DETERMINANTS OF COMPLEMENTARY FEEDING PRACTICES AND NUTRITIONAL STATUS OF CHILDREN 6-23 MONTHS OLD IN KOROGOCHO SLUM, NAIROBI COUNTY, KENYA

BY

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DECLARATION

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

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DEDICATION

This thesis is dedicated to: the almighty God, my wife Bibiana Jumwa Korir, my parents Mr. Benjamin Lang'at and Mrs. Leah Lang'at and all my friends who made the whole study process easy.

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ABSTRACT

Scientific evidence on infant and young child feeding practices from developing countries show that progress is possible when effective strategies and sufficient resources are applied. However, significant gaps in complementary feeding continue to undermine child health. There is limited scientific data on complementary feeding practices and its relation to nutritional status of children aged 6-23 months old in Kenya's urban slums. The study therefore investigated complementary feeding practices in relation to the nutritional status of children aged 6-23 months old in Korogocho slum in Nairobi. The study used cross sectional analytical design and targeted 322 mothers with children 6-23 months old. Proportionate stratified sampling was used to select children in different age categories and two stage cluster sampling was used to select households with mothers/caregivers and children 6-23 months old. A researcher-administered questionnaire and focus group discussion guide were used to collect information from the respondents. Weight and length measurements were used to assess the nutritional status of children based on the weight and length indices. All (100%) the children 6-8 months old had received solid, semi-solid or soft foods. The minimum meal frequency was attained by 88.3% (95% CI 84.3-91.4) whereas the minimum dietary diversity was attained by17.9% (95% CI 14.1-22.5). In addition, the minimum acceptable diet was attained by 15.4% (95% CI 11.9-19.8). Maternal knowledge on: importance of breastfeeding (87.3%); age of introduction of complementary foods (85.4%) and correct meal frequency for age (74.5%) was high. On the contrary, knowledge on the importance of enriching complementary foods (34.5%) was low. Under nutrition was high among the children: wasting (8.4%, 95% CI 5.6-11.9); underweight (9.8%, 95% CI 7.1-13.6) and stunting (20.1%, 95% CI 16.1-24.8) respectively. The prevalence of morbidity among the children was also high with 54.3% having diarrhoea, 33.8% vomiting, 45.7% fever and 34.6% ARIs. Mothers who knew the importance of a diverse diet were likely (chi-square test; p=0.001) to feed their children on a diverse diet. On the other hand, mothers who knew the importance of enriching complementary foods were likely to feed their children on a minimum acceptable diet (chi-square test; p=0.007). Children who had diarrhoea episodes were less likely to consume vitamin A rich foods (chi-square test; p=0.036) and to achieve minimum dietary diversity (chi-square test; p=0.033). Lack of minimum acceptable diet was a significant predictor of nutritional status of the children based on the wasting (ODDS Ratio [OR]=2.56, p=0.038). Absence of diarrhoea in the past 2 weeks (OR=1.77, =0.040), younger mothers (OR =1.77, p=0.030) and maternal knowledge on enriching complementary foods (OR=3.41, p=0.040) were significant predictors of consumption of Vitamin A rich foods, minimum meal frequency and minimum acceptable diet respectively. Behaviour change and communication involving all the stakeholders in infant and young child feeding should be emphasized. Messages on appropriate feeding practices should include importance of dietary diversity. A longitudinal study should be conducted to effectively link feeding practices and individual growth patterns.

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DEFINITION OF TERMS

Adequacy of complementary food- refers to capacity of complementary food to provide sufficient energy, protein, and micronutrients to meet a growing child's nutritional needs (WHO, 2001).

Complementary feeding: refers to the process starting when breast milk is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are introduced to the infant, along with breast milk (PAHO/WHO, 2003).

Complementary feeding practices- covers: time of introduction of solid and semi-solid foods or soft foods; frequency of feeding, dietary diversity; consumption of iron-rich foods and continued breastfeeding among children 6-23 months old (PAHO/WHO, 2003).

Complementary food: Any solid, semi-solid or soft food, whether manufactured or locally prepared, suitable as a complement to breast milk or to infant formula, when either becomes insufficient to satisfy the nutritional requirements of the infant (PAHO/WHO, 2003).

Introduction of solid, semi-solid or soft foods- Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods during the previous day (WHO, 2008b).

Minimum acceptable diet- Proportion of breastfed children 6–23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day, and non-breastfed children 6–23 months of age who received at least two milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day (WHO, 2008b).

Minimum dietary diversity- Proportion of children 6–23 months of age who receive foods from four or more food groups during the previous day. The seven food groups used for tabulation of this indicator were: grains, roots and tubers; legumes and nuts; dairy products (milk, yoghurt and cheese); flesh foods (meat, fish, poultry and liver/organ meats); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables (WHO, 2008b).

Minimum meal frequency- Proportion of breastfed and non-breastfed children 6–23 months of age who receive solid, semi-solid or soft foods the minimum number of times or more (minimum is defined as: two times for breastfed infants 6–8 months; three times for breastfed children 9–23 months; and four times for non-breastfed children 6–23 months) in the previous day (WHO, 2008b).

Nutritional status- refers to the current body status of an individual or a population group related to their state of nourishment (the consumption and utilization of nutrients). Nutrition status was assessed by anthropometry which is the measurement of body height/length, weight and proportions. These measurements were compared to the WHO Growth Standards (2006) of the same age and sex in order to evaluate the nutritional status. The nutrition status indices used in this study were: stunting/Length-for-Age Z scores (LAZ); wasting/Weight-for-Length Z scores (WLZ) and underweight/Weight-for-Age Z scores (WAZ).

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LIST OF ABBREVIATIONS AND ACRONYMS

APHRC	African Population and Health Research Centre
BFCI	Breastfeeding Community Initiative
EPI	Expanded Program on Immunization
FANTA	Food and Nutrition Technical Assistance
HIV	Human Immunodeficiency Virus
IYCF	Infant and Young Child Feeding
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
MIYCN	Maternal Infant and Young Child Nutrition
MOMS	Ministry of Medical Services
MOH	Ministry of Health
NGO	Non Governmental Organization
PAHO	Pan-American Health Organization
UN	United Nations
UNICEF	United Nations Children's Fund
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

An appropriate diet is a critical component for proper growth and development of children (Aggarwal *et al.*, 2008, Butte *et al.*, 2000). The first two years of life are a critical window for ensuring optimal child growth and development (World Health Organization [WHO], 2008a). Nutritional deficiencies during this period can lead to impaired cognitive development, compromised educational achievement and low economic productivity (Grantham-McGregor *et al.*, 2007) which become difficult to reverse later in life (WHO, 2008a). Improving infant and young child feeding (IYCF) practices in children 0–23 months of age is therefore critical to improved nutrition, health and development (WHO, 2008b).

Scientific evidence indicates that inappropriate feeding practices can have profound consequences for the growth, development and survival of infants and children (Saha *et al*., 2008). Various inappropriate complementary feeding practices such as; untimely introduction of complementary food, improper feeding frequency and low dietary diversity of complementary foods have been shown to have numerous negative effects on children's health (Kapur, Sharma & Agarwal, 2005; WHO, 2003). Appropriate complementary feeding entails; introduction of complementary foods at 6 months with continued breastfeeding up to at least 2 years and beyond, correct feeding frequency for age and consumption of a diverse diet (Arimond *et al*., 2008).

The adverse consequences of poor complementary feeding practices justified the publication of guidelines on optimal nutrition of infants and young children by WHO (Dewey & Brown, 2003). Deriving from the broad principles of the joint WHO and UNICEF's Global Strategy for Infant and Young Child Feeding developed in 2003 (WHO, 2010); the government of Kenya is implementing a number of strategies aimed at improving IYCF practices in the country. Three examples of these strategies are: maternal infant and young child nutrition (MIYCN) guidelines; Baby Friendly Community Initiative (BFCI) and revitalization of Baby Friendly Hospital Initiative (BFHI) (GOK, 2012).

Infant and young child feeding practices have improved over the recent past (United Nations Children's Fund [UNICEF], 2009a. In the developing world, however, only 39% of infants less than 6 months are exclusively breastfed and 6% are never breastfed (Lauer *et al*., 2004). In Kenya, according to the Kenya Demographic Health survey findings (KDHS) only 32% of infants less than 6 months are exclusively breastfed, showing that complementary feeding starts early (Kenya National Bureau of Statistics [KNBS] and Inner City Fund [ICF] macro, 2010). The level of under-nutrition among children less than 2 years of age in Kenya is high; 8.3%, 14.1%, 35.2% of the children are wasted, underweight and stunted respectively. The high level of under-nutrition is due to inappropriate feeding practices in addition to other immediate, underlying and basic causes (KNBS and ICF macro, 2010).

Poor urban settlements which are expanding at a fast rate present unique challenges with regards to child health and survival. The global assessment of slums undertaken by United Nations Human Settlements Programme (UN-HABITAT) in 2008 showed that

sub-Saharan Africa has the highest number of slums with 62% of the urban population living in slums. These slums are characterized by poor environmental sanitation and livelihood conditions (Kimani-Murage & Ngindu, 2007; African Population & Health Research Center [APHRC], 2002). Contrary to the long-held belief that urban residents are advantaged with regard to health outcomes, urban slum dwellers tend to have worse health indicators than their counterparts in rural areas (Fotso, 2007). In line with this, infants born to mothers that reside in urban slums in Kenya may be exposed to sub-optimal breastfeeding and complementary feeding practices (Kimani-Murage *et al.*, 2011).

1.2 Statement of the problem

Poor complementary feeding practices have been widely documented in Kenya despite the government and other stakeholders implementing a number of strategies aimed at improving IYCF practices (Kimani-Murage *et al.,* 2011). In line with this, a significant proportion of infants and young children in Kenya are exposed to the hard consequences of poor complementary feeding practices and the situation is likely to be worse in slums (APHRC, 2002). While mortality due to sub-optimal complementary feeding practices is significant, interventions promoting optimal complementary feeding can prevent 6% of deaths for children under the age of 5 years (Jones *et al.,* 2003). Inappropriate complementary feeding practices such as; untimely introduction of complementary foods, improper feeding frequency and low dietary diversity of complementary foods have been widely shown to increase the risk of underweight and stunting (Kumar *et al.,* 2006; Bloss, Wainaina & Bailey, 2004) especially among the urban poor (Muchina, 2010).

There was limited scientific data on complementary feeding practices and its relation to the nutritional status of children 6-23 months old in urban slums in Kenya. To improve complementary feeding in low-resource settings during this critical period of growth and development, assessment of complementary feeding practices and its relationship with nutritional status was essential. This study therefore obtained information that could be used to facilitate targeting of appropriate interventions geared towards reducing child malnutrition in the urban slums.

1.3 Purpose of the study

The aim of the study was to investigate complementary feeding practices in relation to the nutritional status of children 6-23 months old in Korogocho slum, Nairobi.

1.4 Objectives

1. Establish socio-demographic and economic characteristics of mothers/caregivers of children aged 6-23 months old in Korogocho slum.
2. Establish complementary feeding practices in terms of; the time of introduction, frequency of feeding and dietary diversity of complementary foods among children 6-23 months old in Korogocho slum.
3. Assess mothers'/caregivers' knowledge and perceptions on complementary feeding practices in Korogocho slum.
4. Assess the nutritional and morbidity status of children aged 6-23 months old in Korogocho slum.

5. Determine the factors associated with complementary feeding practices of children aged 6-23 months old in Korogocho slum.
6. Determine the relationship between complementary feeding practices and nutritional status of children aged 6-23 months in old Korogocho slum.

1.5 Hypotheses

H_{01} - There is no significant association between maternal demographic and socioeconomic characteristics and complementary feeding practices among children 6-23 months in Korogocho slum.

H_{02} - There is no significant relationship between complementary feeding practices and nutritional status of children 6-23 months in Korogocho slum.

H_{03} - There is no significant association between maternal/caregivers' knowledge on complementary feeding practices and complementary feeding practices among children aged 6-23 months in Korogocho slum.

H_{04} - There is no significant relationship between morbidity prevalence and complementary feeding practices among children aged 6-23 months in Korogocho slum.

1.6 Significance of the study

The study has generated information that may be useful to the Ministry of Health (MOH) and other agencies working in child health survival programmes. The information generated could be useful in designing appropriate interventions to improve complementary feeding thus mitigating child malnutrition in the target area and other

similar areas. The study has also contributed knowledge to ongoing research efforts on complementary feeding.

1.7 Delimitation of the study

The study was only carried out among children aged 6-23 months in Korogocho slum of Nairobi County and thus the research findings can only be applied to the area and other areas with similar characteristics.

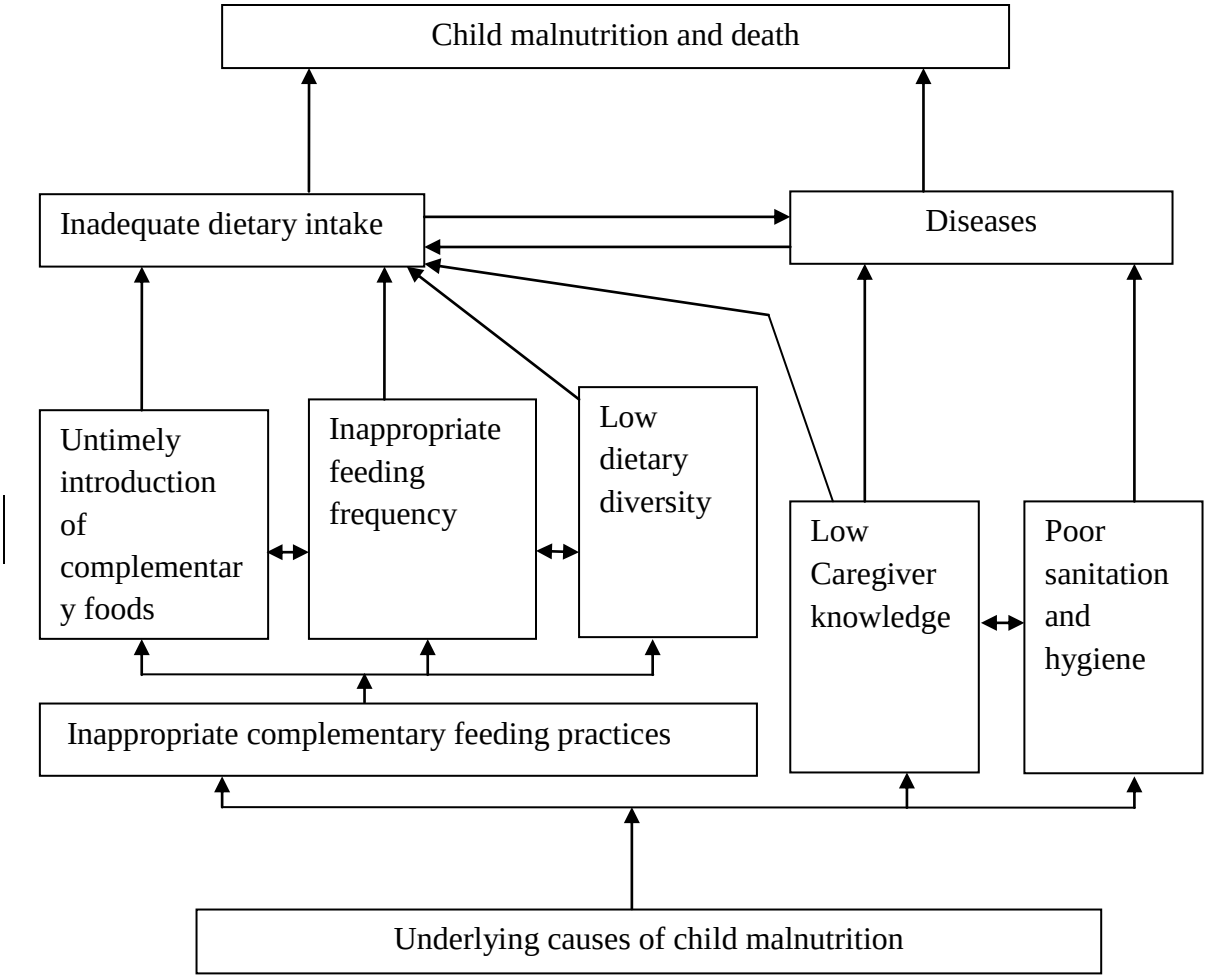
1.8 Limitation of the study

Complementary feeding practices can be best depicted over a prolonged period of time. The data was collected from a cross-sectional study and therefore did not reveal whether reported complementary feeding practices varied over time.

1.9 Conceptual framework for the study

The study used a conceptual framework adapted by the researcher from the causes of maternal and newborn deaths in the state of the world's children report (UNICEF, 2009a). The proximate determinants of child malnutrition and death were inadequate dietary intake and diseases. Proximate determinants were a result of inter-related underlying factors, encompassing: poor complementary feeding practices; inadequate care givers knowledge and poor sanitation and hygiene (UNICEF, 1998). Inappropriate complementary feeding practices which consist of: untimely introduction, improper feeding frequency and low dietary diversity of complementary foods result to inadequate dietary intake (Kapur *et al*., 2005; WHO, 2001). The conceptual framework was central in understanding how different immediate and underlying determinants of

child malnutrition and death interact to affect child's nutrition status and health (Figure 1).



Source: Adapted from the causes of maternal and newborn deaths: The State of the World's Children Report (UNICEF, 2009a).

Figure 1.1: Conceptual framework for immediate and underlying determinants of child malnutrition and death.

CHAPTER TWO: LITERATURE REVIEW

2.1 Role of appropriate infant feeding in the health, development and nutritional status of children

The most recent estimates of the global burden of malnutrition in children younger than five years of age show that 178 million are stunted, 112 million are underweight and 55 million are wasted. Together they account for 21% of all under-5 deaths (Black, 2008), with over two-thirds of these deaths occurring during the first year of life (WHO, 2003). Malnutrition is also a direct cause of mortality, and a major disabler preventing children who survive to reach their full developmental potential (WHO, 2008b).

In the causal matrix of under-nutrition (UNICEF, 1998), an important underlying determinant of child under-nutrition is the care provided to the child. The key care practices that could impact on child nutritional status include breast feeding and complementary feeding (Arimond & Ruel, 2002). Exclusive Breast Feeding (EBF) for the first 6 months of life followed by optimal complementary feeding are critical public health measures in ensuring good nutritional status and reducing mortality significantly (UNICEF, 2009a).

