A: DEMOGRAPHIC AND SOCIO-ECONOMIC DATA

1. Number of household members_____ No. below 15years old _____

   No. above 65years old _____ No. between 15 and 65years____

2. Marital status of the mother_____

   1. Married   2. Single   3. Separated   4. Divorced   5. Widowed

3. Level of Education of (a) mother _____ (b) father _____

   1. No education   2. 1-4 years   3. 5-8 years   4. Secondary school

   5.   College/university   6.   Adult education

4. Occupation of (a) mother_____ (b) father _____

   1.   Salaried employee   2. Farmer 3. Self employment   4. Casual labourer

5.Housewife 6. Unemployed   7. Others (specify) _____

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

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

4. Begging   5. Gifts   6. Trade   7. Crop sale 8. Remittances   9.Other

(specify)_____

6. What is the household's average monthly income? _____

7. How is your household income distributed among the uses listed in the table below

[using proportional piling method- use 100 seeds]

Food (%)=1	Health care (%)=2	Others (%=3)

SECTION B: MORBIDITY; Q9-Q13

8. Has your child been sick in the last two weeks?

      1.   Yes   2. No

9. If yes, how many times? _____

10. How many days in each occasion? _____

11. Did you seek healthcare assistance when child was sick?

      1.   Yes   2. No

13. If yes, where? _____

1. Own medication   2. Traditional healer   3. Private clinic/ Pharmacy

4. Public health facility   5. Other (specify)...............................

14.Did your child suffer from_____?	1.Yes		2.No
14a.If yes_____	No. of times	No. of days/occasion	
a) Diarrhoea			
b) Cough			
c) Malaria			
d) Shortness of breath			
e) Vomiting			
f) Headache			
g) Bloody stool			
h) Bloody urine			
i) Rashes			
j) Joint and body pains			

Q14-Q22; IMMUNISATION STATUS OF CHILDREN AGED 6 - 59 MONTHS IN THE HOUSEHOLD

14.Name of child	Q15 Date of birth *(card)*	Q16 Age in months	Q17 Has the child been provided with Vitamin A in the last 6 months? *1=Yes 2=No*	Q18 BCG at birth 1=Yes 2=No	Q19 DPT 1=Yes 2=No			Q20 OPV 1=Yes 2=No				Q21 Meas-les 1=Yes 2=No	Q22 Fully immune-zed for age 1=Yes 2=No
					DPT 1	DPT 2	DPT 3	OPV 0	OPV 1	OPV 2	OPV 3		

Q 23-28 ANTHROPOMETRY MEASUREMENT

23.Child ID	24.Name	25.Age (yrs)	26.Weight *(nearest 0.1 kg)*			27.Height *(nearest 0.1 cm)*			28.MUAC		
			1	2	Average	1	2	Average	1	2	Average

SECTION C; FOOD FREQUENCY FOR CHILDREN 6-59 MONTHS

29. How often do you give children the following foods? Interviewer:

Food	Once/week=1	Twice/week=2	Not at all=3
Cereals-rice Ugali Githeri			
Milk-fermented milk Fresh milk			
Sugar and honey			
Oils/fats - cooking fat Margarine			
Meat-offal(matumbo) Chicken parts Beef			
Pulses/legume-beans lentils(kamande) Green grams(dengu)			
Roots and tubers-ngwace(sweet potatoes Gwaru(iris potatoes arrowroots(nduma)			
Vegetables-kales(sukuma) Spinach Carrots Amaranth(terere)			
Eggs			
Fruits-water melon Mangoes and oranges, Bananas			
Fish- fried/boiled/roasted Omena (sardines) Fish parts			
Beverages-porridge(uji) Tea			
Other foods not listed that you regularly eat			

SECTION C: WATER, SANITATION AND HEALTH FACILITIES

Q30a What is your main source of drinking water? _____

1 =Tap   2 =Borehole (protected)   3=Borehole (not protected)   4=River   5= Well (not protected)   6= Well (protected)   7= spring   8 =rain water   9=Other (specify)..

