MATERNAL KNOWLEDGE ON COMPLEMENTARY FEEDING PRACTICES AND NUTRITIONAL STATUS OF CHILDREN 6-23 MONTHS OLD, ATTENDING KAHAWA WEST PUBLIC HEALTH CENTRE, NAIROBI COUNTY

BY

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‘‘A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE (FOODS, NUTRITION AND DIETETICS) IN THE SCHOOL OF APPLIED HUMAN SCIENCES, KENYATTA UNIVERSITY”

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DEDICATION

I dedicate this work to my loving husband Dr. Benjamin Muema for his love, financial and moral support throughout the study and to my children Levy, Gloria and Bruce.

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Finally, I offer my deepest gratitude to GOD for showering His choicest blessings on me. Nothing could have been possible without His love and grace.

DECLARATION

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

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ABSTRACT

Worldwide, malnutrition is responsible directly or indirectly for deaths of children under five years. Two thirds of these deaths are associated with inappropriate feeding practices. Interventions that address child malnutrition show that appropriate complementary feeding practices can save up to 6% deaths in under-fives. Attention should therefore be given to decisions taken by the mother during complementary feeding. Thus the purpose of this study was to determine mothers' knowledge on complementary feeding practices and relate this to the nutritional status of their children aged 6-23 months. The study adopted a cross-sectional analytical study design and was carried out at the Kahawa West Public Health Centre among the randomly sampled 286 mothers and their children. A researcher-administered questionnaire and a focus group discussion were used to collect data. Data was entered and analyzed using (SPSS version 20). Anthropometric measurements were analyzed using ENA for SMART. Chi-square test ($p< 0.05$) was used to show the relationships between the child's nutritional status and the mothers' knowledge on complementary feeding practices. Logistic regression was used to establish the predictors of children nutritional status in the study population. The respondents were mostly young (mean age 26.1±4.7 years), married (88.1%), housewives (66.4%) with mainly primary school level of education (47.2%). The main sources of income for most households were business (48.6%) and casual labour (31.8%). Mothers had average knowledge on complementary feeding (14.11±2.33) out of the 20 knowledge questions. All (100%) the children aged 6-8 had been introduced to solids, semi-solids and soft foods. Majority of the breast-fed children received minimum meal frequency; 6-8 months old (95.9%) and 9-23 months old (96.4%) unlike the non-breast fed children (55.0%). The percentage of children who consumed vitamin A rich foods was 60.8% and iron-rich foods were 11.5%. Over three quarters (79.0%) of the children attained the minimum dietary diversity whereas 75.9% attained the minimum acceptable diet. Overall, 13.3% of all the children were stunted, 11.9% wasted and 16.8% underweight. Maternal knowledge on complementary feeding was significantly associated with nutritional status of their children. Mothers' knowledge on feeding the sick and recovering children was related to underweight in children (chi-square test; $p=0.026$). The same was true of mothers who knew that a child's main meal should be diversified (chi-square test; $p=0.027$). There was a significant relationship between mothers' knowledge on duration of exclusive breastfeeding (chi-square test; $p=0.022$) and feeding bottles (chi-square test; $p=0.005$) and wasting in their children. Children who did not attain the minimum meal frequency were likely to be wasted (chi-square test; 0.001 and underweight (chi-square test; 0.013). Mothers' knowledge on complementary feeding practices was not significantly related to her complementary feeding practices ($p>0.05$). Nutrition messages on Infant and Young Child Feeding Practices should emphasis dietary diversity and frequency of feeding especially for non breastfed children and also on how to feed sick children. Nutrition programmes should pay attention to cultural beliefs on infant and young child feeding. A longitudinal study on factors that may influence complementary practices is also recommended.