Appropriate complementary feeding which comprise introduction of complementary foods at 6 months with continued breastfeeding to at least 2 years, correct feeding frequency for age and consumption of a diverse diet can prevent 6% (600,000) of child deaths per year (Jones *et al*., 2003). There is, therefore, sufficient reason to both prevent and appropriately manage malnutrition in early childhood through appropriate child feeding if both the short-and long-term consequences are to be avoided (Ramji, 2009).

2.2 Breastfeeding practices

2.2.1 Importance of breastfeeding

Vast scientific literature demonstrates substantial health, social and economic benefits associated with appropriate breastfeeding (Venneman *et al*., 2009). A multi-centre cohort study done in India, Ghana and Peru showed that infants who were not breastfed had a 10-fold higher risk of dying of any cause and a 3-fold higher risk of being hospitalized for any cause compared to those who had been predominantly breastfed (Bahl *et al.*, 2005).

A study carried out in Chittagong, Bangladesh showed that infants who were exclusively breastfed from 0-6 months had a significantly lower prevalence of diarrhoea and acute respiratory infection than those infants who were not exclusively breastfed (Mihrshahi *et al*., 2008). Association between breastfeeding and a number of chronic or non communicable diseases including allergies, obesity, diabetes, hypertension, cancer, and Crohn's disease have been observed by various studies (Leon-Cava *et al*., 2002). Two different studies by Roig *et al.,* (2011) and Engebretsen *et al.,* (2007) showed that more than a third of infants are not breastfed in the first hour following delivery (Roig *et al.*, 2011, Engebretsen *et al.,* 2007).

Despite an increase in EBF rates in Kenya from 13.2% in 2003, (KDHS, 2003) to 32% (KNBS and ICF macro, 2010) in 2008, the number of children who are EBF drops significantly to only 3.6% at 6 months. The prevalence of EBF has yet to reach the WHO acceptable rate of 90% (WHO, 2009) and is also below the global prevalence currently at 37% (UNICEF, 2009a). Studies conducted in Nairobi and other urban areas in developing countries have shown that almost all (90%) of children below the age of 2

years have ever been breast fed (Muchina, 2010; Singh, 2010; Ochola, 2008). Continued breastfeeding has shown a positive picture in developing countries with the majority of the children being breastfed for one year and above (KNBS and ICF macro, 2010; Owino, 2008).

2.2.2 Continued breastfeeding at 1 year and 2 years

A study in Brazil by Parada *et al*., (2007) assessing complementary feeding practices in children during their first year of life found out that continued breastfeeding rates at 8, 10 and 12 months were 51.0%, 43.1% and 37.8% respectively. A study aimed at assessing trends in breastfeeding and complementary feeding practices in Pakistan from 1990 to 2007 by Hanif *et al.,* (2011) established that the percentage of infants 12 to 16 months who continued to breastfeed increased slightly from 78.2% in 1990-91 to 79% in 2006-07. In the same study, continued breastfeeding among children 20-23 months did not increase significantly.

A cohort study in Burkina Faso by Sawadogo *et al*., (2011) established that the duration of breastfeeding was ideal with more than 98% and 61% of children still breastfeeding at 18 and 24 months respectively. In contrast to Sawadogo's *et al*., (2011) findings; Gebru (2010) in a study assessing breastfeeding practices in Addis Ababa established that 90% of the children in the study population continued breastfeeding into the child's second year and beyond.

A study aimed at assessing complementary feeding practices and nutrient intake from habitual complementary foods of infants and children aged 6-18 months old in Zambia by Owino (2008) found out that majority of the mothers (88%) were still breastfeeding

and average cessation of breastfeeding was at 19 months. Data from KDHS conducted in 2008-09 showed that 84% and 59% of children aged 12-17 and 18-23 months old were still being breastfed (KNBS and ICF macro, 2010).

2.3 Complementary feeding practices

2.3.1 Overview of complementary feeding practices

The complementary feeding period is defined as the period during which breast milk must be complemented by other foods of sufficient quantity and quality to cover infant's nutritional needs (WHO, 2003). According to WHO (2003), complementary feeding period starts from 6 to at least 24 months and this is the most critical period for infants' growth and development (WHO, 2003). The nutritional inadequacy of the complementary diet, both in quality and quantity, and the undermining effects of infections on the nutritional status of the child remain major problems affecting infants and young children in the world today (Nti & Lartey, 2007).

2.3.2 Initiation of solid, semi-solid or soft foods

Complementary feeding should be timely, meaning that all infants should start receiving foods in addition to breast milk from 6 months onwards (WHO, 2006). A prospective study by Caetano *et al*., (2010) aimed at assessing feeding practices and dietary intake of healthy infants in 3 Brazilian municipalities found out that the median age of introducing of solid semi solid and soft foods was at 4 months. In another study in Senegal by Gupta *et al.,* (2007), water was introduced to about 85% of the children in the first 3 months of life and 62% were given complementary foods before 6 months. A community based cross-sectional study assessing low adherence to exclusive

breastfeeding in Eastern Uganda by Engebretsen *et al., (*2007), found that 30% of the infants had started receiving other foods in addition to breast milk before 6 months.

In Kenya, a randomized controlled trial by Ochola (2008) evaluating two counseling strategies improving exclusive breastfeeding among HIV-negative mothers in Kibera Slum, Nairobi, found that 61.2% of mothers intended to introduce complementary feeding when the child was less than 6 months. Muchina (2010) in a study in Nairobi informal settlement area reported that 63.1% of infants received complementary foods before the age of 6 months. A comparative study between World Vision Project and non-project areas in Makueni district indicated that 37.5% and 68.3% of infants 0-6 months in the project and non-project areas respectively were introduced to complementary feeds within the first three months (Macharia *et al*., 2004). The above findings concur with 2008-09 KDHS data which indicated that complementary feeding begins early with 24% of newborns less than two months of age receiving complementary foods (KNBS and ICF macro, 2010). Early introduction of complementary foods before the recommended age of 6 months is a common practice in Kenya.

2.3.3 Dietary diversity

Children 6–23 months old should receive foods from 4 or more food groups out of the 7 recommended food groups namely: grains, roots and tubers; legumes and nuts; dairy products; flesh foods (meat, fish, poultry and organ meats); eggs; vitamin-A rich fruits and vegetables; other fruits and vegetables (WHO, 2008b). Consumption of any amount of food from each food group is sufficient to count; there is no minimum quantity,

except if an item was only used as a condiment. The cut-off of at least 4 of the above 7 food groups above was selected because it is associated with better quality diets for both breastfed and non-breastfed children (FANTA/AED, 2007). Consumption of foods from at least 4 food groups on the previous day would mean that in most populations the child has a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable that day, in addition to a staple food (grain, root or tuber). Breast milk is not counted because the indicator is meant to reflect the quality of the complementary food diet. As a consequence, this indicator may show 'better' results for children who are not breastfed than those who are breastfed in populations where formula and/or milk are commonly given to non-breastfed children (WHO, 2008b).

A study conducted to assess dietary diversity of complementary foods and its relationship to micronutrient deficiencies in Mongolia (Lander *et al*., 2010) found out that most children consumed less than 2 food groups out of the recommended 7 groups. That was way below the recommended minimum dietary diversity of ≥4 foods groups as recommended by WHO (2008b).

Similarly, Sawadogo *et al*., (2011) in a study among young children in Burkina Faso found that complementary food diversification was low and limited to cereals. In this study, porridge (the main complementary food) was made up of only a cereal and water in 22% to 71% of the cases. Despite the fact that dietary diversity increased as the infants grew, the minimum of 4 food groups (out of the 7 food groups) recommended by WHO (2008b) was achieved by less than 50% of the children (Sawadogo *et al*., 2011).

Food group analysis in a study assessing complementary feeding in India by Gard and Chadha (2009) showed that the mean intake of cereals and animal milk was highest with consumption of vegetables and fruits being the lowest among the infants. Grummer-Strawn *et al*., (2008) in a study assessing feeding transitions during the first year found out that at 6 months, majority of infants consumed at least one serving per day of solid foods only from 2 food groups. However, by 9 months, 45% of the infants consumed at least 1 serving per day of food from each of the 3 food groups (cereals, fruits and vegetables and meats or meat substitutes).

In Kenya, a study by Mutie-Macharia *et al*., (2010) in Mwingi District, also found that unfortified maize porridge was the main complementary food and diversity was limited in terms of animal products. Nationally, over half (54.0%) of children are fed from the requisite number of food groups (≥4 food groups) (KNBS and ICF Macro, 2010). The overall picture is that dietary diversity is low in most settings in the developing countries. The specific food groups that lack in the diets of children vary from one country to another and over time. Identifying the specific food groups that are lacking in the diets of children is therefore essential in order to include this information in nutrition education and counselling of mothers and caregivers on appropriate complementary feeding practices.

Several studies have demonstrated the shift in consumption from more traditional basic foods, to processed foods, such as cookies and soft drinks (Caetano, 2010; Bertazzi *et al.,* 2005; Popkin, 2002). Romulus-Nieuwelink *et al.,* (2011) in a study conducted in Brazil noted that even though complementary food intake in the study participants included several nutritious foods such as vegetables, fruits and potatoes, less healthy

foods such as biscuits, cookies and sweets were consumed by a large number of infants as well. Review of the available literature did not reveal any study showing the shift in consumption from traditional to processed foods in the study area and similar areas in Kenya.

2.3.4 Meal frequency

Minimum meal frequency is defined as the proportion of children 6-23 months old who receive solid, semi-solid or soft foods (but also including milk feeds for non-breastfed children) the minimum recommended number of times or more (WHO, 2008a). The number of meals should be: 2 times for breastfed infants 6–8 months; 3 times for breastfed children 9–23 months and 4 times for non-breastfed children 6–23 months (WHO, 2008b). "Meals" include both meals and snacks (other than trivial amounts).

In terms of meal frequency, Romulus-Nieuwelink *et al.,* (2011) in a study conducted among breast-fed infants aged 8 months in Brazil found out that feeding frequency according to the minimum recommended frequency of 3 meals per day was common. The findings concurred with those of a cohort study in Burkina Faso by Sawadogo *et al*., (2011) assessing the time of introduction and dietary diversity of complementary foods at 9 months where the infants received on average 2 meals per day and 3 meals at 12 months of age.

An educational intervention to promote appropriate complementary feeding practices and physical growth in infants and young children in India established that the mean meal frequency for children 9 months old was 4.4 and 3.9 times for intervention and control groups respectively. At 18 months of age, the meal frequency was 5.9 and 5.4

for intervention and control groups respectively (Bhandari *et al.*, 2004). In Kenya, the national data indicates that 72.5%, 65.0%, 60.7% and 57.7% of children are fed the minimum recommended times or more for 6-8months, 9-11 months, 12-17 months and 18-23 months age sub-categories respectively (KNBS and ICF Macro, 2010). Despite the fact that minimum meal frequency is common in various settings, findings need further investigation to determine the challenges, if any, faced by slum dwellers in achieving minimum meal frequency.

On the whole, scientific evidence shows that complementary feeding practices are suitable in terms of minimum meal frequency but are inappropriate in terms of initiation of complementary foods, minimum dietary diversity and minimum acceptable diet. Nonetheless, there is inadequate data especially among the urban poor residing in informal settlements in Kenya.

2.4 Factors associated with complementary feeding practices

2.4.1 Socio-demographic and economic factors

A systematic review by Wijndaele *et al*., (2009) found that mothers with low education level were more likely to introduce complementary foods early. A prospective study conducted in Delhi showed that knowledge about the correct timing of complementary feeding significantly correlated with maternal and paternal education levels (Aggarwal *et al*., 2008). Gebru (2007) in a study in Addis Ababa found that working mothers were more likely to introduce complementary foods before 6 months (OR=0.37) compared to mothers who stayed at home. Sawadogo *et al*., (2011) in Burkina Faso also found that late introduction of complementary food to be more frequent in mothers aged less than 25 years.

A study by Kimani-Murage *et al*., (2011) assessing patterns and determinants of child feeding practices in Nairobi informal settlements found that mothers who had never been in marriage unions were 23% more likely to introduce complementary foods before 6 months of age compared to mothers who were in unions. In the same study, mothers in Viwandani slum had 10% lower hazards of introducing complementary foods early compared to mothers in Korogocho slum.

A study in Tanzania established that mothers in medium and high income groups introduced solid and semi-solid foods earlier compared to those in lower income groups (Hussein, 2005). These findings are in agreement with those of a previous study conducted in the same country which established that women participating in economic activities had less time for cooking and caring for their infants and young children (Wandel *et al*., 1989).

Multivariate analysis in a study assessing complementary feeding practices in young children aged 6–23 months in Nepal by Joshi *et al.*, (2011) indicated that working mothers and mothers with primary or no education were significantly less likely to give complementary foods that met the recommended dietary diversity, minimum meal frequency and minimum acceptable diet. In the same study, children living in poor households were significantly less likely to achieve the minimum dietary diversity and minimum acceptable diet.

In a study assessing breastfeeding practices in Iran by Olang *et al.,* (2012), the children of non-working and educated mothers were more likely to feed their children at the

recommended minimum meal frequency. Senarath *et al.,* (2011) in a study assessing factors associated with breastfeeding in Timor-Leste demonstrated maternal education and wealth index to be associated with dietary diversity.

2.4.2 Maternal knowledge and perceptions

A study assessing feeding practices of children in an urban slum of Kolkata in India by Roy (2009) showed that children below 6 months of age were introduced to complementary foods due to a perceived lack of sufficient breast milk by their mothers. The same was demonstrated in a study in the Kibera slum of Nairobi, Kenya (Ochola, 2008). Joshi *et al.,* (2012) established that 56% of women started giving supplementary foods like animal milk before 6 months of age because they felt that their breast milk was not sufficient for the child. Romulus-Nieuwelink *et al.,* (2011) in a study in Brazil established that mothers with greater knowledge of healthy eating habits choose to give more healthy products to their children. A study by Siegel *et al*., (2006) in Nepal established that mothers were less likely to give animal source foods to infants under one year of age due to a misperception that they cannot digest animal source foods.

2.4.3 Morbidity factors

In some studies, child morbidity has been demonstrated to be associated with feeding practices. In Timor-Leste, children suffering from Acute Respiratory Infections (ARIs) were more likely to have a complementary diet of poor dietary diversity and also not to have an acceptable diet (Senarath *et al.,* 2007). A study examining the association between breastfeeding, morbidity and malnutrition in Botswana found that children who had been introduced to complementary food at the age 4 months and below were 11

times more likely to suffer from diarrhoea compared with those who had not been introduced to complementary feeding (Madise, 1991).

The above findings show a variety of factors influencing complementary feeding practices. These factors influence complementary feeding practices in different ways in diverse set-ups and therefore the results from the studies so far conducted cannot be generalized.

2.5 Complementary feeding practices and child nutrition status

A study in India by Kumar *et al.*, (2006), showed that improper complementary feeding was a significant risk factor for underweight. In Malawi, stunting was prevalent in children who had ceased breast feeding and their predominant food source was maize (Hotz & Gibson, 2001). Ma *et al.*, (2012) in their longitudinal study in China established cross-sectional infant and child feeding index (CS-ICFI). The CS-ICFI index consisted of information on current breast feeding and bottle feeding; feeding frequency and food diversification which were significantly associated with stunting especially among children 12-36 months old.

A study done in western Kenya by Bloss *et al.*, (2004) established that children who were introduced to complementary foods before 6 months had an increased risk of being underweight. Muchina (2010) in her study in an informal settlement in Nairobi found out that stunting remained associated with the mode of complementary feeding among children 12-23 months of age but not among children 6-11 months of age. Nonetheless, there is inadequate data on the relationship between complementary feeding practices and child nutrition status in Kenya.

2.6 Summary of literature review

Appropriate complementary feeding practices can ensure good nutrition status and prevent under 5 mortality rate significantly (Jones *et al.,* 2003). Nutritional inadequacy of the complementary diet both in quality and quantity is one of the major problems affecting infants and young children in the world today (Nti & Lartey, 2007). Despite the fact that there are various strategies to improve complementary feeding in Kenya (MOPHS, 2007), complementary feeding practices are largely poor with majority of children receiving complementary foods too early at a lower frequency than recommended and often the diet is limited in diversity.

A review of the literature revealed that there are significant gaps in information on the factors associated with complementary feeding practices in terms of: time of initiation, dietary diversity and frequency of feeding. Therefore, the need to investigate complementary feeding practices in relation to the nutritional status of children aged 6-23 months in the study area.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research design

The study adopted a cross-sectional analytical design to investigate complementary feeding practices in relation to the nutritional status of children aged 6-23 months in Korogocho slum in Nairobi. This design facilitated collection of quantitative and qualitative data and enabled identification of associations between the dependent and independent variables of the study (Katzenellenbogen *et al.*, 2002).

3.2 Study variables

3.2.1 Dependent variable

The dependent variables for the study were complementary feeding practices namely: introduction of solid, semi-solid foods and soft foods; dietary diversity; meal frequency and minimum acceptable diet.

3.2.2 Independent variables

The independent variables for the study were: maternal/caregivers' demographic and socio-economic characteristics; morbidity and maternal knowledge on complementary feeding practices.

3.3 Study location

The study was carried out in Korogocho slum located in Kasarani District, Nairobi County. The slum has an approximate area of 1.5 square kilometers, a population

density of 63,318 people per square kilometer and a total population of 67, 802 people (KNBS, 2010). It is the fourth largest slum in Kenya and ranked among the most impoverished slums in the country (APHRC, 2002).

Households in the slum lack access to clean and safe water, sanitation facilities and sufficient living area (Mutua *et al.,* 2007). The main economic activities are small scale trading and casual labour (APHRC, 2002). The area was chosen because most of the children were likely to be predisposed to sub-optimal complementary feeding practices due to poverty and poor living conditions (Kimani-Murage *et al.,* 2011). There is inadequate scientific data on complementary feeding practices and nutritional status of children 6-23 months.

3.4 Target population

The target population was mothers/caregivers and their children aged 6-23 months old and living in Korogocho slum, Nairobi. Mothers/caregivers were interviewed so as to obtain information with regard to complementary feeding and other relevant issues while children 6-23 months were assessed to determine their nutritional status.

3.4.1 Inclusion criteria

Mothers/caregivers and their children 6-23 months old who were residents of Korogocho slum for the past 6 months and were willing to participate in the study.