Q30b   Do you treat your drinking water? _____   1=Yes   2=No

Q30c   If Yes in Q14b how do you treat your water? _____

1=boiling, 2=expose it to the sun,   3=use chemicals (water guard), 4=filters/sieves

5=other (specify)...................

Q31a   Presently, how much water do you use for domestic purposes in litres per day? _____it's; 99 = have plenty flowing/tap water

Q31b   How far is the water source to and fro including waiting time? _____minutes

Q31c   Which means of transport do you use to get there? _____

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

6. = Others (specify) _____

Q32   What kind of toilet facility does your household use? _____

1= Traditional pit latrine   2== Ventilated improved latrine

3=None/Bush/Field 4=other (specify).........................

Q33   What health care facilities/ services do you have access to?

1= Public hospital/health centre   2=Private hospital/health centre   3=none

4=other (specify)...........................

Q34   How far is the nearest health facility, where you get your services? _____minutes

SECTION D; NUTRITION KNOWLEDGE

Q35a Have you ever heard of Malezi Bora?1= Yes2=No_____

Q36b If yes from where? _____

Q37 what do you know about Malezi Bora? _____

Q38 Are you aware of any malezi bora activities? 1=Yes 2=NO

Q39 what nutrition messages do you know in relation to child care practices? _____

Q40 Do you take your child to the clinic after measles injection for weighing? 1=Yes 2=No

Q41 Have you ever participated in Malezi Bora campaign? 1=yes 2=No

Q42 what are the main sources of vitamin A? _____

Q43 what are the sources of proteins? _____

Q44 what is a balanced diet? _____

Q45a Do you deworm your child? 1= Yes2=No_____

Q45b If yes how often? _____

Q46c where do you get the dewormers from? 1=Healthy facility 2=shop 3=pharmacy

Appendix 3: Focused group discussion Guide

Name of moderator_____   Date_____

Name of recorder_____   Place_____

No	Name of participant	Occupation	Marital status	Number of under fives	Nutrition knowledge
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Question guideline:

What do you understand about nutrition?

1. Is nutrition essential for the growth of your child? 1=yes 2=No
2. If yes how?
3. What is a balanced diet?
4. Name three sources of vitamin A and C?
5. Do you deworm your children? 1=yes 2=No
6. If yes how often?
7. What do you know malezi bora?
8. Name four activities carried out during malezi bora week?
9. Give me two nutritional messages about child care practices?

Thank you for your attention

Appendix 4: Training curriculum

Day	Time	Subject matter	Learning material	Learning/Teaching Aid
9.08.12	8.30	Introduction, climate setting		
	9-00-11.00 am	Instruct and discuss guidelines on ethics throughout the study; Dress code, clean, smart and decent. Timetable, purpose and background of the survey, organization of the survey team and division of responsibility Explain sample frame Question by question review of the questionnaire, techniques of interviewing, recording answers and checking questionnaire Explain specific indicators of nutrition. Definitions of terms used in the questionnaire	Demonstration Discussion Taking notes	Handouts With ethical Guidelines Note books Questionnaire
	11.00-12.30	To instruct on how to take anthropometric measurements: 1.Weight 2.Height3 3.MUAC	Demonstration Discussion Take notes	Weighing scale Height board Questionnaire Pencils Note books
	12.30-1.00pm	L u n c h	B r e a k	
9.08.12	8.30-9.30am	Standard test for all the enumerators	Taking measurements	Weighing scale Height board Questionnaire Pencils Note books
	9.30-11.00 am	Role play among the enumerators on how to administer the questionnaire to the respondents.	Demonstration	Weighing scale Height board Questionnaire Pencils Note books
	11.00-3.00pm	Proceed for pretesting		