LIST OF ABBREVIATIONS AND ACRONYMS

ACC/SCN	Administrative Committee on Nutrition\Sub Committee on Nutrition
APHRC	African Population and Health Research Center
CF	Complementary Feeding
GOK	Government of Kenya
HFA	Height for Age
IYCF	Infant and Young Child Nutrition
IYCN	Infant and Young Child Nutrition
KHDS	Kenya Demographic Health Survey
KNBS	Kenya National Bureau of Statistics
MDG	Millennium Development Goal
MOPHS	Ministry Of Public Health and Sanitation
OTP	Outpatient Therapeutic Programme
PAHO	Pan American Health Organization
SD	Standard Deviation
SPSS	Statistical Package for Social Science
UNICEF	United Nation Children Fund
WFA	Weight for Age
WFH	Weight for Height
WHO	World Health Organization

DEFINITION OF TERMS

Complementary feeding:-period during which other foods or liquid are provided along with breast milk (WHO, 2006b).

Complementary foods:-Any non-breast milk foods or nutritive liquids that are given to young children during the period of complementary feeding (WHO, 2006b).

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, 2007).

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 this indicator were: grains, roots and tubers; legumes and nuts; dairy products (milk, yoghurt and cheese); flesh meats (meat, fish, poultry and liver/organ meats); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables (WHO, 2007).

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 (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 including a snack (WHO, 2007).

Minimum acceptable diet: The proportion of children 6–23 months of age, who received minimum dietary diversity and attained the minimum meal frequency during the previous day (WHO, 2007).

OPERATIONAL DEFINITIONS

Complementary feeding practices: In this study it will include; consumption of vitamin A rich fruits and vegetables and iron rich foods, minimum dietary diversity, minimum meal frequency, introduction of solids, semi-solids and soft foods at 6-8 months and minimum acceptable diet.

Maternal knowledge: Mothers' understanding, information, perception and familiarity about complementary feeding based on the guiding principles of complementary feeding for a breastfed child.

Nutritional status:- For this study it will include; underweight (weight-for-age below-2 Standard deviation (SD) of the WHO Child Growth Standards), stunting (height-for-age below -2 SD of the WHO Child Growth Standards), wasting (weight-for-height below -2SD of the WHO Child Growth Standards) among children 6-23 months of age.

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

The period from birth to 2 years of age is a "critical window" for the promotion of optimal growth, health and cognitive development (Srivatsava and Sandhu, 2007). Early years have been recognized as time for developing good dietary habits and important time for taking in nutrients for optimal growth and development (Engle *et. al,* 2000). Poor breastfeeding patterns, low nutrient density and poor quality of complementary feeds accounts for nutrient deficiency, illness and infections in children leading to malnutrition at an early age (Savatsava and Sandhu, 2007). Malnutrition has a profound effect on a child's growth and development, as it can lead to permanent stunting, impaired brain and mortar development or excess weight gain, predisposing the child to obesity later in life (Shrimpton, 2001). Infant and young child feeding practices directly affect the nutritional status of children under two years, impacting on child survival (Black *et. al*, 2008).

WHO recommends exclusive breastfeeding for the first 6 months, introduction of complementary feeding with continued breastfeeding for at least 2 years (WHO, 2006b). The recommended infant and young child feeding practices for children aged 6-23 months include: continued breastfeeding; feeding semi-solid/solid food according to the age of the child; and feeding a variety of foods such as cereals, fruits, vegetables (WHO 2005).

Breastfeeding of up to 2 years of age and beyond is an important source of nutrients, fluids and immunological protection, while appropriate complementary food promotes good health, nutritional status and growth of young children (WHO, 2006b). In many

developing countries, complementary feeding is introduced too early and the quality and quantity of the foods are insufficient, thus children are at the risk of nutritional deficiency (Pelto *et al*, 2003). Most of the complementary foods are cereal-based gruels low in energy and nutrient density and more so inadequate in iron, zinc, pyridoxine, riboflavin, niacin, calcium, thiamine, foliate, ascorbic acid and vitamin A (Lutter and Rivera, 2003).