3.4.2 Exclusion criteria

Eligible subjects who declined to consent and children 6-23 months old who had chronic or congenital illnesses at the time of the study were not included in the study. The status of the above conditions was determined based on mother/caregiver self-reports, observation and records on the child health card.

3.5 Sample size determination and sampling techniques

3.5.1 Sample size determination

The sample size was 324 mother/caregiver-child (6-23 months old) pairs; this was calculated using a formula by Cochran (in Israel, 1992). The illustration in the formula below is for 6-8 months age sub-category which was repeated for 9-11, 12-17 and 18-23 months age categories and presented in table 3.1.

$$N = \frac{Z^2pq}{e^2} = \frac{(1.96)^2(0.062)\,(0.938)}{(0.05)^2} = 89.36$$

Where: N = sample size before finite population correction

Z = the standard normal deviate at 95% confidence level (1.96);

P = estimated prevalence of underweight children 6-23 months (KNBS, 2010); Prevalence of underweight was used because it is a composite indicator reflecting both chronic and acute malnutrition thus it is related to both stunting and wasting. This ensured that all the three indices of nutritional status were captured.

q = 1-p;

e = desired level of precision (0.05)

Finite population correction was done to produce a sample size that is proportional to the population, therefore the sample size was calculated as;

$$n = \frac{no}{1 + \frac{(no - 1)}{N}}$$

$$n = \frac{89.3}{1 + \frac{(89.3 - 1)}{200}} = 61.95$$

Where: n= desired sample size

N=the estimate of the population size

The calculated sample size was inflated by 10% to cater for non-response, to make a sample of 68.

NB: This was repeated for the remaining age categories but using the expected prevalence of underweight for each of the age sub-category; 7.1% for children aged 9-11 months; 8.3% for children aged12-17 months old and 5.9% for those aged 18-23 months old (KNBS and ICF macro, 2010). The resulting sample sizes are shown in Table 3.1below.

Table 3.1: Sample size determination

Age category / Symbol	6-8	9-11	12-17	18-23
N (sample size before finite population correction)	89.36	101.36	119.5	86.22
Z (standard normal deviate at 95% confidence level)	1.96	1.96	1.96	1.96
p (estimated prevalence of underweight)	0.062	0.071	0.083	0.059
q (1-p)	0.938	0.929	0.937	0.951
e (desired level of precision)	0.05	0.05	0.05	0.05
n(after population correction)	61.95	67.4	92.19	71.08
10% increase (due to non-response)	68	75	102	79

3.5.2 Sampling Techniques

The Korogocho slum has 8 villages that vary in size and population. Out of the 8 villages, 6 formed the sampling frame due to the high level of insecurity in the other 2 villages namely: Grogan A and Grogan B. Proportionate stratified sampling was used to determine the sample size in various age categories required for the IYCF indicators of complementary feeding (WHO, 2008a) explained in section 3.5.1.

Households in the study area were selected using two stage cluster sampling technique. This is because of lack of accurate population data to allow for simple random sampling and also the arrangement of the households were not in a manner to facilitate systematic sampling. In the first stage of sampling, the 6 villages were segmented into 40 smaller discrete cluster areas with approximately 150-200 households. This was conducted with the help of village elders and Community Health Workers (CHWs) who were residents in the area. The number of clusters (40) was relatively large and few households were sampled per cluster, therefore, this resulted in a low sampling variance thus increasing the reliability of the findings (United Nations, 2005).

In stage two, one cluster area out of the 40 was selected by simple random sampling using a table of random numbers. Modified Expanded Program of Immunization (EPI) method which has been adopted by nutrition surveys was used to select households where mothers/caregivers and their children 6-23 months old were present in the cluster area. The modified EPI method involved going to the approximate centre of the randomly selected cluster and randomly choosing a direction by spinning a pen and

walking in the direction the pen pointed to the edge of the village. At the edge of the village the pen was spin again until it pointed into the body of the village (Figure 3.1). Households having mothers/caregivers and children 6-23 months were enumerated following the direction of the second spin (both left and right side) until the other edge of the cluster area. A table of random numbers was used to select the first house to be visited. The spinning of the pen procedure ensured that selection of the first household was random. The subsequent households were chosen by proximity in the direction until a maximum of 3 households had been visited for each of the 6-8, 9-11, 12-17 and 18-23 months old age categories. This meant that the total number of households that were visited in any cluster area did not exceed 12. The same method was used for all the cluster areas (after they had randomly been selected using table of random numbers) until the required number of children was obtained in all the age categories. A household was defined as a group of people who live together and share a common cooking pot (Figure 3.1).

Members of the focus group discussions (FGDs) were purposively and conveniently selected to take part with the help of village elders and Community Health Workers (CHWs). This ensured that participants who were easily accessible and had adequate information regarding infant feeding in the study area were selected. To enhance homogeneity, each FGD participants were made up of 6-12 mothers with children below 2 years who were not part of the main sample. The FGDs were held in all the 6 villages after quantitative data had been collected.

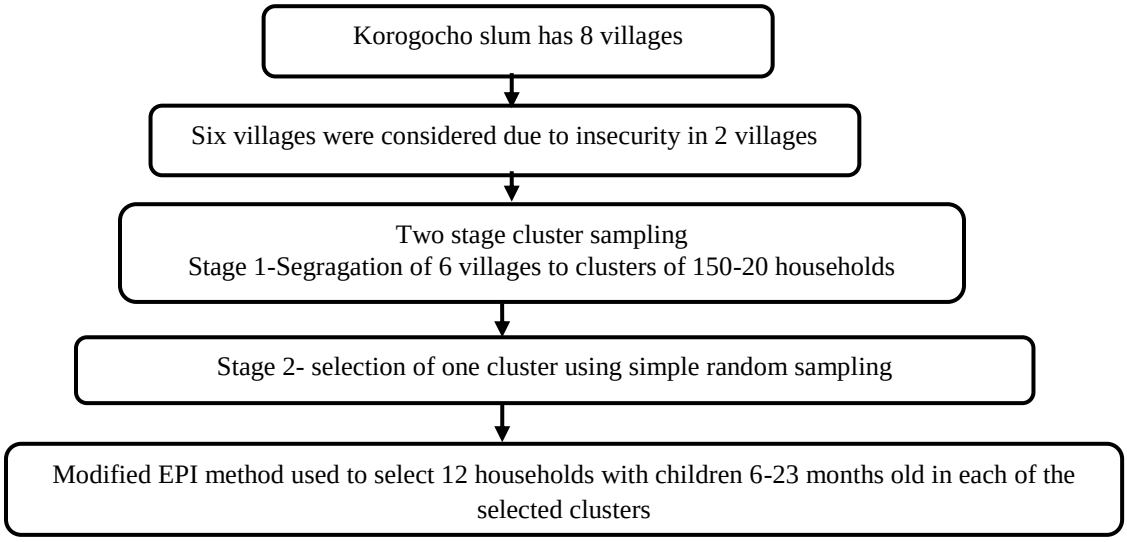


Figure 3.1: Flow chart on the sampling procedure

3.6 Research Instruments

3.6.1 Questionnaire

The WHO standard IYCF practices assessment questionnaire (WHO, 2010a) (Appendix II) was used to collect information on complementary feeding practices. This questionnaire is standardized and validated and has been successfully used in a variety of circumstances in developing countries including Kenya (WHO, 2010b). Data was also collected on socio-demographic and economic characteristics of respondents" households, child morbidity and maternal knowledge on IYCF practices using a researcher-developed and administered questionnaire. An Observation was used to ascertain whether children's faeces were disposed hygienically (Appendix III, question E5).

3.6.2 Focus group discussion guide

A focus group discussion (FGD) (Appendix III) guide was administered to elicit maternal perceptions on complementary feeding practices in relation to child nutritional status. It also provided information on maternal views on complementary feeding practices and its relationship with child nutritional status.

3.7 Pre-testing of instruments

The pre-testing was conducted to establish accuracy of questions and clarity and to determine the length of interviews. During pre-testing an effort was made to check for consistency in the interpretation of questions and to identify ambiguous items. After review of the instruments all suggested revisions were made before being administered in the actual study.

3.7.1 Validity

To ascertain the degree to which the data collection instruments measured what they purported to measure, the instruments were validated by a group of professionals from Kenyatta University and two IYCF experts. The data collection instruments were reviewed based on their feedback.

3.7.2 Reliability

The Test-retest method was used to test the consistency of the questionnaire in producing the same results. Ten caregivers from an area similar to the study area were interviewed two times (with a span of one week between the interviews) using the same

questionnaire. A comparison was then made between the answers obtained from both interviews. Correlation coefficient was determined using Cronbach correlation formula by Cronbach *et al.,* (2004) which yielded a correlation coefficient of 0.7 which was acceptable. The pre-test subjects were allowed to make comments and give suggestions concerning the questionnaire.

3.8 Recruitment and training of research assistants

Six research assistants were recruited to participate in the study. The selection criteria was; attainment of the Kenya Certificate of Secondary Education and fluency in Kiswahili and English languages. Previous participation in nutrition surveys was an added advantage. Three of the assistants had participated in nutrition surveys before. The research assistants underwent a three day training which was facilitated by the researcher. The training entailed the use of lectures, discussions, role plays and exercises with the help of training aids. They were first taken through the objectives and methodology of the study. The training also involved rigorous guidance on questionnaire administration and anthropometric measurements.

The research assistants were exposed to a practical experience in conducting the interviews and taking anthropometric measurements during class room demonstrations, role plays and also during pre-testing of the questionnaires. The responses recorded by the research assistants were compared with those recorded by the investigator himself and appropriate advice given to the assistants on areas they needed to improve. Standardization of anthropometric measurements was conducted using the Emergency

Nutrition Assessment version 2010 soft-ware which facilitated assessment for intra and inter-observer variations in the measurement of weight and height.

3.9 Data collection techniques

The researcher and his assistants administered the questionnaire to the mother/caregiver in face-to-face interviews during a one-time visit to the household. Mothers were asked specific questions to elicit information on complementary feeding practices, morbidity and socio-demographic and economic characteristics. Weight and length measurements were taken from the eligible sampled children using a salter scale (measurements taken to the nearest 0.1kg) and length board (measurements taken to the nearest 0.1cm) respectively. Children with moderate and severe malnutrition were referred to the nearest health facility.

One FGD with the mothers /caregivers was conducted in each of the 6 villages, making a total of 6 FGDs. The FGDs were conducted at the end of the household interviews in each of the villages to solicit information on the mothers'/ caregivers' knowledge and perceptions on the adequacy of complementary feeding in the area of study. Each FGD had a minimum of 6 and a maximum of 12 mothers/caregivers with children below 2 years. Members of the FGDs were recruited by the researcher with the help of community leaders, Community Health Workers (CHWs) and village elders. The researcher moderated the discussions while one of his assistants took notes. Each FGD lasted between 45 to 90 minutes and the discussions were tape recorded and non-verbal communication documented.

3.10 Data analysis and presentation

The data underwent rigorous daily checking to identify and correct errors. Anthropometric data was entered and analyzed using ENA for SMART Software version 2010 and then exported to SPSS for cross analysis with other variables. Socio-demographic, economic and complementary feeding data was entered and analyzed using SPSS version 16 software. Descriptive statistics (frequency, mean, media, standard deviation and percentage) were used to describe socio-demographic and economic characteristics of the study population, morbidity and complementary feeding practices.

Inferential statistics used were: Chi-square test for categorical/nominal data to test for associations between categorical variables whereas T-test and ANOVA were used for continuous data to test for significant differences and association between independent variables complementary feeding practices data. Logistic regression was used to identify predictors of complementary feeding practices. A P value of < 0.05 was used as the criterion for statistical significance. Data from FGDs was transcribed, coded and common themes established. Selected responses from FGDs were also directly quoted to exemplify common perceptions among the respondents. Conclusions were finally drawn and triangulated with quantitative data from the questionnaires (Table 3.2).

Table 3.2: Data analysis

Objectives	**Variables**			**Statistical test**
	Variables requiring descriptive analysis	**Dependent**	**Independent**	

Establish socio-demographic and economic characteristics of mothers/caregivers of children 6-23 months old	Occupation, marital status, education level, household size, parity, income, age and sex			Median, range, percentage, mean, standard deviation
Establish complementary feeding practices among children 6-23 months old	Time of introduction, meal frequency, dietary diversity, minimum acceptable diet			Range, percentage, mean, standard deviation
Assess mothers'/caregivers' knowledge and perceptions on complementary feeding practices	Knowledge on time of introduction, meal frequency and dietary diversity of complementary foods and hygiene			Range, percentage, mean, standard deviation
Assess the nutritional and morbidity status of children aged 6-23 months old	Wasting, stunting, underweight, morbidity prevalence, household water consumption, hygiene and sanitation			Percentages
Determine the factors associated with complementary feeding practices of children 6-23 months old		Complementary feeding practices: Introduction; frequency of feeding, dietary diversity	Socio-demographic and economic characteristics of the , maternal knowledge, morbidity	T-test, Chi-square, Pearson correlation,
Determine the relationship between CF practices and nutritional status of children 6-23 months old		Nutritional status children: wasting, underweight, stunting	Complementary feeding practices	T-test, Chi-square, logistic regression

3.11 Logistical and ethical consideration

A letter of authority to conduct the study was provided by the Kenyatta University Graduate School. A research permit (Appendix VII) was obtained from the National Council of Science and Technology and ethical clearance (Appendix VIII) was obtained from Kenyatta National Hospital ethical review committee. Authority to conduct the study in Korogocho slums was sought from the chief's office in Korogocho location. At

the house hold level, informed signed or thumb print consent was sought from the respondents. Respondents were guaranteed confidentiality and informed that the information provided will only be used for research purposes. Confidentiality was assured by not including respondent names on the questionnaires but only identity numbers.

CHAPTER FOUR: RESULTS

4.1 Characteristics of the study population

4.1.1 Socio-demographic profiles of the households

Three hundred and twenty two (322) mothers and caregivers representing the same number of households were interviewed during the study. The median age of the mothers was 24 years with the youngest and oldest mothers being 16 and 54 years old respectively. Majority (74.5%) of the mothers were married, 16.1% single, 6.5% widowed while 2.8% were separated. Over half (59.6%) of the mothers had primary school education while 29.5% had secondary education. The average size of a household was 4.6 (range 1-9) people (Table 4.1).

Table 4.1: Socio-demographic characteristics of the study population

Socio-demographic characteristics	N=322	
	N	%
Maternal/caregiver age (years):		
Median (range)	24(16-54)	
<25 years	181	56.2
25-34 years	114	35.4
35 years and above	27	8.4
Marital status:		
Single	52	16.1
Married	240	74.5
Separated	9	2.8
Widowed	21	6.5
Education:		
No formal education	18	5.6
Primary school level	192	59.6
Secondary school level	95	29.5
Tertiary level	17	5.3
Parity (number of Children):		
Median (range)	2(1-7)	
Household size:		
Mean (range)	4.63(1-9)	

4.1.2 Socio-economic profiles of the households

Over two-thirds (66.5%) of the participants' husbands' were casual labourers, 14.3% small scale traders, 9.3% formally employed and 9.9% unemployed. Nearly three quarters (71.1%) of the mothers were not employed while slightly less than a third (28.6%) was either small scale traders, casual labourers or formally employed (Figure 4.1).

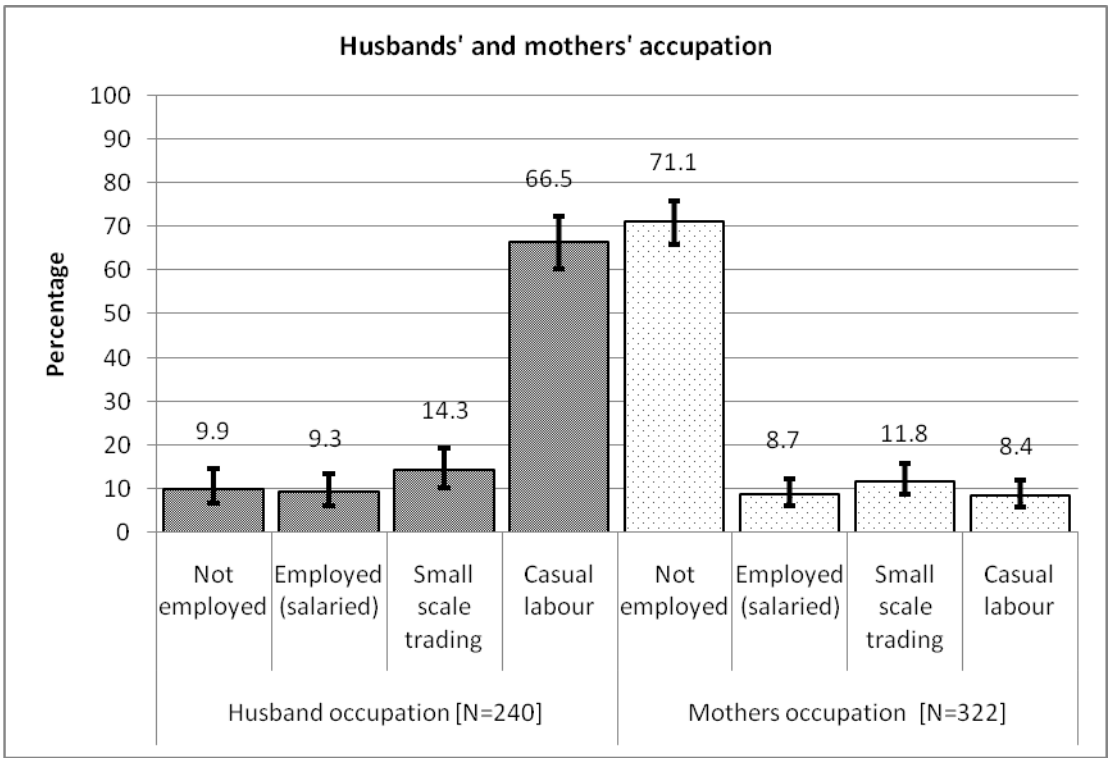


Figure 4.1: Occupation of the husbands' and mothers'

Over three quarters of the families (77.0%) depended on casual labour as their main source of income followed by small scale business (16.1%) and lastly formal employment (6.8%). Nearly all (94.1%) the households obtained food through purchasing from the market. Nearly half (46.3%) of the households estimated to allocate medium percentage (30%-65%) of their income to food while (39.4%) allocated the

largest percentage (>65%) of their income to food and only (14.3%) allocated the smallest percentage (<30%) of their income to food (Table 4.2).