Appendix 5: Protocol for taking the weight and length/height of the children
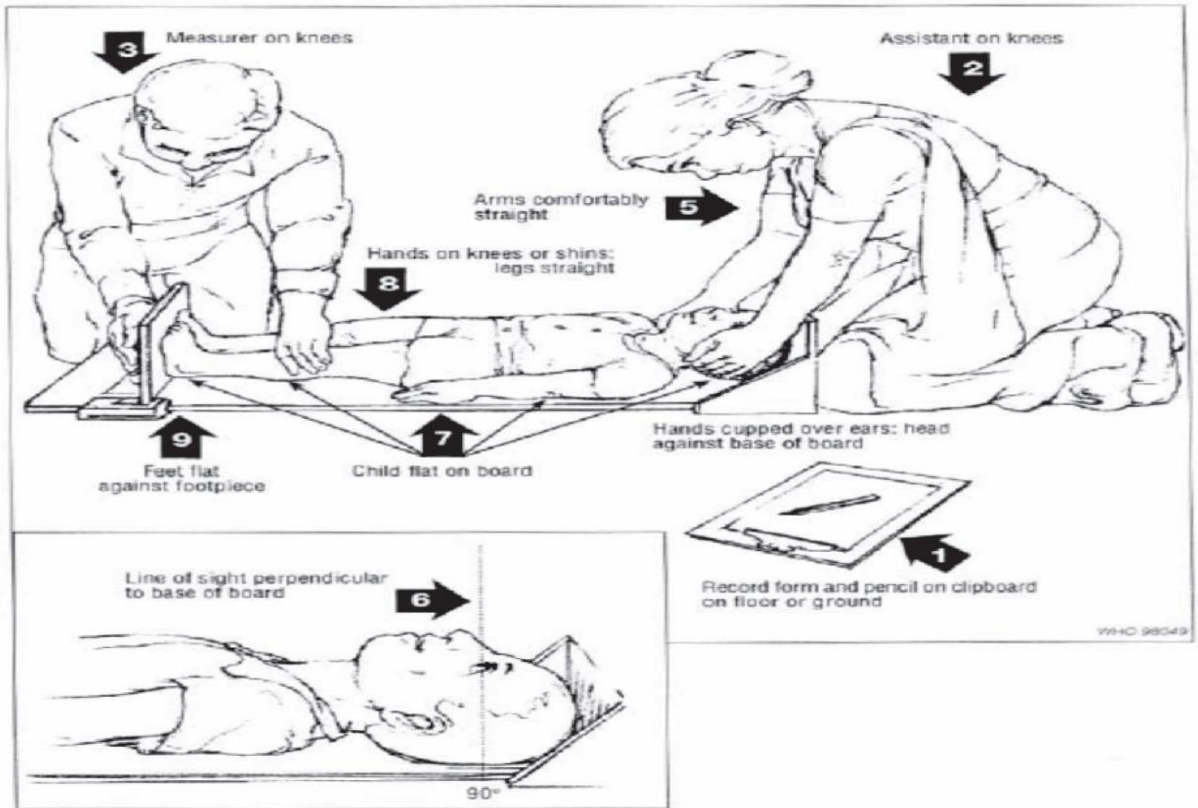
a. Steps to be followed when weighing a child using a hanging spring balance and pants

1. Explain to the child's mother what you intend to do.
2. Hang the scale from a suitable point such as tree, doorframe, or a stick held from the shoulders of two people
3. (local men can be enlisted to accompany the team for this specific purpose). The dial on the scale must be at eye level.
4. Hang the weighing pants from the hook of the scale and check that the needle reads zero.
5. Remove the child's clothes and any jewellery, and place him or her in the weighing pants.
6. Hang the weighing pants, with the child in them, from the hook on the scale.
7. Check that nothing is touching the child or the pants.
8. Read the scale at eye level to the nearest 100 g (0.1kg).
9. Say the number out loud.
10. The assistant should repeat the weight out loud so that everyone can hear, and write the weight on the datasheet.

b. Steps to be followed when measuring the length/.height using the height board

1. Explain the procedure to the child's mother or caregiver.

2. Remove the child's shoes and any hair ornament or knot on the child's head.

3. Place the child gently onto the board on his/her back, with the head against the fixed vertical part and the soles of the feet near the cursor or moving part.