Malnutrition has been responsible directly or indirectly for 60% of the 10.9 million deaths annually among children under 5 years in the whole world, where two thirds of these deaths are associated with inappropriate feeding practices in the first year of life (WHO, 2003). In developing countries, malnutrition accounts for 50% deaths of the children under five years (ACC/SCN, 2000). In Africa, malnutrition contributes to half of the 9.7 million annual under five deaths and is a leading cause of diseases and disabilities in children (WHO, 2000 and UNICEF, 2007). In Kenya, inappropriate complementary feeding practices contribute to more than 10000 annual deaths for children under five years (MOPHS, 2007-2010). Malnutrition rates for the under fives in 2008 were, 7% wasted, 35% stunted and 16% underweight based on the Kenya Demographic (KNBS and Macro, 2010).

To reduce child mortality and achieve the fourth Millennium Development Goal i.e., to reduce child mortality rates (United Nations Development Group, 2008), there is need to improve the feeding practices of the children, since child feeding is one of the most neglected determinants of young child nutrition in spite of the importance in growth pattern of the child hence the need for this study.

1.2 Statement of the problem

Exclusive breastfeeding in the first 6 months and introduction of complementary feeds at 6 months with continued breastfeeding for at least 2 years can decrease infant mortality by 19% (WHO, 2002). Complementary feeding bridges the gap that arises in breast milk after 6 months (Sethi *et al.*, 2003). Inappropriate quality, quantity, frequency and consistency of complementary foods can make the child more susceptible to infection, slower in recovery after illness and higher mortality (Sethi *et al.*, 2003).

Interventions to address child malnutrition show that appropriate complementary feeding practices can save up to 6% of all under-five deaths (Jones *et al.*, 2003), and therefore attention should be given to decisions taken by the mother during complementary feeding (Bereng *et al.*, 2007). Many observational studies show that maternal knowledge of optimal child feeding practices like exclusive breastfeeding for six months, continued breastfeeding and the timely transition to adequate complementary food is basic to keep health of a child (WHO, 2010). Knowledge does not necessarily translate to practice as supported by Sellen (2001), who observed that a combination of mothers' self-perception, assessment of infant's well being, culture; food availability and financial status influence the actual complementary feeding, hence child nutritional status. In Kenya, mothers' knowledge on complementary feeding has been identified as a major gap in complementary feeding which needs to be addressed hence the need for this study.

In Kenya, complementary foods are introduced as early as the first month and by 6 months 84% of the infants are already receiving complementary feeds, where some of

these foods are low in energy and micronutrients (MOPHS, 2007-2010). Only 39% of the Kenyan children aged 6-23 months are fed in accordance with the WHO recommended IYCF guidelines (KNBS and ICF Macro, 2010). This coupled with unhygienic preparation and storage conditions predisposes many infants to diarrhoea and inadequate diet causing a negative impact on growth and development, which is very characteristic in this age group (MOPHS, 2007-2010).

It has been known for long time that malnutrition has been a significant and enduring public health problem in Kenya; it continues to trap Kenyan children in a vicious circle, affecting their survival, growth and development. The general nutritional status of children under five years for the period 2000 to 2008-09 shows that since 2003, the proportion of stunted children has remained unchanged, in fact stunting levels in the age group 6-11 has increased from 15.3% to 21.6%. In Nairobi province, stunting rates have increased by 4 points (18.7-22.7%), underweight children although lowest in Nairobi province has since almost doubled 6.3% to 10% (KNBS and ICF Macro, 2010).

According to the national strategy on infant and young child feeding, one of the key issues or constrains that need to be addressed to improve complementary feeding in Kenya is mothers' inadequate knowledge on complementary feeding. Mothers' knowledge on: hygiene during complementary feeding; timely introduction of complementary feeding; dietary diversity; and feeding frequency (Ministry of Public Health and Sanitation(MOPHS), 2007-2010). In view of this, it was mandatory for all mothers with children underfive years of age attending Kahawa West Public Health Centre to also attend nutrition education sessions offered every morning to fill this gap in

knowledge (Personal Communication, Sister- in –Charge, Kahawa West Public Health Centre, 16th august, 2012).