Table 4.2: Socio-economic characteristics of the of the study population

Socio-economic characteristics	N=322	
	n	%
Main source of family income:		
Formal employment	22	6.8
Casual labour	248	77.0
Small scale business	52	16.1
Estimated % household of income allocated to food:		
Largest percentage (>65%)	127	39.4
Medium percentage (30%-65%)	149	46.3
Smallest percentage (<30%)	46	14.3
How food is obtained:		
Farming	13	4.0
Purchase	303	94.1
Food aid/donation	4	1.2
Others	2	0.6
Provider* of food in a household:		
Father/Husband	246	76.4
Mother	67	20.8
Grand parents	4	1.2
Relatives	5	1.6

Provider refers to a household member who is the breadwinner and brings food home or contributes the largest percentage of income used to access food.

4.2 Feeding practices among children 6-23 months old in Korogocho slum

Infant feeding practices were measured by a set of simple, valid and reliable indicators developed by WHO (2008b) over a period of 5 years. The indicators focus on selected food related aspects of child feeding associated with both breastfeeding and complementary feeding, amenable to population level measurement. Even though the study focused on complementary feeding, it was worth to give a snapshot of some breastfeeding practices.

4.2.1 Breastfeeding practices

Nearly all the children (92.0%) had ever been breastfed with slightly over two-thirds (68.8%) having been initiated to breastfeeding timely (within 1 hour of birth). Whereas, half (50.0%) of those who never breastfed was due to the fact that their mothers had no breast milk others (42.3%) chose not to breastfeed their children (Table 4.3).

Table 4.3: Breastfeeding practices

Breastfeeding practices	**N=324**		
	n	%	95% CI
Ever breastfed N= 324	298	92.0	
Timely initiation of breastfeeding N= 324	205	68.8	
Reasons for not breastfeeding: N=26			
Did not have milk	13	50.0	
Did not want to breast feed	11	42.3	
Other reasons	2	7.7	
Children 6-23 months still breastfeeding N= 298	265	88.9	84.8 -94.0
Continued breastfeeding at 1 year N= 79 (children 12-15 months old)	69	87.3	78.1 -93.2
Continued breastfeeding at 2 years N= 49 (children 20-23 months old)	32	65.3	51.3-77.1
Bottle feeding N=324	96	29.6	
Age of cessation of breastfeeding (months) N=33 Mean, (SD), range	9.18; (±3.25); 4-18		

Majority (87.3%, 95% CI; 78.1-93.2) of the children 12-15 months old were still breastfeeding compared to their 20-23 months old counterpart who rated slightly lower at (65.3%, 95% CI 78.1-93.2). During the FGDs mothers reported that it was challenging to breastfeed up to 2 years and beyond due to lack of breast milk and occupations which kept them away from home most of the time. Slightly above a

quarter of the children (29.6%) received food or drink from a bottle with a nipple/teat in the previous day (Table 4.3).

4.2.2 Complementary feeding practices

4.2.2.1 Introduction of solid, semi-solid or soft foods

All the children 6-8 months (100%) had received solid, semi-solid or soft foods the previous day. During the FGDs, mothers reported to have introduced other foods apart from breast milk as early as when their babies were 2 months old.

4.2.2.2 Dietary diversity of complementary feeding diet

Dietary diversity was determined based on a 24-hour recall. The mothers were requested to state what their children consumed the previous day. Dietary diversity was then computed based on 7 food groups as recommended by WHO (2008b) which comprise of: grains, roots and tubers; legumes and nuts; dairy products; flesh foods (meat, fish, poultry and organ meats); eggs; vitamin-A rich fruits and vegetables; other fruits and vegetables. Consumption of any amount of food from each food group was sufficient to count except if a food item was only used as a condiment.

Nearly all the children (94.4%) consumed foods made from grains, roots and tubers. Over half of the children consumed grains, roots and tubers. Vitamin-A rich fruits and vegetables were consumed by 47.8%, dairy products by 32.1%, other fruits and vegetables by 31.2% and finally legumes and nuts by 18.2% of the children aged 6-23 months old. Consumption of animal origin foods was low, barely 4.6% of the children consumed eggs while consumption of dairy products and flesh foods was at 32.1% and 13.0% respectively (Figure 4.2).

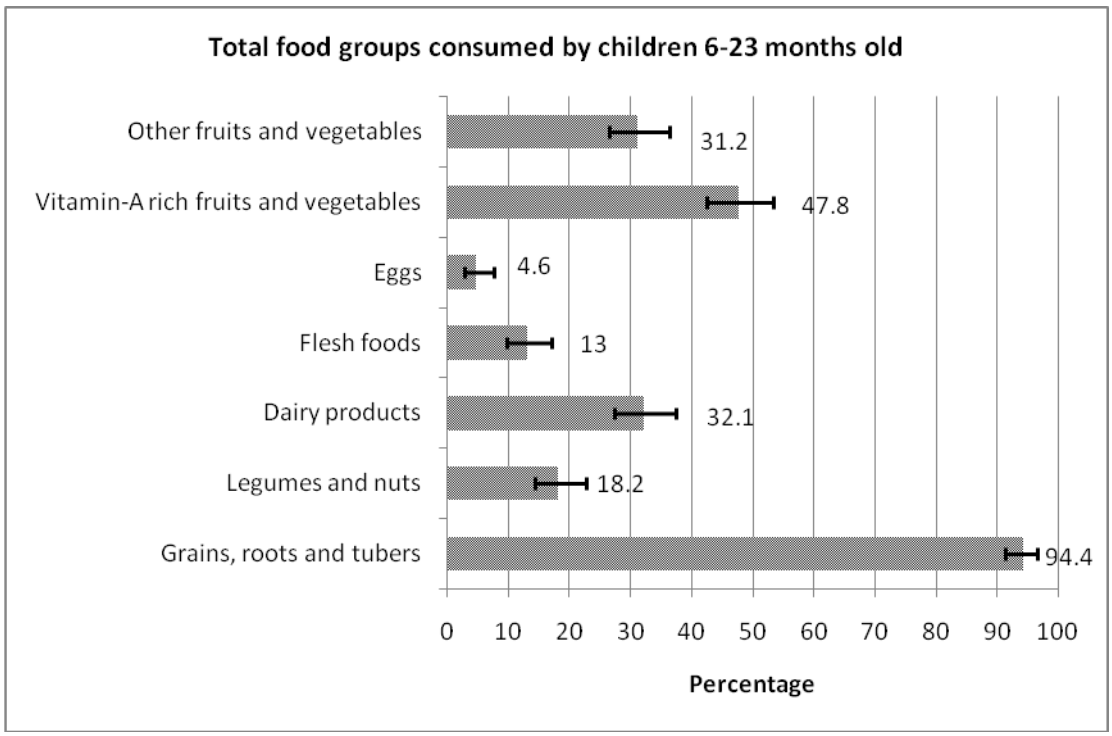


Figure 4.2: Dietary diversity

The mean dietary diversity score for children aged 6-23 months old was 2.4, (± 1.3, 95% CI 2.3-2.6) and the scores ranged from 1 to 7. Slightly over one-tenth (13.6%) of the children aged 6-23 months old consumed iron-rich and iron fortified foods. The percentage of those who consumed iron-rich foods was more or less the same in the other age categories with 10.5% in 6-11 months, 15.7% in 12-17 months and 16.5% in 18-23 months old (Table 4.4).

To determine minimum dietary diversity, a cut-off of at least 4 out of the above listed 7 groups was selected because it is associated with better quality diets for both breastfed and non-breastfed children (FANTA, 2007). Consumption of foods from at least 4 food groups on the previous day would mean that the children have a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable that day, in addition to a staple food (grain, root or tuber) (WHO, 2008b).

Table 4.4: Foods consumed and dietary diversity

Dietary diversity	N=324		
			95% CI
Mean Dietary Diversity:	Mean, (SD), (range)		
6-23 months N=324	2.4, 1.2 (1-7)		2.3- 2.6
6-11 months N=143	2.2, 1.2 (1-6)		
12-17 months N=102	2.6, 1.3 (1-7)		
18-23 months N=79	2.5, 1.2 (1-7)		
	N	%	
Consumption of Iron rich and iron fortified foods:			
6-23 months N=324	44	13.6	10.3-17.8
6-11 months N=143	15	10.5	
12-17 months N=102	16	15.7	
18-23 months N=79	13	16.5	
Minimum dietary diversity			
6-23 months N=324	58	17.9	14.1-22.5
Breastfed N=265	47	17.7	
Non-breastfed N=59	11	18.6	
6-11 months N=143	23	16.1	
Breastfed N=128	20	15.6	
Non-breastfed N=15	3	20.0	
12-17 months N=102	20	19.6	
Breastfed N=85	18	21.2	
Non-breastfed N=17	2	11.8	
18-23 months N=79	15	19.0	
Breastfed N=52	9	17.3	
Non-breastfed N=27	6	22.2	

Less than a two-tenths (17.9%, 95% CI 14.1-22.5) of children 6-23 months old received foods from 4 or more food groups in the previous 24 hours. In the same age category, 17.7% and 18.6% of breast fed and non-breastfed children attained minimum dietary diversity respectively. Minimum dietary diversity was highest (19.6%) in 12-17 months old category (21.2% and 11.8% for breast fed and non-breastfed children respectively). This was followed by 18-23 months old category (19.0%) (17.3% and 22.2% for breast

fed and non-breastfed children respectively). The last was the 6-11 months old category (16.1%) (15.6% and 20.0% for breast fed and non-breastfed children respectively) (Table 4.4).

4.2.2.3 Meal frequency

The minimum meal frequency was determined by calculating the proportion of all the children who received solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) in the minimum recommended number of times or more. Minimum dietary diversity was defined as: 2 times for breastfed infants 6–8 months old; 3 times for breastfed children 9–23 months old and 4 times for non-breastfed children 6–23 months old (WHO, 2008a). "Meals" included both meals and snacks (other than trivial amounts) as reported by the respondents.

The mean meal frequency for all the aged children 6-23 months old was 3.45 (±1.14) (95% CI 3.3-3.6). The number of meals consumed by the children in all the age categories ranged from 1 to 6.The minimum meal frequency was achieved by most (88.3%; 95% CI 84.3-91.4) of the children 6-23 months old with the same trend in the 6-11 months (86.7%), 12-17 months (92.2%) and 18-23 months (86.1%) old age categories. The percentage of breastfed and non-breastfed children who attained minimum meal frequency in the different age categories was: 88.3% and 88.1% in 6-23months old; 87.5% and 80.0% in 6-11 months old; 91.8% and 94.1% in 12-17 months old and 84.6% and 88.9% in 18-24 months old respectively. During the FGDs mothers reported that children 6-23 months old should consume at least 3 meals in a day (Table 4.5).

Table 4.5 Meal frequency

Meal frequency	**Mean, (range), (SD)**		**95% CI**
Meal frequency:			
Children 6-23 months old N 324	3.6, (1-6), 1.1		3.3- 3.6
6-11 months (N=143)	3.3, (1-6), 1.2		
12-17 months (N=102)	3.6, (1-6), 1.0		
18-23 months (N= 79)	3.4, (1-6), 1.2		
Minimum meal frequency:	N	%	
6-23 months N=324	286	88.3	84.3-91.4
Breastfed N=265	234	88.3	
Non-breastfed N=59	52	88.1	
6-11 months N=143	124	86.7	
Breastfed N=128	112	87.5	
Non-breastfed N=15	12	80.0	
12-17 months N=102	94	92.2	
Breastfed N=85	78	91.8	
Non-breastfed N=17	16	94.1	
18-23 months N=79	68	86.1	
Breastfed N=52	44	84.6	
Non-breastfed N=27	24	88.9	

4.2.2.4 Minimum acceptable diet

Less than a quarter of the children 6-23 months old (15.4%, CI 11.9-19.8) attained a minimum acceptable diet. Children 12-17 months old category attained the highest (17.6%) followed by 18-23 months (16.5%) and lastly 6-11 months (13.3%) old categories (Table 4.6).

Table 4.6: Minimum acceptable diet

Minimum acceptable diet	**N=324**		
	n	%	95% CI
6-23 months N=324	50	15.4	11.9-19.8
Breastfed N=265	40	15.1	
Non-breastfed N=59	10	16.9	
6-11 months N=143	19	13.3	
Breastfed N=128	16	12.5	
Non-breastfed N=15	3	20.0	
12-17 months N=102	18	17.6	
Breastfed N=85	17	20.0	
Non-breastfed N=17	1	5.9	
18-23 months N=79	13	16.5	
Breastfed N=52	7	13.5	
Non-breastfed N=27	6	22.2	

4.3 Maternal/caregivers' knowledge on complementary feeding practices

In order to determine maternal knowledge on complementary feeding practices, mothers/caregivers were asked questions with regards to: initiation of semi-solid, solid or soft foods; dietary diversity and frequency of complementary foods; importance of ensuring high standards of hygiene when preparing complementary foods; suitable preparation of complementary food and importance of breast feeding. The respondents were asked a total of 12 questions (Appendix II). Maternal nutrition knowledge was determined based on nutrition knowledge scores. Scores were coded as 1 for a correct response and 0 for an incorrect response, resulting in a total possible score of 12. The overall nutrition knowledge score for each respondent was determined by the number of correct responses. Respondents with higher scores reflected higher nutrition knowledge on complementary feeding than those with lower scores.

4.3.1 Knowledge on breastfeeding practices

Majority of the mothers (87.3%) interviewed knew that breastfeeding ensures proper growth and development and protects the baby from illness compared to the 69.9% who knew that breast milk alone can sustain the baby for the first 6 months of life (Table 4.7).

Table 4.7: Maternal knowledge on breastfeeding

Knowledge on breastfeeding	N=322	
	N	%
Breastfeeding ensures proper growth and development and protects the baby from illness	281	87.3
Breast milk alone can sustain the baby for the first 6 months	225	69.9
Baby should be breast fed on demand	224	69.1
Breastfeeding should continue for at least 2 years and beyond	193	59.9

4.3.2 Knowledge on complementary feeding practices

In the current study, most of the mothers (85.4%) knew that semi-solid, solid and soft foods should be introduced at 6 months. Slightly less than three quarters of the mothers (70.5%) did not know the risks of starting complementary feeding late. Malnutrition was the main consequence pointed out by mothers who knew the risk of introducing complementary feeding too late (Table 4.8).

With regards to dietary diversity, mothers who stated that a child should consume a diverse diet were 65.8%. Almost three quarters (74.5%) of the mothers were aware that a 6-23 months old child should consume 2 meals or more in a day in addition to breast milk. Mothers' knowledge with regards to the importance of animal foods in

complementary diet was low with only 18% of them pointing out that animal source foods are rich in nutrients and should form part of the complementary diet (Table 4.8).

Slightly more than a third (34.5%) of the respondents stated that enriching complementary food (through adding other foods like milk, fruit juices and fat to the main dish) makes it more nutrient dense/diverse and adequate to meet the dietary needs of the children especially as they grow. Barely one-tenth (7.5%) of mothers knew that child's porridge should be made of one type of flour. In addition to that mothers reported using mixed flour to prepare children's porridge during the FGDs (Table 4.8).

Table 4.8: Maternal knowledge on complementary feeding practices

Knowledge on complementary feeding practices	N=322	
	n	%
Introduction of semi-solid, solid and soft foods:		
Complementary foods should be introduced at 6 months	275	85.4
Starting complementary feeding after 6 months may cause malnutrition N=322	95	29.5
Dietary diversity and frequency of feeding:		
A child should consume a diverse diet	212	65.8
A child should consume more than 2 meals per day	240	74.5
Animal source foods are nutrient rich	58	18.0
Hygiene and proper preparation of complementary food:		
High standards of hygiene when preparing complementary foods will protect the child from illnesses like diarrhea	298	92.5
Enriching* complementary food makes it more diverse and adequate	112	34.8
Children's porridge should be made of one type of flour	24	7.5

*Enriching complementary foods means addition of other foods such as milk, fruit juices and fat to the main dish usually starchy to improve its nutritive component

4.3.3 Maternal/caregivers' knowledge score on complementary feeding

The overall mean maternal knowledge score on complementary feeding was 6.8, (±1.7) out of a total score of 12 and scores ranging from 3 to 10 (Table 4.9).

Table 4.9: Maternal knowledge on complementary feeding practices

Overall maternal/caregivers' knowledge score on complementary feeding	**N=322**	
Mean overall score:		
Mean, (SD), (range)	6.47, (1.6), (3-10)	
	n	%
<4 scores	11	3.4
4-7 scores	203	63.1
8-10 scores	108	33.5

Maternal/caregivers' knowledge score was also computed by maternal age categories, marital status, education level and occupation. Analysis of variance (ANOVA) was done to establish any significant differences in maternal knowledge on complementary feeding by the various maternal characteristics. There was no significant difference in the maternal knowledge score by age (p= 0.097) and marital status (p=0.383) and occupation (p=0.827) (Table 4.10).There was a significant difference in maternal knowledge scores among mothers of different education levels (p=0.017). Post hoc results showed that mothers who had secondary education had significantly higher total maternal knowledge score (p=0.037) compared to mothers who had primary education primary (p=0.017) (Table 4.10).

Table 4.10: Maternal knowledge on infant and young child feeding by maternal characteristics

Maternal/caregivers' knowledge verses maternal characteristics			ANOVA
	Mean	SD	Overall and post hoc p value
Maternal age category N=322	6.8	1.7	0.097
<25 years N=181	6.6	1.7	
25-34 years N=114	7.0	1.7	
35 years and above N=27	7.0	1.4	
Marital status N=322	6.8	1.7	0.383
Single N=52	6.7	1.8	
Married N=240	6.7	1.7	
Separated N=9	7.2	1.0	
Widowed N=21	7.2	1.4	
Occupation N=322	6.8	1.7	0.827
Not employed/house wife N=229	6.7	1.7	
Employed (salaried) N=28	6.8	1.6	
Small scale trading N=38	7.0	1.8	
Casual labour N=27	6.6	1.4	
Education level N=322	6.8	1.7	0.017*
No formal education	7.5 [a]	1.3	0.200
Primary	6.5 [ab]	1.7	0.017**
Secondary	7.0 [ab]	1.6	0.037**
Tertiary	7.2 [a]	1.2	0.552

** P values after post hoc test

Means followed by one superscript (a) are not significantly different at p= <0.05 after post hoc while means followed by two different superscripts (ab) are significantly different.