4. The child should lie straight in the middle of the board, looking directly up.

5. The assistant should hold the child's head firmly against the base of the board.

6. The measurer places one hand on the knees (to keep the legs straight), leaving the child's feet flat against the cursor with the other, and pushing the cursor against the feet firmly but gently.

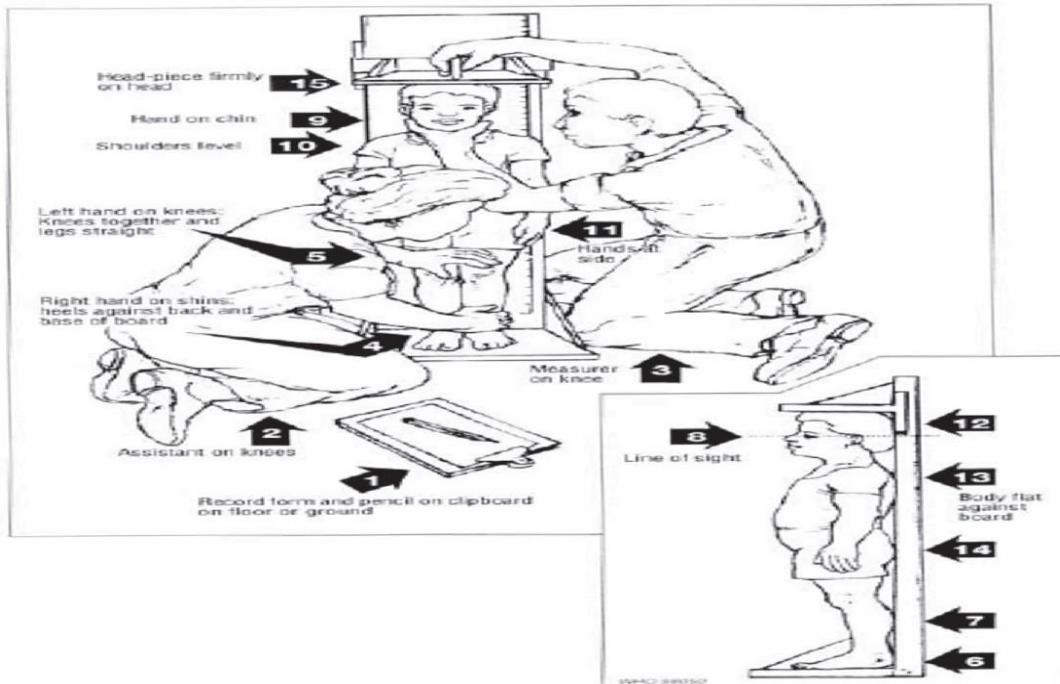7. The measurer reads and announces the length to the nearest 0.1cm.

Fig. A3.2 *Measuring a child's length*[1]

3 Measurer on knees

2 Assistant on knees

5 Arms comfortably straight

8 Hands on knees or shins: legs straight

9 Feet flat against footpiece

7 Child flat on board

Hands cupped over ears: head against base of board

1 Record form and pencil on clipboard on floor or ground

WHO 98049

6 Line of sight perpendicular to base of board

90°

[1] Adapted, with permission, from *Assessing the nutritional status of young children: preliminary version.* New York, United Nations Department of Technical Co-operation for Development and Statistical Office, 1990.

8. The assistant repeats the measurement out loud and records it on the datasheet.

Fig. A3.3 Measuring a child's height[1]

Head-piece firmly on head — 15

Hand on chin — 9

Shoulders level — 10

Left hand on knees: Knees together and legs straight — 5

Right hand on shins; heels against back and base of board — 4

Hands at side — 11

Measurer on knee — 3

Assistant on knees — 2

Record form and pencil on clipboard on floor or ground — 1

Line of sight — 8

12

Body flat against board — 13

14

7

6

WHO 93050

[1] Adapted, with permission, from *Assessing the nutritional status of young children: preliminary version*. New York, United Nations Department of Technical Co-operation for Development and Statistical Office, 1990.

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