Knowledge on feeding practices of infants and young children is crucial for undertaking or improving health and nutrition programmes in a country (Sethi, *et al.*, 2003). So, it is presumed that it is worthy to conduct a study to assess mother's knowledge regarding complementary feeding for evidence based programme planning and intervention. It is also envisaged that it will provide information about existing knowledge and practices of the mothers so that the appropriate steps could be taken to fulfill the goals of the appropriate complementary feeding practices.

1.3 Purpose of the study

The purpose of the study was to determine mothers' knowledge on complementary feeding practices and the nutritional status of their children aged 6-23 months old attending Kahawa West Public Health Centre.

1.4 Objectives

1. To determine the demographic and socio-economic characteristics of mothers with children aged 6-23 months attending Kahawa West public Health Centre.
2. To determine the knowledge on complementary feeding of mothers with children aged 6-23 months attending Kahawa West public Health Centre.
3. To determine complementary feeding practices of mothers with children aged 6-23 months attending Kahawa West public Health Centre.

4. To assess the nutritional status of children aged 6-23 months attending Kahawa West Public Health Centre.
5. To establish the relationship between maternal knowledge on complementary feeding practices and nutritional status of their children 6-23 months attending Kahawa West Public Health Centre.
6. To establish the relationship complementary feeding practices and nutritional status of children 6-23 months and attending Kahawa West Public Health Centre.

1.5 Hypotheses

H_{01}: There is no significant relationship between mothers' knowledge on complementary feeding and the nutritional status of their children aged 6-23 months.

H_{02}: There is no significant relationship between mothers' knowledge on complementary feeding and her practices in complementary feeding for children aged 6-23 months.

1.6 Significance of the study

The findings from this study may be useful to the Ministry of Health, Non Governmental Organizations, Community-Based Organizations (CBOs) in improving complementary feeding practices and therefore child health and survival. The findings will contribute to the field of knowledge on infant and young child nutrition and act as a basis for future research on complementary feeding.

1.7 Delimitations

This study was carried out in an urban public health centre and the findings can only be generalized to mothers of Kahawa West Public Health Centre and mothers living in similar circumstances.

1.8 Limitations

The sample was recruited from a health centre and not from the households and therefore not be representative of the entire Kahawa West population since not all mothers in urban areas attend public health centers for child welfare clinics especially those from middle and higher socio-economic classes.

1.9 Conceptual framework

The conceptual framework shows that mother's demographic and socio-economic factors like; age, occupation, education level, religion, child's age and sex may influence and modify her knowledge on complementary feeding. Maternal knowledge, demographic and socio-economic factors may influence complementary feeding in terms; minimum meal frequency, introduction of solids, semi-solids and soft foods, timely introduction of complementary foods, dietary diversity in complementary feeding, minimum acceptable diet and consumption of vitamin A- and iron rich-foods. Complementary feeding practices are major determinant of a child's nutritional status.