4.3.4 Maternal perceptions and beliefs on complementary feeding and its relationship with child nutritional status

One FGD was held in each of the six villages at the end of quantitative data collection making a total of 6 FGDs. Each FGD had a minimum of 6 and a maximum of 12 mothers of children below 2 years of age. The discussions were guided by the questions in the focus group discussion guide.

4.3.4.1 Sources and relevance of information on complementary feeding

Most of the mothers said that they got information regarding complementary feeding from the health facility. Mothers also reported they got information from family, friends and at the chief's camp. The following statement made by mothers in Gitathuru shows how mothers obtain information on child feeding other sources of information apart from the health facility:

"When we take our children to the health facility, health workers talk to us on how we can appropriately feed our children but we also discuss a lot on child feeding with our friends and relatives and once in a while we are sensitized by CHWs during meetings at the chief's camp."

Information obtained by the mothers especially from the health facility focused on dietary diversity, continued breastfeeding to 2 years and beyond, exclusive breastfeeding and the type of foods suitable for initiation of complementary feeding with soft foods. They also reported that the information they received especially from the health facilities was beneficial in ensuring that the child becomes healthy but few mothers put the information into practise due to poverty and lack of food (Table 4.11).

The following statement demonstrates these sentiments: *"We are told by the health workers to feed our children on a balanced diet ensuring that we include foods like meat and fruits in the child's diet. We agree with the information given and we are willing to put into practise what we are taught but cannot afford even flour for preparing porridge!"*

4.3.4.2 Introduction of complementary food, dietary diversity and frequency of complementary foods

Mothers reported that they did not follow health workers advice on the age of introducing complementary foods. They introduced food as early as when the infants were 2 months old because the mothers were not at home most of the times to practice exclusive breastfeeding. The following statement made by mothers in Ngomongo village illustrates that mothers introduced complementary food earlier:

"We don't follow health workers advice on introducing complementary foods. We initiate complementary foods as early as 2 months because our babies cry frequently due to hunger and we have to leave children at home and go to work to look for income"

Mothers reported that beans, mangoes, oranges, vegetable soups, mixed flour porridge, milk, avocado, tea, rice, chips and *bhajia* were foods commonly given to children 6-23 months old. Street foods; cooked rice, beans chips and *bhajia* were also given to children. Mothers reported that meal frequency was mostly dependent on whether they had access to food or not (Table 4.11).

4.3.4.3 Relationship between complementary feeding practices and child nutrition status

The participants acknowledged that children 6-23 months old who are not fed appropriately lose weight, have poor growth, become weak and sick (Table 4.11).

4.3.4.4 Challenges experienced and suggestions on how complementary feeding practices can be improved in the study area

Mothers pointed out a number of challenges they experienced in ensuring optimal complementary feeding of their children. These included; food shortages due to

inadequate income to purchase enough food, high food prices, poverty, occupations that keep mothers away from home most of the time, many children to cater for and lack of reliable jobs that can provide steady income. The following suggestions to improve complementary feeding practices were made by mothers: young mothers (who were the majority) need more knowledge and follow up with regards to complementary feeding; families should be sensitized on importance of family planning; food aid to be provided to vulnerable households; initiation of income generating activities and education on how to access adequate food with low income and finally door to door sensitization campaigns on IYCF (Table 4.11).

Table 4.11: Summary of the main findings on mothers' perceptions on complementary feeding

Main areas of focus for FGDs	Main and common findings on perceptions and among the study groups
Sources of information on complementary feeding and information provided	• Health facilities (main source), family, friends and chief's camp • Information focused on dietary diversity, continued breastfeeding to 2 years and beyond, exclusive breastfeeding, starting complementary feeding with soft foods
Relevance and adequacy of the information	• Information provided was adequate, beneficial and relevant for the healthy growth and development of the child. The main challenge however, was that many families were not able to translate this into practice because of poverty.
Mothers opinion on introduction of complementary feeding at 6 months	• Mothers generally do not follow health workers advise on the age of introducing complementary foods (they introduce earlier) because they are not at home most of the times to practice exclusive breastfeeding
Foods commonly given to children 6-23 months old	• Porridge, milk, avocado, tea, rice, chips, *bhajia*, beans, mangoes, oranges, vegetable soups
Mothers' opinion on appropriate meal frequency	• Meal frequency was mostly dependent on access to food. If food is available, then a child should be fed 3 meals a day •
Maternal opinion on the importance of appropriate complementary feeding	• Children 6-23 months who are not fed as required will lose weight, have poor growth, become weak and sick
Challenges experienced by mothers in complementary feeding	• High food prices • Poverty/ lack of money to buy food • Occupations which keep mothers away from home most of the time • Many children to cater for • Lack of reliable jobs that can provide steady income for mothers
Suggestions on how appropriate complementary feeding can be improved in Korogocho slum	• Mothers (especially young ones) need more knowledge and follow up • Families should be sensitized on the importance of family planning • Provision of food aid to households • Provision of income generating activities and education on how to access adequate food with low income • Door to door sensitization campaigns on child feeding

4.4 Nutritional status of children aged 6-23 months old

4.4.1 Child age and sex

A total of 324 children were included in the study. The mean age of the children was 13.1 months (±5.0) (range 6 to 23 months). Male and female sexes were almost equally

represented in the study with 48.1% of children being male and 51.9% female (Table 4.12).

Table 4.12: Child age and sex

Child sex and age	N=324	
	N	%
Sex		
Male	156	48.1
Female	168	51.9
Age (months)		
Mean (SD) (range)	13.1 (5.0) (6-23)	

4.4.2 Prevalence of wasting, underweight and stunting

The dependent variables showing child nutritional status was modeled both as continuous and categorical variables. The continuous variables included Length-for-Age Z scores (LAZ), Weight-for-Length Z scores (WLZ) and Weight-for-Age Z scores (WAZ). Categorical variables capturing stunting (WAZ), wasting (WLZ) and underweight (WAZ) levels were generated from the continuous variables. The categories representing nutritional status were: overweight and obese (≥+2 Z scores), normal (>-2 to <+2 Z scores), moderately malnourished (≤-2 to >-3 Z scores), and severely malnourished (<-3 Z scores). Global Acute Malnutrition (GAM) (<-2 Z scores) corresponded to moderately malnourished and severely malnourished cases in each of the three indices (LAZ, WLZ and WAZ). The confidence intervals of the results presented below were wide due to the relatively small sample sizes within the age categories.

4.4.2.1 Prevalence of wasting

The total percentage of children aged 6-23 months old category wasted was 8.4% (CI 5.8-11.9). Over three quarters (82.7%) of the children aged 6-23 months old were normal. Slightly less than one-tenth (9.0%) of children 6-23 months old were overweight while (5.6%) and (2.8%) were moderately and severely wasted respectively. Total percentage of children wasted (GAM) in the age categories was: 4.9% (CI 2.2-9.9) in 6-11 months old; 8.8% (CI 4.5-15.9) in 12-17 months old and 14.0% (CI 7.9-23.4) in 18-23 months old (Table 4.13).

Table 4.13: Prevalence of wasting

Child nutritional status: Wasting	**N=324**		
	n	%	CI
Weight for Length Z scores			
6-23 months N=324			
Overweight and obese	29	9.0	
Normal	268	82.7	
Moderately wasted	18	5.6	
Severely wasted	9	2.8	
Global Acute Malnutrition	27	8.4	5.8-11.9
6-11 months N=143			
Overweight and obese	11	7.7	
Normal	125	87.4	
Moderately wasted	5	3.5	
Severely wasted	2	1.4	
Global Acute Malnutrition	7	4.9	2.2-9.9
12-17 months N=102			
Overweight and obese	14	13.7	
Normal	79	77.4	
Moderately wasted	6	4.9	
Severely wasted	3	3.9	
Global Acute Malnutrition	9	8.8	4.5-15.9
18-23 months N=79			
Overweight and obese	5	6.3	
Normal	63	79.7	
Moderately wasted	7	8.9	
Severely wasted	4	5.1	
Global Acute Malnutrition	11	14.0	7.9-23.4

4.4.2.2 Prevalence of underweight

Slightly less than one-tenth (9.8%, CI 7.1-13.6) of children aged 6-23 months old were underweight. In the same age category, slightly less than three-quarters (73.2%) of the children were normal while two-tenths (17.0%) of the children aged 6-23 months old were overweight and obese. Total percentage of underweight children in the age categories was: 7.7% (CI 4.4-13.2) in 6-11 months old; 14.7% (CI 9.1-22.9) in 12-17 months old and 7.6% (CI 3.1-16.4) in 18-23 months old (Table 4.13).

Table 4.14: Prevalence of underweight

Child nutritional status: Underweight	**N=324**		
	N	%	CI
Weight for Age Z scores			
6-23 months N=324			
Overweight and obese	55	17.0	
Normal	237	73.2	
Moderately underweight	28	8.6	
Severely underweight	4	1.2	
Global underweight	32	9.8	7.1-13.6
6-11 months N=143			
Overweight and obese	27	18.9	
Normal	105	73.4	
Moderately underweight	10	7.0	
Severely underweight	1	0.7	
Global underweight	11	7.7	4.4-13.2
12-17 months N=102			
Overweight and obese	23	22.5	
Normal	64	62.7	
Moderately underweight	13	12.7	
Severely underweight	2	2.0	
Global underweight	15	14.7	9.1-22.9
18-23 months N=79			
Overweight and obese	5	6.3	
Normal	68	86.1	
Moderately underweight	5	6.3	
Severely underweight	1	1.3	
Global underweight	6	7.6	3.1-16.4

4.4.2.3 Prevalence of stunting

Global stunting prevalence in children aged 6-23 months old was 20.1% (95% CI 16.1-24.8). In the same age category, more than three-quarters (79.9%) of the children aged 6-23 months were normal while 14.5% and 5.6% were moderately and severely stunted. The total percentage of stunted children in the age categories was: 10.5% (CI 6.5-16.6) in 6-11 months old; 26.4% (CI 18.9-35.8) in 12-17 months old and 29.1% (CI 20.2-39.9) in 18-23 months old (Table 4.15).

Table 4.15: Prevalence of stunting among children 6-23 months

Child nutritional status: Stunting	N=324		
	n	%	95% CI
Length for Age Z scores:			
6-23 months N=324			
Normal	259	79.9	
Moderately stunted	47	14.5	
Severely stunted	18	5.6	
Global stunting	65	20.1	16.1-24.8
6-11 months N=143			
Normal	128	89.5	
Moderately stunted	11	7.7	
Severely stunted	4	2.8	
Global stunting	15	10.5	6.5-16.6
12-17 months N=102			
Normal	75	73.5	
Moderately stunted	18	17.6	
Severely stunted	9	8.8	
Global stunting	27	26.4	18.9-35.8
18-23 months N=79			
Normal	56	70.9	
Moderately stunted	18	22.8	
Severely stunted	5	6.3	
Global stunting	23	29.1	20.2-39.9

4.4.2.4 Under-nutrition by age

The total number of moderate and severely malnourished children by Weight for Length Z scores (WLZ) and Length for Age Z scores (LAZ) raised from 6-11 months through 12-17 months to the highest prevalence at 18-23 months age categories. Prevalence of underweight was highest (14.7%) at 12-17 months and dropped at 18-23 months to almost a similar level (7.6%) with 6-11 months age category. Stunting levels rose as children grew from 10.5% at 6-11 months to 29.1% at 18-23 months. In terms of all the three indices, children aged 18-23 months old were most malnourished followed by 12-17 months age category and lastly 6-11 months category. In summary, nutrition status deteriorated with age (Figure 4.3).

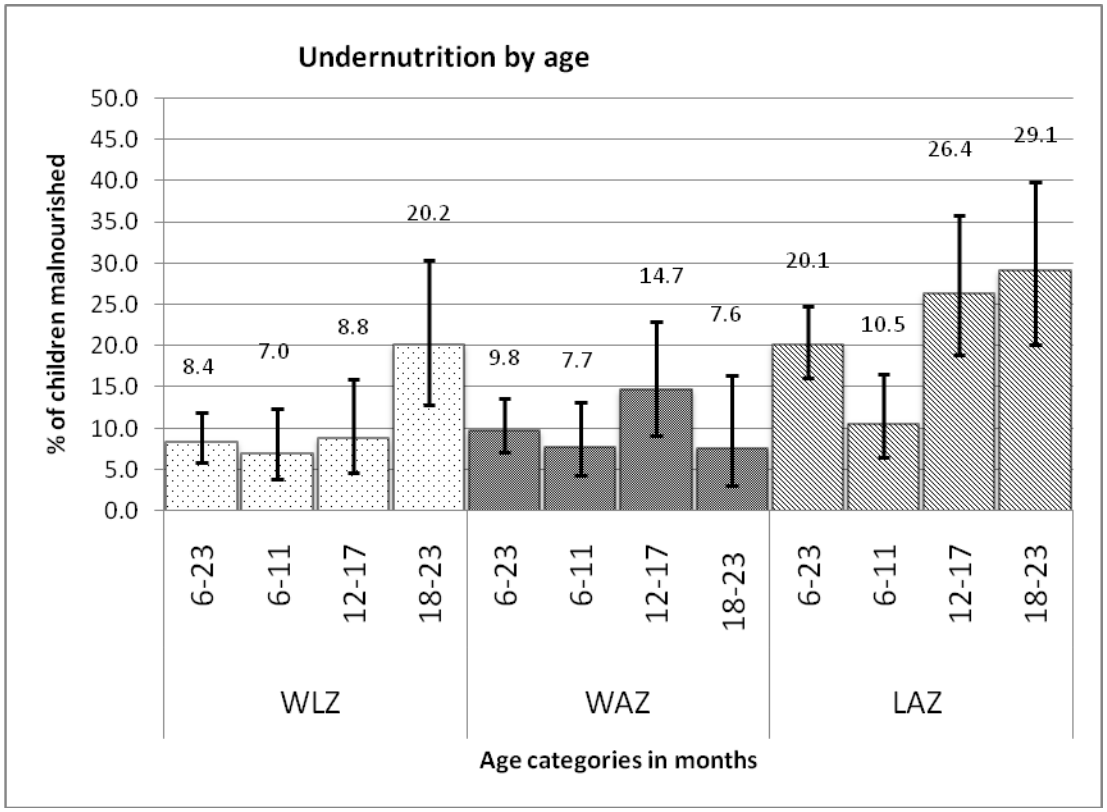


Figure 4.3: Under nutrition by age

4.5 Morbidity Prevalence among the children aged 6-23 months old

The Infant morbidity status was determined based on a two-week recall by the mother. Slightly less than three quarters (72.2%) of the infants were reported to have been sick. Of those infants reported to have been sick, 54.3% had diarrhoea, 33.8% suffered from vomiting, 45.7% had fever, 34.6% had respiratory infections (ARIs) defined as colds, cough and difficulty in breathing; while 10.3% had skin infections (Table 4.16). Majority (80.8%) of mothers sought assistance when their children were sick mainly from public health facilities (58.7%) (Table 4.16).

Table 4.16: Child morbidity

Child morbidity	N=324	
	N	%
Children sick in the past 2 weeks	234	72.2
Prevalence of common illness[+] N=234		
Diarrhoea	127	33.8
Vomiting	79	54.3
Fever with chills like malaria	107	45.7
Fever cough and difficulty in breathing	81	34.6
skin infections	24	10.3
Assistance sought when child was sick[+] N=189	189	80.8
Private clinic/pharmacy	37	19.6
Public health facility	111	58.7
NGO/FBO	17	9.0
Shop/kiosk	13	6.9
Others	12	6.3

[+] Multiple responses
NGO/FBO- Non Governmental Organization/Faith Based Organization
Others- Tradition healers, CHWs, mobile clinics and local herbs

4.5.1 Household water utilization, sanitation and hygiene

Almost all (95.3%) the households reported to have been drinking tap water. Treatment of water before drinking was done by less than a quarter (24.5%) of the households mainly through boiling (11.2%) and using chemicals (9.6%). Virtually all (99.1%) had access to a toilet facility with slightly below three quarters (71.5%) using traditional pit latrines. Nearly all the respondents reported to have been washing their hands at the most critical times which are: after defecation/visiting the toilet (99.7%); before feeding the child (99.7%); before eating (100%) and before preparing food (97.2%) (Table 4.17).

Table 4.17: Household water consumption, hygiene and sanitation

Household water consumption, hygiene and sanitation:	N=322	
	N	%
Main source of drinking water:		
Tap water	307	95.3
Water treatment before drinking	79	24.5
Boiling	36	11.2
Use of chemicals	31	9.6
Access to toilet facility	319	99.1
Traditional pit latrine	228	71.5
Ventilated improved pit latrine	41	12.9
Flush toilet	45	14.1
Immediate and hygienic disposal of children feaces	244	75.8
Hand washing:		
After defecation/visiting the toilet	321	99.7
Before feeding the child	321	99.7
Before eating	322	100
Before preparing food	313	97.2

4.6 Factors associated with complementary feeding practices

Socio-demographic and economic factors: age, parity, household size, sex of the household head, occupation, main source of family income, provider of food in the household. In addition, the estimated percentage of household income allocated to food and how food is obtained in the household and their association with complementary feeding practices (consumption of vitamin A rich foods, consumption of iron rich foods, minimum dietary diversity, minimum meal frequency and minimum acceptable diet) was investigated.

The association between introduction of complementary foods and other dependent variables could not be assessed because all (100%) children aged 6-8 months old had been introduced to complementary foods. Maternal nutritional knowledge on dietary diversity meal frequency and enriching complementary foods with complementary feeding practices was conducted. Child morbidity prevalence, household water consumption, hygiene and sanitation in relation to complementary feeding practices were also examined. Lastly, the study investigated the association between complementary feeding practices and nutrition status (wasting, underweight and stunting) was investigated.

Chi-square test was used to determine the association between categorical/nominal independent variables and the indicators of complementary feeding practices which were also of categorical nature.

4.6.1 Socio-demographic and economic factors and their relationship with complementary feeding practices

Maternal age and occupation, proportion of income allocated to food and the decision maker on how family income is used were the only socio-demographic and economic factors having an association with complementary feeding practices. Children belonging to young mothers were more likely (chi square test; p=0.024) to achieve minimum meal frequency. Mothers who were not employed were more likely (chi square test; p=0.045) to feed their children with vitamin A rich foods (Table 4.18).

Table 4.18: Significant relationship between demographic and socio-economic factors and complementary feeding practices

Characteristic	**Complementary feeding practice**						**Chi-square test; P value,**
Mothers' age N=322	**Minimum meal frequency**						**0.024***
	Yes		No		Total		
	n	%	n	%	n	%	
<25 years	167	92.3	14	7.7	181	56.2	
25-35 years	96	84.2	18	15.8	114	35.4	
>25 years	6	77.8	21	22.2	27	8.3	
Occupation	**Consumption of vitamin A rich foods**						**0.045***
	Yes		No		Total		
	n	%	n	%	n	%	
Not employed	114	49.8	115	50.2	229	71.1	
Employed	40	43.4	52	56.5	92	28.3	
Percentage of income allocated to food	**Minimum dietary diversity**						**0.048***
	Yes		No		Total		
	n	%	n	%	n	%	
Largest (>65%)	27	21.3	100	78.7	127	39.4	
Medium (30%-65%)	28	18.8	121	81.2	149	46.2	
Smallest (<30%)	3	6.5	43	93.5	46	14.3	
Decision maker on how family income is used	**Consumption of vitamin A rich foods**						**0.045***
	Yes		No		Total		
	n	%	n	%	n	%	
Husband/partner	19	36.7	11	63.3	30	9.3	
Wife/mother	135	46.2	157	53.8	292	90.1	

Children belonging to households which allocated more than 65% of their income to food were more (chi square test; p=0.048) likely to consume a diverse diet compared to children whose households allocated less than 65% of their income to food. Children belonging to households where mothers decided on how family income is used were more likely (chi square test; p=0.045) to achieve minimum dietary diversity compared to children belonging to households where husbands decided (36.7%) on how income is used (Table 4.18).

The following variables; sex of the household head, mothers' age, mothers' occupation, marital status and main source of family income had no significant associations with complementary feeding practices (Table 4.19, Appendix VI).

4.6.2 Maternal/caregivers' knowledge and its relationship with complementary feeding practices

Children belonging to mothers who knew the importance of feeding their children on a diverse diet were likely (chi square test; p=0.001) to achieve minimum dietary diversity compared to children belonging to mothers who were not knowledgeable. Children of mothers who knew the importance of enriching complementary foods we more likely (chi square test; p=0.007) to achieve minimum acceptable diet compared to mothers who were not knowledgeable on the importance of enriching complementary foods (Table 4.20).

Table 4.20: Relationship between maternal nutrition knowledge and complementary feeding practices

Characteristic	Complementary feeding practices						Chi-square test; P value,
Knowledge on the importance of diverse diet	**Minimum dietary diversity**						**0.001***
	Yes		No		Total		
	n	%	n	%	n	%	
Correct response by the mother	31	28.2	79	71.8	110	34.2	
Incorrect response by the mother	27	12.7	185	87.3	212	65.8	
Knowledge on the importance of enriching complementary food	**Minimum acceptable diet**						**0.007***
	Yes		No		Total		
	n	%	n	%	n	%	
Correct response by the mother	41	19.5	169	80.5	210	65.2	
Incorrect response by the mother	9	8.0	103	92.0	112	34.8	

Maternal knowledge on the importance of a diverse diet, frequency of feeding and importance of flesh foods had no significant association with complementary feeding practices (Table 4.21, Appendix VI).

4.6.3 Child morbidity status and its relationship with complementary feeding practices

The relationship between prevalence of diarrhoea and consumption of vitamin A rich foods and minimum dietary diversity was significant (chi square test; p=0.036) and (chi square test; p=0.033) respectively. A significantly higher proportion (51.0%) of children who did not suffer from diarrhoea in the past 2 weeks consumed vitamin A rich foods compared to (36.7%) who suffered from diarrhoea in the past 2 weeks. On the other hand, a significantly higher proportion (19.4%) of children who did not suffer from

diarrhoea achieved minimum dietary diversity compared to children (11.4%) who suffered from diarrhoea in the past 2 weeks.

Table 4.22: Significant relationship between child morbidity status and complementary feeding practices

Morbidity	Complementary feeding practice						Chi-square test; p value
	Consumption of vitamin A rich foods						**0.036***
	Yes		No		Total		
	n	%	n	%	n	%	
Presence of diarrhoea	29	36.7	50	63.3	79	33.8	
No diarrhoea	79	51.0	76	49.0	155	66.2	
	Minimum dietary diversity						**0.033***
	Yes		No		Total		
	n	%	n	%	n	%	
Presence of diarrhoea	9	11.4	70	88.6	79	33.8	
No diarrhoea	30	19.4	125	80.6	155	66.2	

There was no association between other morbidity variables among the children aged 6-23 months old and complementary feeding practices (Table 4.23, Appendix VI)

4.6.4 Complementary feeding practices and their relationship with child nutritional status

A significant (chi square test; p=0.036) higher proportion (29.6%) of children who did not attain minimum acceptable diet were wasted compared to (14.1%) who were wasted and attained minimum acceptable diet (Table 4.24).

There was no association between other morbidity variables among the children aged 6-23 months old and complementary feeding practices (Table 4.25, Appendix VI)

Table 4.24: Significant relationship between child nutritional status and complementary feeding practices

Complementary feeding practices N=324	Nutrition status						Chi-square test; P value
	Wasting						**0.036***
	Yes		No		Total		
	n	%	n	%	n	%	
Achieved minimum acceptable diet	42	14.1	255	85.9	297	91.7	
Did not achieve minimum acceptable diet	8	29.6	19	70.4	27	8.3	

4.6 Predictors of complementary feeding practices and child nutrition status

The variables that had significant relationships in univariate analysis were subjected to binary logistic regression analysis. Maternal age and occupation, proportion of income allocated to food, decision maker on how family income is used, maternal knowledge on the importance of diverse diet and enriching complementary foods and prevalence of diarrhoea were subjected to binary logistic regression to determine significant predictors of complementary feeding practices. Logistic regression was also used to predict the odds of a wasted or well-nourished child consuming a minimum acceptable diet.

Absence of diarrhoea (Odds Ratio [OR] =1.77, P=0.040), young mothers (OR =1.77, P=0.030), maternal knowledge on enriching complementary foods (OR=3.41, P=0.040) and prevalence were significant predictors of consumption of Vitamin A rich foods, minimum meal frequency and minimum acceptable diet respectively. Well-nourished children were 2.56 times more likely to achieve minimum acceptable diet compared to wasted children (P=0.038) (Table 4.26).

Table 4.26: Predictors of complementary feeding practices

Independent variable	Odds ratio	95%CI	p value
	Minimum dietary diversity		
Percentage of income allocated to food	4.55	0.90-5.47	0.062
Presence of diarrhoea	1.67	0.42-3.12	0.289
Knowledge on the importance of diverse diet	1.95	0.95-3.99	0.289
	Consumption of vitamin A rich foods		
Occupation of the mother			
Decision maker on how family income is used	1.81	0.15-3.92	0.667
Diarrhoea in the last 2 weeks	1.77	0.56-4.73	0.040*
	Minimum meal frequency		
Mothers age	3.41	1.18-9.82	0.030*
	Minimum acceptable diet		
Knowledge on enriching complementary foods	2.77	1.30-5.95	0.009*
	Child's nutritional status (Wasting)		
Minimum acceptable diet	2.56	1.10-6.21	0.038

*Significance at p<0.005

CHAPTER FIVE: DISCUSSION

5.1 Introduction

Improving infant and young child feeding (IYCF) practices in children 0–23 months of age is critical to improved nutrition, health and development (WHO, 2008b). There is limited scientific data on complementary feeding practices and its relation to the nutritional status of children aged 6-23 months old in urban slums in Kenya. Most of the studies have focused on breastfeeding practices (Njeri (2012); Ochola, (2008) and Muchina (2007) while few studies (Kimani-Murage *et al*, (2011) and Adere (2007) focused on complementary feeding.

To improve complementary feeding in low-resource settings during this critical period of growth and development, factors associated with complementary feeding practices should be investigated to provide information necessary for focused and appropriate interventions. The study adopted a cross-sectional analytical design to investigate complementary feeding practices in relation to the nutritional status of children aged 6-23 months in Korogocho slum Nairobi.

5.2 Socio-demographic and economic characteristics of mothers/caregivers of children 6-23 month

As a whole, the participants were young, married and of primary level of education. The findings on marital status are in agreement with those conducted in other in informal settlements in Kenya (Mututho, 2012; Kimani-Murage *et al.*, 2011; Ochola, 2008) and in Ethiopia (Gebru, 2007). The high poverty levels in Korogocho slum as

reported by mothers during FGDs may have resulted to early school dropout by most of the girls and subsequently leading to early marriages. High levels of poverty may also lead to students discontinuing their studies because of lack of money to finance their education. The average urban household size in this study was higher than the Kenya national size of 3.1 (KNBS and ICF Macro, 2010). This is because the Kenyan urban statistics reflects both slum and non-slum settlements in urban areas while the study was restricted to an informal urban slum.

On the whole, most of the husbands were casual labourers while most of the mothers were unemployed and depended on their spouses for provision of food and other necessities. Other studies conducted in informal settlements in Nairobi have found similar findings (Kimani-Murage *et al.*, 2011; Ochola, 2008; Adere, 2007).

The majority of the households allocated over half of their income to food expenditure indicating high levels of poverty in the study area. As expected in an urban setting, nearly all the households obtained food through purchase. High levels of poverty, low purchasing power and lack of own production of food may have had a negative effect on the attainment of minimum acceptable diet by children aged 6-23 months old in majority of the households.

5.3 Feeding practices among children 6-23 months old in Korogocho slum

5.3.1 Breastfeeding practices

Scientific evidence has consistently shown that breastfeeding from birth to 2 years and beyond plays a critical role in ensuring proper growth and development of a child (Iliff *et al*., 2005, Bahl *et al.*, 2005 and Venneman *et al*., 2009). Even though the study

focused on complementary feeding, it was worth giving a snapshot of some of the breastfeeding practices. As is the case in many sub-Saharan countries and Kenya in particular (Kimani-Murage *et al,* 2011; KNBS and ICF Macro, 2010; Chelimo, 2008; Ochola, 2008; Reygal, 2007; Adere, 2006), initiation of breastfeeding was universal with nearly all the children having been breastfed.

The above findings are also comparable to those of studies conducted in Asia (Timor-Leste and Bangladesh) which has similar circumstances to the sub-Saharan Africa (Senarath *et al.,* 2007 and Rah *et al*., 2012). The minority of the mothers who did not initiate breastfeeding in this study reported that the main reason for not doing so was lack of breast milk. These findings concur with those of studies in other informal settings in Nairobi (Kimani-Murage *et al,* 2011 and Ochola, 2008).

A high percentage of the children who are one year old were still being breastfed. This finding is similar to those by Hanif *et al.,* (2011) and Marriott *et al.,* (2011) in several countries in Asia and sub-Saharan Africa respectively. At 2 years of age, the rate of breastfeeding dropped to about two-thirds, indicating that one-third of the children had prematurely stopped breastfeeding and therefore missing on the benefits of the practice. A similar trend was noted in all the studies conducted in Africa and reviewed by Sawadogo *et al.,* (2011) with the rate of breastfeeding decreasing from 100% at 6 months to 61% at 24 months.

The median age of cessation of breastfeeding in this study was 9.0 months, a much lower rate than the rate in Nairobi Province at 15.0 months (KNBS and ICF Macro, 2010). The relatively low duration of breastfeeding in this study could be partly

explained by the fact that most mothers had to leave their children at home to look for casual jobs and thus could not continue with breastfeeding. This finding implies that a significant proportion of children were therefore likely to miss the health benefits of continued breastfeeding for the recommended duration of 2 years or more (UNICEF, 2011).

The use of pacifiers and bottles with nipples is undesirable as it interferes with successful breastfeeding leading to reduced duration of breastfeeding due to 'nipple confusion' by infants (Neifert, Lawrence & Seacat, 1995). In addition, in the slum setups, bottle feeding poses the additional risk of introducing pathogens into the infant, because of the unhygienic practices during handling and preparation and often limited accessibility to adequate supply of safe water leading to increased susceptibility to diarrhoea and other infections (Redmond, Griffith & Riley, 2009). About one-third of the children in this study were fed using a bottle with a nipple, probably because the mothers were not at home most of the times to breastfeed their children as evidenced by the low duration of breastfeeding.

5.3.2 Complementary feeding practices

5.3.2.1 Introduction of solid, semi-solid and soft foods

WHO recommends exclusive breast-feeding for the first 6 months of life, with nutritionally adequate and safe complementary foods introduced at 6 months while breast-feeding continues up to 2 years of life (WHO, 2003). Despite the well-known advantages of exclusive breast feeding and WHO recommendations, many studies have demonstrated a high prevalence of early introduction of water and complementary foods

before the age of 6 months especially in the African setting. Delayed introduction of complementary foods has also been associated with nutritional deficiencies of iron, zinc, vitamin A and calcium (Gibson, Ferguson & Lehrfeld, 1998).

All the children (aged 6-8 months old) in this study had appropriately been introduced to complementary feeding. Nonetheless, some of the children had been introduced to complementary foods as early as 2 months as reported by mothers during the FGDs. The finding on early introduction of complementary feeding is in agreement with those of other studies conducted in informal settlements in Kenya (Kimani-Murage *et al*., 2011; Ochola, 2008; Reygal, 2007; Muchina, 2007). The reasons given for early introduction of complementary foods by respondents in the present study were that; most of the children cried frequently due hunger, perceived lack of enough breast milk by the mothers and maternal absence from home for long periods. These reasons compare with those of a study conducted in Kibera informal settlement in Nairobi by Ochola (2008) in which the reasons for early introduction of complementary feeding included: societal pressure to introduce complementary feeding; misconception about inadequacy of breast milk production; practical perceptions about excessive demands on maternal time against other competing responsibilities and maternal absence from home for long periods of time.

5.3.2.2 Dietary diversity

Appropriate complementary diet must include a balanced composition of foods containing adequate amount of macro and micronutrients (with special attention to iron, zinc, calcium, vitamin A, vitamin C and folic acid) to ensure optimal growth after the age of 6 months. Consumption of a diverse diet (of 4 or more out of 7 food groups) as

recommended by WHO (2008) is irrespective of routine Vitamin A supplementation. Scientific studies have established that appropriate dietary diversity is associated with improved child nutritional status (Arimond & Ruel, 2004). Adherence to the quality of the diet is especially important in low-income set-ups where poor hygiene presents an additional burden, early introduction (Popkin *et al.*, 1990).

Nearly all the children aged 6-23 months old consumed foods made from grains, roots and tubers mainly in form of porridge. This is similar to studies by KNBS and ICF Macro, (2010) in Kenya, Rao *et al*., (2011) in India, Xu *et al.*, (2007) in China, Owino *et al.*, (2008) in Zambia and Hussein, (2005) in Tanzania. The consumption of vitamin-A rich fruits and vegetables and other fruits and vegetables was low. These findings compare with those of studies conducted in Kenya by Chelimo, (2008) and in Nepal by Joshi *et al*., (2011). The low consumption of vitamin A-rich foods may have been contributed by the high poverty level in the slum and therefore limited income to purchase foods.

The low intake of iron rich and iron fortified foods in the current study was consistent with past observations in Tanzania (Mamario *et al.,* 2005) and Zambia (Serlmitsos & Fusco, 2001) which established that complementary foods were inadequate in iron. Scientific evidence from studies demonstrates that consumption of animal origin foods is consistently low in both rural and urban set-ups (Joshi *et al*., 2011 and Owino *et al*., 2008), findings that concur with that of the present study. Nonetheless, a study in Tanzania by Maseta *et al.*, (2008) found contrasting results. The difference was attributed to child survival, protection and development program aimed at improving the welfare of mothers and children which was in operation in the study area (Tanzania) at

the time of the study. Again, the low consumption of animal origin foods may be contributed to the high poverty level in the slum and therefore limited income to purchase foods.

The findings of this study showed that complementary feeding was low in dietary diversity. The mean dietary diversity was (2.4 ± 1.3), implying that many children ate foods from only 2 out of the 7 recommended groups (WHO, 2008b) with the number of food groups consumed increasing with the age of the child. With regards to achieving the minimum dietary diversity, less than two-tenths of all the children 6-23 months of age consumed foods from 4 or more food groups as per the WHO recommendations (WHO, 2008b). These findings are in agreement with those from various studies; Sawadogo *et al.,* (2011) in Burkina Faso and Joshi *et al.,* (2011) in Nepal. In a study conducted in Ethiopian informal settlements (Gebru, 2007), the minimum dietary diversity rate, was higher (7%) than in the present study but lower than what was found in rural and urban Zambia (37%) by Disha *et al.,* (2012).

The findings on minimum dietary diversity in this study showed a lower rate of children achieving the minimum dietary diversity compared to the Nairobi Province rate at 58.7% (KNBS & ICF Macro 2010). The difference in the findings in this study and that of Nairobi Province is explained by the fact that the present study was conducted in a low resource-setting where the population has challenges in accessing a variety of foods because of low purchasing power. The Nairobi Province rate also included children from middle and lower income categories who are more likely to have more diverse diets.

5.3.2.3 Meal frequency

The relatively high energy requirements of children aged 6-23 months old and their limited stomach capacity challenge their ability to meet nutrient needs, particularly if only a few meals are offered each day (Islam *et al.,* 2008). Feeding frequency is related to total daily nutrient intake and thus it is essential in ensuring optimal growth. WHO recommends minimum meal frequency at: 2 times for breastfed infants 6–8 months old; 3 times for breastfed children 9–23 months old and 4 times for non-breastfed children 6–23 months old (WHO, 2008a).

The study established that most children aged 6-23 months old received one to three meals a day with a mean meal frequency of 3.5 (± 1.1). This resulted into the majority of the children achieving minimum meal frequency as per the WHO recommendations (WHO, 2008b). Similar findings have been documented by Adere (2006) in an urban Kenyan slum, Maseta *et al*., (2008) and Hussein, (2005) in Tanzania and Sawadogo *et al*., (2011) in Burkina Faso. In conclusion, complementary feeding, in this study was sufficient in terms of meal frequency.

5.3.2.4 Minimum acceptable diet

Overall, a small proportion (less than two-tenths) of the children achieved the minimum acceptable diet (children 6–23 months old who attained the minimum dietary diversity and the minimum meal frequency during the previous day). The low achievement of the minimum acceptable data was largely contributed to by the low dietary diversity. The findings on the prevalence of minimum acceptable diet were comparable to those of

Joshi *et al*., (2011) and Disha *et al*., (2012) in Nepal and Ethiopia. The findings however differed with those of Senarath *et al*., (2007) and KDHS (2008-09) which established that 68% and 43.8% of the children achieved a minimum acceptable diet respectively. The two studies which differed were nationwide and included households from all the socio-economic strata. Therefore, the difference in the proportion of children aged 6-23 months attaining the minimum acceptable diet.

The low adherence to appropriate feeding practices in this study may be partly attributed to by the high poverty and household food insecurity; mothers being away from home most of the times; women having many children and lack of reliable jobs that can provide steady income for the mothers.

5.4 Mothers/caregivers knowledge and perceptions on complementary feeding in Korogocho slum

Appropriate complementary feeding depends on accurate information and skilled support from the family, community and healthcare system. Inadequate knowledge on appropriate food and feeding practices is often a greater determinant of malnutrition than the lack of food thus significantly affecting the nutritional status of children (Sethi, Kashyap & Seth, 2003).

Overall, mothers' and caregivers' demonstrated a high knowledge on breastfeeding compared to complementary feeding practices. The aspects on which mothers demonstrated high knowledge included: the importance of breastfeeding and in particular the correct duration of exclusive breastfeeding; age of introduction of complementary foods; correct meal frequency and importance of high standards of

hygiene in the preparation of complementary foods, findings that are comparable to those of a study conducted in a Nairobi slum (Muchina, 2007). During the FGDs mothers reported d to have received knowledge on infant feeding mainly from the health facilities and this partly explains the high level of maternal knowledge on the above mentioned factors. Sources of knowledge in the present study were similar to those conducted in informal settlements in Kenya (Mututho, 2012; Ochola, 2008). Support groups were not mentioned as a source of information in the present study.

The findings on the awareness of the importance of breast feeding concur with those of studies on infant and young child feeding conducted in Zambia (Owino *et al.,* 2008), Ethiopia (Gebru, 2007) and Kenya (Ochola, 2008). In addition to this, in a study in informal settlement in Nairobi, approximately two-thirds of the mothers knew that complementary foods should be introduced at 6 months which is consistent with the findings of the present study (Kimani-Murage *et al.,* 2011

Over two-thirds of the mothers in this study were aware of the ability of breast milk alone to sustain the baby for the first 6 months of life. Such findings are in contrast with the findings of a study conducted in Zambia (Owino *et al.,* 2008) where more than a third of mothers were doubtful of the nutritional adequacy of breast milk to meet the nutritional needs of an infant. In the current study, about half of the mothers knew the health implications of keeping high standards of hygiene when preparing complementary foods which is in agreement with the findings of a study conducted in Nigeria (Amosu *et al.,* 2011). The proportion of mothers who knew that breast feeding should be on demand and continued to breastfeed for at least 2 years was comparatively lower in this study than in a study conducted in Kibera, an informal settlement in

Nairobi (Ochola, 2008). In the Kibera study (Ochola, 2008), participants were mothers with infants less than 6 months who frequently visited health facilities for routine immunizations and therefore benefited from the standard health and nutrition education offered. In the present study, mothers with children over 9 months of age are likely to visit the health facilities less often after immunization has been completed. This trend was been observed in many settings (Mapatano *et al*, 1997).

Few mothers had knowledge on: the risks of introducing complementary foods too late; importance of animal source foods to the child; benefits of enriching complementary foods and the importance of using one type of flour to prepare children's porridge. The findings are comparable to a study in Burkina Faso by Sawadogo *et al.,* (2011).

The mean maternal knowledge score on complementary feeding was 6.5 ±1.6 out of a possible total score of 12. These findings were slightly lower compared to those of Adere (2007) in Kibera slums. The difference in maternal knowledge in the two informal slums may have been attributed to high peer support for mothers in Kibera (Adere 2007). The average maternal knowledge, poverty and being away from home may have been some of the factors contributing to the relatively low adherence to appropriate complementary feeding practices as reported in the FGDs.

5.5 Morbidity prevalence among the children

Morbidity burden was high with diarrhoea, vomiting, fever and acute respiratory infections (ARIs) being common in the study area which was comparable to studies by Moursi *et al.,* (2008) and Bhandari *et al*., (2004) in urban areas in Madagascar and India

respectively. High prevalence of morbidity especially diarrhoea and vomiting may be due to the fact that very few households treated drinking water and the unhygienic environment in the slum.

5.6 Water, sanitation and hygiene

Almost all the households reported to have been drinking tap water which was higher than the national rate at 75.7%, (KDHS, 2008-09) findings in the urban areas. Tap water is generally regarded as safe but chances are high that it could be contaminated during transport and storage considering the challenges of hygiene in the slum set ups. Treatment of water at home is effective in improving the quality of drinking water (KNBS and ICF Macro, 2010). Very few households treated water before drinking, a finding that was comparable to the Kenya national rate (KNBS and ICF Macro, 2010).

Toilet facilities are important determinants of the levels of hygiene and sanitation among households. Most studies (Amosu *et al.*, 2011), (KDHS, 2008-09) and (Nyapera, 2012) support the current findings showing majority of the households access toilets or latrines. Nearly all of the respondents also reported to have been washing their hands at critical times. The question on whether the toilet facilities were used properly and whether knowledge on hand washing is translated to practice was beyond the scope of the study.

5.7 Nutritional status of children aged 6-23 months old

Overall, the magnitude of under-nutrition was high among children 6-23 months of age based on all the three indices: wasting, stunting and underweight all increasing with age

for the three indices. Prevalence of wasting and stunting was above the acceptable levels for a developmental area which is an issue of concern (WHO, 1995). The high burden could be attributed to double burden of poor feeding practices and high morbidity which have immediate consequences on the nutritional status of children. This trend in under-nutrition rates is comparable to those of a study conducted in Ethiopia and Zambia (Disha *et al*., 2012) and Kenya (KDHS-2008-09). However the two studies assessed children 6-59 months old in households from all the socio-economic strata.

The prevalence of wasting, underweight and stunting among the children 6-23 months old were similar to findings which assessed children 6-36 months in Kibera slum by Adere (2007). This demonstrated that the factors influencing child wasting in the two informal settlements were comparable.

5.8 Factors associated with complementary feeding practices

Achievement of the minimum dietary diversity, minimum meal frequency and minimum acceptable diet is associated with better nutritional status of children aged 6-23 months and is influenced by socio-demographic and economic factors; maternal nutritional knowledge; child morbidity prevalence; household water consumption; hygiene and sanitation.

5.8.1 Socio-demographic and economic factors and complementary feeding practices

Several studies have established different maternal factors related to complementary feeding practices. In the present study, younger mothers and those who were not employed were significantly more likely to feed their children at the required minimum

meal frequency and also to feed them on vitamin A rich foods respectively. The null hypothesis that there is no significant association between maternal demographic and socioeconomic characteristics and complementary feeding practices among children aged 6-23 months in Korogocho slum is thus rejected. Younger mothers of whom majority were unemployed had fewer children to cater for and thus lesser workload compared to older women. This contributed to younger mothers offering better quality care to their children.

More children belonging to households where mothers decided on how family income is used significantly achieved minimum dietary diversity compared to those in households where husbands decided on how family income was used. This is because mothers are likely to purchase food items in the household when they are the ones deciding on how family income will be used compared to when fathers are the ones doing it (Acharya *et al.*, 2010). The proportion of total income allocated to food was also related to complementary feeding practices. Significantly, more children from households which allocated more than two-thirds of their income to food consumed a diverse diet compared to those from households in which less than two-thirds of the income was allocated to food. The more income a household spends on purchasing food, the more is the likelihood that the children will achieve the minimum dietary diversity.

Other studies in similar settings have also found significant relationship between socio-demographic and economic factors and complementary feeding. In Timor-Leste, Senarath *et al.*, (2007) established maternal education, wealth index and media exposure to be associated with child dietary diversity.

5.8.2 Maternal knowledge and complementary feeding practices

Maternal nutritional knowledge about appropriate food and feeding practices significantly influences complementary feeding practices and is often a greater determinant of malnutrition than the lack of food (Aggarwal *et al.*, 2008). Mothers should therefore be equipped with the necessary knowledge on complementary feeding practices (Sethi, Kashyap & Seth, 2003).

Mothers who were aware of the importance of a diverse diet were more likely to feed their children on a diverse diet. On the other hand, mothers who were aware of the importance of enriching complementary foods fed their children with a minimum acceptable diet. The findings underscore the importance of maternal nutrition knowledge as a tool towards achieving appropriate complementary feeding in children aged 6-23 months old. The null hypothesis that there is no significant association between maternal/caregivers' knowledge on complementary feeding practices and complementary feeding practices among children aged 6-23 months in Korogocho slum was thus rejected. The findings on the positive association between maternal knowledge and complementary feeding practices agree with those conducted in urban Brazil (Romulus-Nieuwelink *et al.*, 2011) which showed that mothers with greater knowledge of healthy eating habits choose to give nutritious foods to their children.

5.8.3 Morbidity status and complementary feeding practices

The synergistic relationship between illness and malnutrition is central in determining the nutrition and health status of children (UNICEF, 1998). The positive relationship between diarrhoea prevalence with low consumption of vitamin A rich foods and low

dietary diversity was established in this study. Thus the null hypothesis that there is no relationship between morbidity prevalence and complementary feeding practices among children 6-23 months in Korogocho slum was rejected.

The findings of this study demonstrate beneficial effect of good health in ensuring appropriate complementary feeding practices among infants and young children.

5.8.4 Complementary feeding practices and their relationship with nutritional status

There is a direct relationship between complementary feeding practices and nutrition status of children aged 6-23 months old. Inadequate dietary intake results into growth faltering (UNICEF, 1998). Several studies have demonstrated the relationship between complementary feeding practices and wasting, stunting or underweight (Ma *et al.*, 2012).

In this study, lack of achievement of minimum acceptable diet was a predictor of wasting thus the null hypothesis that there is no significant relationship between complementary feeding practices and nutritional status of children aged 6-23 months in Korogocho slum is rejected. Other studies have demonstrated relationship between other indicators of nutritional status and complementary feeding practices. Disha *et al.*, (2012) in Ethiopia and Zambia found timely introduction of solid, semi-solid or soft food to be significantly associated with a lower risk of both stunting and underweight.

A pooled analysis of data from 11 Demographic Health Surveys in sub-Saharan Africa, Asia and Latin America, demonstrated that consumption of a diverse diet was associated

with lower stunting among children aged 6–23 months old (Arimond & Ruel, 2004). Similarly, Rah *et al*., (2012) in rural Bangladesh, found high dietary diversity to be associated with 15 %, and 26 % reduced odds of being stunted among children aged 6-11and12–23months, respectively.

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of findings

1. Most of the respondents were young, married and with primary education with the majority of them being housewives and dependent on their husbands for upkeep.

2. All the children had been introduced to complementary feeding although some of them prematurely. The frequency of feeding of the children was appropriate but the dietary diversity of the meals was inadequate making many children not to attain the minimum acceptable diet. Additionally, the consumption of animal source foods, vitamin A-rich and iron-rich foods was poor. On the whole, the complementary feeding practices in Korogocho slum fell below the recommendations by WHO (2008b) because of the relatively low percentage of children who attained the minimum diet diversity and the low prevalence of minimum acceptable diet among children 6-23 months old.

3. Mothers/caregivers had average knowledge on complementary feeding and were aware of the importance of: breastfeeding, the appropriate age of introduction of complementary foods, correct meal frequency and the importance of high standards of hygiene when preparing complementary foods. Significant gaps identified were: maternal knowledge related to importance of enriching complementary foods and the risks of introducing complementary foods too late.

4. Morbidity burden was high with diarrhoea, vomiting, fever and acute respiratory infections (ARIs) being most common in the study area. The high burden of

morbidity could be linked to the low practice of treating drinking water by the majority of the households and unhygienic environment in the slums.

5. The magnitude of under-nutrition was high among children 6-23 months based on wasting, stunting and underweight and it increased with age for all the three indices. Prevalence of wasting and stunting were above the WHO acceptable threshold levels for developmental areas (WHO, 1995).

6. The factors related to complementary feeding practices included; maternal age, maternal occupation, proportion of income allocated to food, decider of how family income is used, maternal knowledge on the importance of a diverse diet and diarrhoea prevalence. Children with diarrhoea were less likely to consume vitamin A rich foods and to achieve minimum dietary diversity. Lack of minimum acceptable diet was a significant predictor of nutritional status of the children based on the wasting.

6.2 Conclusion

On the whole, the complementary feeding practices in Korogocho slum fell below the recommendations by WHO (2008b) and the Kenya MOH Guidelines (GOK, 2012) because of the relatively low percentage of children who attained the minimum diet diversity and the low prevalence of minimum acceptable diet among children 6-23 months old. The magnitude of under-nutrition was high among children 6-23 months based on wasting, stunting and underweight. Prevalence of wasting and stunting were above the WHO acceptable threshold levels for developmental areas (WHO, 1995).

Mothers/caregivers who knew the importance of a diverse diet were likely to feed their children on a diverse diet. On the other hand, mothers who knew the importance of enriching complementary foods were likely to feed their children on a minimum acceptable diet. Children who had diarrhoea episodes were less likely to consume vitamin A rich foods and to achieve minimum dietary diversity. Lack of minimum acceptable diet was a significant predictor of nutritional status of the children based on the wasting.

6.3 Recommendations

6.3.1 Recommendations for policy and practice

i. Behaviour Change Communication (BCC) on complementary feeding practices in Korogocho slum and other similar areas should emphasize the importance of dietary diversity. In addition the consumption of animal origin foods, iron-rich and iron-fortified foods and vitamin A rich-foods as well as appropriate preparation of complementary foods should be emphasized. This agenda should be driven primarily by the MOH in collaboration with non-governmental organizations working on child survival programmes in such areas.

ii. The MOH and other organizations working on child survival programmes in slums should integrate water, sanitation and hygiene interventions with IYCF interventions to equip mothers with knowledge and skills on hygiene, prevention of diarrhoea and water treatment with the aim of lowering diarrhoea cases.

iii. Strategies to promote complementary feeding should target all the stakeholders and not only mothers of children. The strategies should target mothers-in-law, grandmothers, fathers and community leaders as they play a key role in influencing the mothers' choice of complementary feeding practices.

iv. The ministry of agriculture should sensitize households in slums on innovative and cost-effective agricultural and livelihood strategies, for example, multi-storey and kitchen gardening to improve access to vegetables and fruits which will in turn improve micronutrient intake and dietary diversity of the children.

6.3.2 Recommendations for research

The following suggestions are made for further research:

i. A longitudinal study should be conducted to track infant and young child feeding practices throughout the period from birth to 24 months of age. This is to effectively link feeding practices and individual growth patterns.

ii. Studies determining the quantity of dietary intake of the children should be done in the same and similar areas to establish the adequacy of nutrient intake of the diet. This will allow for comparison between actual dietary intake and nutritional status of children 6-23 months old.

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APPENDICES

Appendix I: Informed consent

Letter of introduction

My name is Jacob Korir, a Kenyatta University student pursuing a Master of Science in Foods, Nutrition and Dietetics. I am carrying out a research on complementary feeding practices and nutrition status of children aged 6-23 months in Korogocho slums, Nairobi.

I am seeking your consent to participate in the study whose findings might be beneficial to your child and other children. There will be no direct reference of your name nor will your contact information be published at the end of the study. There is no financial or other personal benefit from participating in this study and there are no risks to you resulting from your participation. You will be referred to the nearest facility if your child is moderately or severely malnourished. Your participation is voluntary and it will be highly appreciated.

When you sign or thumb print below, it shows that you have understood the purpose of the study and you have agreed to participate.

Signature/ thumb print of the participant……..

Date……

Appendix II: Questionnaire

COMPLEMENTARY FEEDING PRACTICES AND NUTRITIONAL STATUS OF CHILDREN AGED 6-23 MONTHS IN KOROGOCHO SLUM, NAIROBI.

[This questionnaire is designed for all children in the household who are more than 6 months (24 completed weeks) and less than 24 months of age. This includes other children from the same mother as well as children from other caregivers in the same household. Once you have completed the survey for one child, use a separate form for each and every other child less than 24 months of age who lives in the same household.]

ADMINISTRATIVE DETAILS

Date: _____ / _____ / 2012 *Day month*	Household Number
Questionnaire identity number	Team leader
Team number	Questionnaire checked by
Village name	

Background

[*Make every effort to speak with the mother. If she is not available, speak with the primary caregiver responsible for feeding of the child.]*

Are there any children in the household who are more than 6 months and less than 24 months of age? If YES, identify the mother/primary caregiver and continue:

SECTION A: HOUSEHOLD DEMOGRAPHIC AND SOCIO-ECONOMIC DATA

NB: The word 'mother' refers to biological mother of the child or the primary caregiver of the child

[INSRUCTIONS ON HOW TO RECORD ANSWERS: Circle the number corresponding to the response that a mother gives. Record the appropriate response in areas where choices have not been given. All 'Any other' responses should be specified]

	QUESTION	**RESPONSES**	**CHOICES**
A1	Sex of household head	Male Female	1 2
A2	Age of mother	……. Years	
A3	Marital status	Single Married Separated Widowed	1 2 3 4
A4	Occupation of household head (skip to A6 if the mother is the household head)	Not employed Employed (salaried) Small scale trading	1 2 3

		Casual labour Any other (specify)	4 5
A5	Occupation of mother	Not employed/house wife Employed (salaried) Small scale trading Casual labour Any other (specify)	1 2 3 4 5
A6	Education level of the household head	No education Primary Secondary Tertiary	1 2 3 4
A7	Household size (people who usually eat from the same pot)	…….. people	
A8	How many children do you have?	…….. children	
A9	How many children are below 5 years of age?	…….. children	
A10	Main source of family income	Formal employment Casual labour Small scale business Any other (specify)	1 2 3 4
A11	How is food obtained in the family? *[Probe for all responses]*	Farming Buying Food aid/donation Any other (specify)	1 2 3 4
A12	Who has the primary responsibility of providing food for the household?	Father Mother Grandparent Relatives Any other (specify)	1 2 3 4 5
A13	What is the estimated percentage of household income that is allocated to food?	Largest percentage Medium percentage Smallest percentage No specific allocation	1 2 3 4
A14	Who usually decides how family income is used?	Husband/Partner Wife/mother Any other (specify)	1 2 3
A15	Who usually decides on what food to be cooked each day in the household?	Husband/Partner Wife/mother Any other (specify)	1 2 3

SECTION B: CHILD'S DATA

[If there is more than 1 child 6-23 months in the household, identify each child's mother or primary caregiver starting with the youngest and arrange to interview her once. Section A of the interview schedule is completed. After you have completed the questionnaire for the first child,

repeat from section B of interview schedule for the 2nd child, substituting the correct NAME for this child.]

[The household number (B1) must be the same for those children who are from the same household]

	QUESTION	RESPONSES	CHOICES
B1	Household Number	……..	
B2	Child Number	……..	
B3	What is your child's name? *[Use this NAME in remaining questions]* Please get his/her card	……..	
B4	Sex of the child	Male Female	1 2
B5	Child's date of birth *[If there is no documentary source, probe using memorable dates /calendar of events until a mother provides the most accurate answer]*	Date: _____ / ____/ 2012 *Day month*	
B6	Source of birth date	Child health card Mother/caregiver Any other source (specify)	1 2 3
B7	Order of birth of the child	……..	

SECTION C: CHILD'S ANTHROPOMETRIC DATA

	ANTHROPOMETRIC MEASUREMENT	FINDINGS
C1	Weight of the child *(to the nearest 0.1gms)*	……..kgs
C2	Length of the child (to the nearest 0.1 cm)	……..……cms

SECTION D: CHILD MORBIDITY IN THE LAST TWO WEEKS

	QUESTION	RESPONSES	CHOICES	SKIP
D1	Has the child been sick in the past 2 weeks?	Yes No	1 2 ⇢	 E1
D2	If Yes which? *(More than one response possible)*	Diarrhoea Vomiting Fever with chills like malaria Fever, cough, difficulty in breathing Intestinal parasites Measles Eye infections Skin infections Accident Malnutrition	1 2 3 4 5 6 7 8 9 10 11	

		Stomachache Tooth ache Other (Specify)	12 13	
D3	When the child was sick did you seek assistance?	Yes No	1 2 ⋯⋯▶	 E1
D4	If YES Where? *(More than one response possible)*	Traditional healer Community health worker Private clinic/Pharmacy Shop/Kiosk Public clinic Mobile Clinic Relative or friend Local herbs NGO/FBO	1 2 3 4 5 6 7 8 9	

SECTION E: HOUSEHOLD WATER CONSUMPTION, SANITATION AND HYGIENE

	QUESTION	RESPONSES	CHOICES	SKIP
E1	What is your main source of drinking water?	River Water tap Borehole Unprotected well Protected well Tanker Other (Specify)	1 2 3 4 5 6 7	
E2	Do you do anything to the water before drinking it? *(Probe for all responses)* *(More than one response possible)*	Boiling Use traditional herbs Use chemicals Filters/Sieves Decant Nothing done Others (Specify)	1 2 3 4 5 6 7	
E3	Does your house hold have access to a toilet facility?	Yes No	1 2 ……▶	 E5
E4	If YES, What type of toilet facility? *(Observe also)*	Bucket Traditional pit latrine Ventilated improved pit latrine Flush toilet Other (specify)	1 2 3 4 5	
E5	If NO, where do you go/use? (probe further)	Bush Open field Near the river Behind the house Other specify	1 2 3 4 5	
E5	How are children's faeces disposed? (*Observe*)	Disposed off immediately and hygienically Not disposed (scattered in the compound) Others (Specify)	1 2 3	
E6	At what occasions do you wash your hands? (Multiple answers possible)	After defecation/visiting toilet Before feeding the child Before eating Before preparing food When I think they are dirty When water is available Other (Specify)	1 2 3 4 5 6 7	

SECTION F: CHILD FEEDING HISTORY

	QUESTION	RESPONSES	CHOICES	SKIP
F1	Did you ever breastfeed *[Name]*?	Yes No DNK	1 ……▶ 2 ……▶ 3	F3 F2

F2	If No, why?	No milk Did not want to breast feed Traditional beliefs (child will die) Other (Specify)	1 2 3 4	F8
F3	If yes, how soon after birth did you put *[Name]* on the breast?	If less than an hour If less than 24 hours record number of Hours If more than 24 hours record number of Days If mother does not know record	00 …..Hrs …..Days 88	
F4	During the first 3 days after delivery, did you give *[Name]* the fluid/liquid that came from your breasts?	Yes No DNK	1 2 3	
F5	Yesterday during the day or at night, did *[Name]* consume breast milk from you or someone else?	Yes No DNK	1 2 3	
F6	Are you still breastfeeding [Name]?	Yes No	1 ⇢ 2	F8
F7	If No how old was the child when you stopped breastfeeding?	.....months.		
F8	Was *[Name]* given any vitamin drops or other medicines as drops yesterday during the day or at night?	Yes No DNK	1 2 3	
F9	Was *[Name]* given ORS yesterday during the day or at night?	Yes No DNK	1 2 3	
F10	Was *[Name]* given Micronutrient sprinkles or Lipid based nutrient supplement yesterday during the day or at night?	Yes No DNK	1 2 3	

F11. Please describe everything that *[Name]* ate yesterday during the day or night, whether at home or outside the home.

[Keep probing 'Anything else?' until the respondent says 'nothing else.']

[If respondent mentions mixed dishes like a sauce or stew, probe: What ingredients were in that [MIXED DISH]? Probe: 'Anything else?' Until respondent says 'nothing else']

[If foods are used in small amounts for seasoning or as a condiment, include them under the condiments food group.]

[If a food recalled by the respondent is not listed in any of the food groups below, write the food in the box labeled 'other foods' at the end of this section.]

INSTRUCTIONS FOR RECORDING RESPONSES

As the respondent recalls each food, underline the food in the food group below.

Once the respondent tells you everything s/he remembers the child eating yesterday during the day or at night, look at each food group. If one or more foods in a food group are underlined, circle 'Y' in the column to the right.

Now return to the list of foods. Are there any food groups with no 'Y' circled? Read the entire list of food items in that line to the respondent. If s/he indicates that one or more of the foods has been given to the child, underline that food and circle 'Y.' if none of the foods has been given to the child, circle 'N.' If the mother does not remember or does not know, circle 'DNK.'

NB: Every line must have a code.

No	Question and filters	Coding categories(circle as applicable)			
			Yes	No	DNK
A	Porridge, bread, rice, noodles, or other foods made from grains	A…	1	2	8
B	Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside	B…	1	2	8
C	White potatoes, white yams, cassava, or any other foods made from roots	C…	1	2	8
D	Any dark green leafy vegetables	D…	1	2	8
E	Ripe mangoes, ripe papayas, or (insert other local vitamin A-rich fruits)	E….	1	2	8
F	Any other fruits or vegetables	F….	1	2	8
G	Liver, kidney, heart, or other organ meats	G…	1	2	8
H	Any meat, such as beef, pork, lamb, goat, chicken, or duck	H…	1	2	8
I	Eggs	I….	1	2	8
J	Fresh or dried fish, shellfish, or seafood	J….	1	2	8
K	Any foods made from beans, peas, lentils, nuts, or seeds	K…	1	2	8
L	Cheese, yogurt, or other milk products	L….	1	2	8
M	Any oil, fats, or butter, or foods made with any of these	M...	1	2	8
N	Any sugary foods such as chocolates, sweets, candies, pastries, cakes, or biscuits	N…	1	2	8

O	Condiments for flavor, such as chilies, spices, herbs, or fish powder	O…	1	2	8
P	Insects e.g termites	P….	1	2	8
Q	Foods made with red palm oil, red palm nut, or red palm nut pulp sauce	Q….	1	2	8
R	Other foods				

	QUESTION	**RESPONSES**	**CHOICES**
F12	How many times did *[Name]* eat solid, semi-solid or soft foods other than liquids yesterday during the day or at night? *[Small snacks and small feeds such as one or two bites of mother's or sibling's food should not be counted]*	[If caregiver answers 7 or more times, record 7] [If caregiver doesn't know, record 88]	**….**times DNK 88
F13	Did *[Name]* drink anything from a bottle with a nipple yesterday or last night?	Yes No DNK	1 2 3

SECTION G: MATERNAL KNOWLEDGE ON COMPLEMENTARY FEEDING PRACTICES

G1. What is the importance of breastfeeding to a child?

_____
_____
_____
_____

G2. Do you believe that a baby can survive on breast milk alone without even water?

If YES, for how long? (Indicate in months)_____

If, NO, Why?_____
_____
_____
_____
_____
_____

G3. At what age in months should semi-solid, solid and soft foods be introduced to a child?

_____
_____
_____

Why should they be introduced at this time?

_____
_____

_____
_____

G4. What are the risks of starting complementary feeding too late?

_____
_____
_____
_____

G5. How many times should a mother breast feed a child after 6 months?

_____
_____

G6. For how long should a mother breastfeed a child before stopping?

_____
_____
_____

G7. Is it essential for a child to consume a diverse diet? If yes why? And how many varieties of food a child should consume every day? *[Let the mother list the varieties]*

_____
_____
_____

G8. How many times should you feed your child on complementary food each day?

_____
_____
_____

G9. Why is it critical to ensure high standards of hygiene when preparing complementary feeds?

_____
_____
_____

G10. Is it important to enrich or make your child's food more energy and nutrient dense? (If YES or NO why?)

_____
_____

G11. How do you prepare flour before you cook porridge for your child? (Probe on the importance of fermenting flour or germinating grain and dangers of mixing different types of flour)

_____
_____

G12. What is your opinion about the inclusion of animal source food in a child's diet?

Appendix III: Focus Group Discussion Guide

1. What is your view on the adequacy of feeding children in this community?
[The discussion should be based on both breastfeeding and complementary feeding but with special focus on complementary feeding].
[The discussion should include why they think it is adequate or not adequate].
[The discussion should also include the following aspects; introduction of solid, semi-solid foods and soft foods, dietary diversity, frequency of feeding and continued breast feeding to 2 years and above].

_____
_____
_____

2. What are the sources of information on complementary feeding in this community?

_____
_____

Is the information beneficial? (If yes-how or no-why?)

_____
_____
_____

Is the information received adequate?

_____
_____

What other aspects of CF would you like to receive information on?

_____
_____

3. In your opinion, do mothers initiate complementary feeding at the appropriate time?

_____

4. What are foods commonly given to children 6-23 months old in this community?

_____
_____

5. In your opinion, do mothers feed their children at the required meal frequency?

_____

6. Does poor/inappropriate complementary feeding affect infant/child nutrition status?

_____
_____

7. What are the challenges experienced by mothers in complementary feeding in this community?

_____

8. What are your suggestions on how to encourage appropriate complementary feeding could be improved in this community?

_____
_____
_____

Appendix IV: Research budget

ITEM	QUANTITY	UNIT COST (Kshs)	TOTAL COST (Kshs)
Proposal writing			
Printing (pages)	120	10	1200
Photocopying (10 sets *50pages)	500	3	1500
Binding sets of proposal	10	100	1000
Sub- total			**3,700**
Communication/ Internet services			
Phone calls			5,000
Internet services			5,000
Research permit			1,000
Sub-total			**11,000**
Pre-testing of research instruments			
Questionnaire printing (pages)	10	10	100
Photocopying -questionnaire (10*10pages)			
Sub-total	100	3	300
			400
Research instruments			
Questionnaire printing (10 pages)	10	10	100
Photocopy of questionnaires (375*10 pages)	3750	3	11,250
Hiring of length boards & weighing scales	3	5000	15,000
Sub-total			**26,350**
Data collection phase			
-Personnel allowances	2	1500	3,000
Transport to research destination	60	800	48,000
-6 Research assistants(10 days)			**51,000**
Sub-total			
Transport			
Preliminary preparation	3	1,500	3,000
Pre-testing centre (trip)	2	2,500	5,000
Sub-total			**8,000**
Data entry and analysis			
Data entry			5,000
Data analysis			20,000
Statistician consultation			10,000
Sub-total			**35,000**
Thesis writing			
Typing and printing 1 set (pages)	150	30	4,500
Photocopying 10 sets * 150 (pages)	1,500	3	4,500
Binding (sets)	10	100	1000
Sub-total			**10,000**
Supplies/stationery			
Note books (dozen)	1	600	600
Printing paper (reams)	5	500	1,500
Biro pens (packet)	1	1000	200

Stapler Stapler pins(packets) Foolscap (reams) **Sub-total**	1 5 1	400 100 400	400 500 400 **3,600**
Total			**149,050**
Contingency (total budget)	10%		**14,000**
GRAND TOTAL			**163,050**

Appendix V: Work plan for the study

Year	**2011**			**2012**		**2013**						
Activity	**J**	**Feb-Nov**	**D**	**Jan-June**	**July-Dec**	**J**	**F**	**M**	**A**	**M**	**J**	**J**
Concept Presentation at the department												
Proposal preparation												
Proposal defense at the department												
Submission of proposal to the school												
Proposal corrections submission to graduate school												
Clearance and permit												
Data Collection												
Data Analysis												
Thesis Writing												
Notice of submission												
Presentation of Findings												
Corrections on thesis												
Submission of thesis												
Defense of the thesis												
Submission of bound thesis and graduation												

Appendix VI: Factors insignificantly associated with complementary feeding

Table 4.19: Insignificant association between demographic and socio-economic factors and complementary feeding practices

Characteristic	Complementary feeding practice	Chi-square test; P value,
Sex of the household head	Consumption of Iron rich foods	0.433
Sex of the household head	Minimum meal frequency	0.586
Sex of the household head	Minimum dietary diversity	0.691
Sex of the household head	Minimum acceptable diet	0.902
Mothers age	Consumption of Iron rich foods	0.750
Mothers age	Minimum dietary diversity	0.372
Mothers age	Minimum acceptable diet	0.154
Mothers occupation	Consumption of Iron rich foods	0.331
Mothers occupation	Minimum meal frequency	0.262
Mothers occupation	Minimum dietary diversity	0.229
Mothers occupation	Minimum acceptable diet	0.126
Marital status	Consumption of Iron rich foods	0.564
Marital status	Minimum meal frequency	0.786
Marital status	Minimum dietary diversity	0.505
Marital status	Minimum acceptable diet	0.485
Main source of family income	Consumption of Iron rich foods	0.535
Main source of family income	Minimum meal frequency	0.873
Main source of family income	Minimum dietary diversity	0.646
Main source of family income	Minimum acceptable diet	0.939

Table 4.21: Insignificant relationship between maternal nutrition knowledge and complementary feeding practices

Characteristic	Complementary feeding practice	Chi-square test; P value,
Maternal knowledge on importance of a diverse diet	Consumption of Iron rich foods	0.300
Maternal knowledge on importance of a diverse diet	Consumption of vitamin A rich foods	0.658
Maternal knowledge on frequency of feeding	Minimum meal frequency	0.788
Knowledge on the importance of enriching complementary food	Consumption of vitamin A rich foods	0.286
Maternal knowledge on consumption of flesh foods	Consumption of flesh foods	0.808
Maternal knowledge on consumption of flesh foods	Minimum dietary diversity	0.356

Table 4.23: Insignificant relationship between child morbidity status and complementary feeding practices

Characteristic	Complementary feeding practice	Chi-square test; p value,
Morbidity in the last 2 weeks	Consumption of Iron rich foods	0.537
Morbidity in the last 2 weeks	Minimum meal frequency	0.830
Morbidity in the last 2 weeks	Minimum dietary diversity	0.350
Morbidity in the last 2 weeks	Minimum acceptable diet	0.703
Diarrhoea in the last 2 weeks	Minimum meal frequency	0.187
Diarrhoea in the last 2 weeks	Minimum acceptable diet	0.120
Assistance sought when the child was ill	Minimum dietary diversity	0.165
Assistance sought when the child was ill	Minimum meal frequency	0.841
Assistance sought when the child was ill	Minimum acceptable diet	0.165

Table 4.25: Insignificant relationship between child nutritional status and complementary feeding practices

Characteristic N=324	Nutrition status	Chi-square test; p value,
Minimum dietary diversity	Stunting	0.126
Minimum dietary diversity	Wasting	0.554
Minimum meal frequency	Wasting	0.252
Minimum meal frequency	Underweight	0.663
Minimum meal frequency	Stunting	0.553
Minimum acceptable diet	Underweight	0.288
Minimum acceptable diet	Stunting	0.692
Consumption of iron rich foods		
Consumption of iron rich foods	Underweight	0.723
Consumption of iron rich foods	Stunting	0.739
Consumption of vitamin A rich foods	Underweight	0.391
Consumption of vitamin A rich foods	Stunting	0.392
Consumption of vitamin A rich foods	Wasting	0.442

Appendix VII: Research Permit

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349
254-020-310571, 2213123, 2219420
Fax: 254-020-318245, 318249
When replying please quote
secretary@ncst.go.ke

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

Our Ref: NCST/RCD/12A/012/80

Date: 31st May 2012

Jacob Kipruto Korir
Kenyatta University
P.O.Box 43844-00100
Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "***Complementary feeding practices and nutritional status of children aged 6-23 months in Korogocho Slum, Nairobi County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi Province** for a period ending **30th June, *2012.***

You are advised to report to **the Provincial Commissioner and the Provincial Director of Education, Nairobi Province** before embarking on the research project.

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

DR. M. K. RUGUTT, PhD HSC.
DEPUTY COUNCIL SECRETARY

Copy to:

The Provincial Commissioner
The Provincial Director of Education
Nairobi Province

OFFICE OF THE PROVINCIAL COMMISSIONER
RECEIVED
05 JUN 2012

5.6.2012.
RESEARCH AUTHORIZATION.
Researcher is hereby granted formal APPROVAL to conduct the research. Please accord him all the necessary Co-operation in this regard.
JAMIN M. WAMOCHA
FOR: PROVINCIAL DIRECTOR OF EDUCATION
NAIROBI PROVINCE

"The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development"

Appendix VIII: Ethical Clearance

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355

KNH/UON-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke
Link:www.uonbi.ac.ke/activities/KNHUoN

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/113

16th May 2012

Jacob Kipruto Korir
Dept.of Foods, Nutrition and Dietetics
Kenyatta University

Dear Jacob

Research proposal: "Complementary Feeding Practices and Nutritional status of children aged 6-23 months in Korogocho slum, Nairobi county, Kenya" (P188/04/2012)

This is to inform you that the KNH/UoN-Ethics & Research Committee (ERC) has reviewed and **approved** your above revised research proposal. The approval periods are 16th May 2012 to 15th May 2013.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN -ERC website **www.uonbi.ac.ke/activities/KNHUoN**

"Protect to Discover"