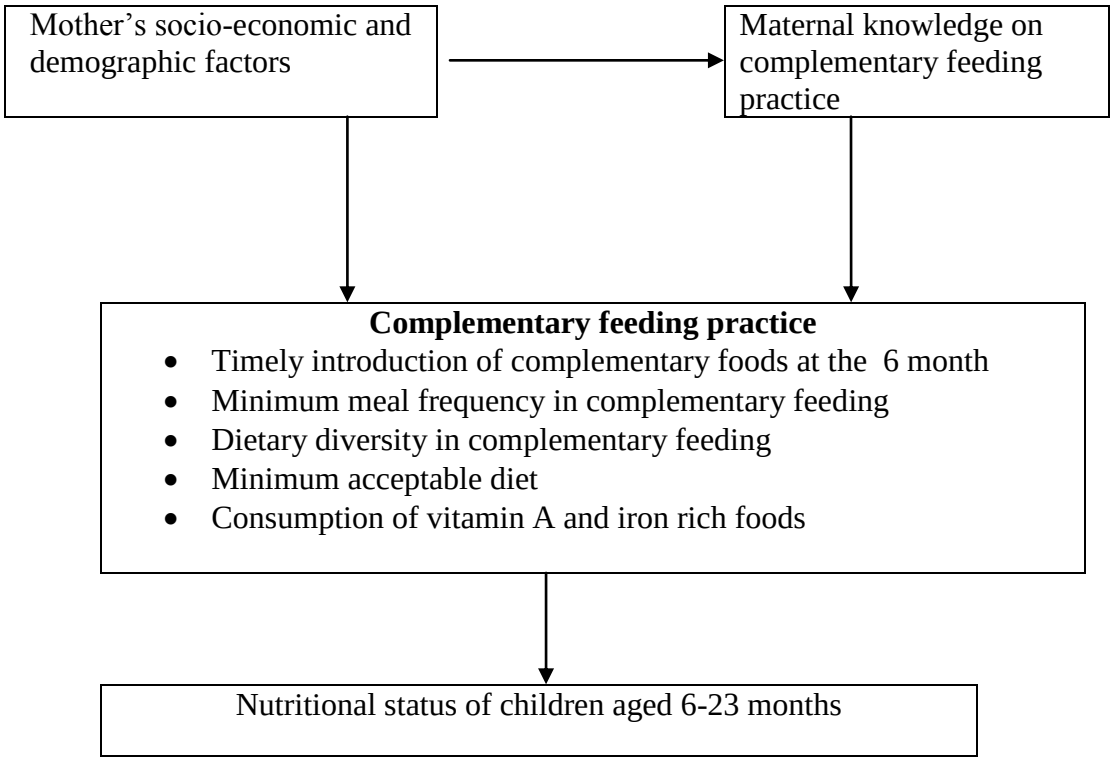

Figure 1:1: Conceptual framework on mother's knowledge and practices on complementary feeding practices and nutritional status of children aged 6-23 month

Adapted and modified from: Vida, A. (2008). Influence of feeding practices on nutritional status of children 0-23 months

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction:

An estimated 32% or 186 million children below five years of age in developing countries are stunted and about 10% or 55 million are wasted (WHO, 2003). Unless massive improvements in child nutrition are made, it will be difficult to achieve MDG-1 to eradicate extreme poverty and hunger and MDG-4 to reduce child mortality by 2015 (United Nations Development Group, 2008). Mothers' knowledge on complementary feeding practices can influence a child's nutritional status thus this study reviewed literature on mothers' knowledge on complementary feeding practices and mothers'; complementary feeding practices in terms of; frequency of meals, dietary diversity, timely introductions of complementary foods, use of bottle feeding and hygiene during complementary feeding.

2.1 Mothers' knowledge on complementary feeding practices

Feeding practice has a lot of implication for the nutritional status of the child. Mothers' knowledge about nutritious meals for the children influences how the child is fed. In many developing countries infants and young children are most vulnerable to malnutrition because of lack of knowledge on how to feed a child (WHO, 2003).). Many observational studies show that maternal knowledge of optimal child feeding practices like exclusive breastfeeding for six months, continued breastfeeding and the timely transition to adequate complementary food is basic to keep health of a child (WHO, 2010). In Ethiopia, 57% of all under-five deaths are highly associated with abrupt cessation of breastfeeding and infectious diseases, but it is closely linked to gap of

knowledge on how to feed appropriately (Central Statistical Authority Ethiopia and ORC Macro. 2012).

Mother's nutritional knowledge is considered to have a great impact on the child feeding practices as she has the capacity to take diet related conscious decisions for the child. A study by Hellen Keller International (2010) in Baitadi District, Nepal showed that 28% and 42.1% of mothers had the perception that children of 6-12 months should not be fed on eggs and flesh meats, this translated to only 2.1% and 4.4% of their children being fed on eggs and flesh meats respectively. Scientific knowledge demonstrates that maternal knowledge on complementary feeding may positively influence practice or may lead to no change in feeding practices. In India, an interventional study where nutritional education was given to mothers to improve awareness about infant feeding in the variety, quantity, quality and consistency of complementary feeding showed that, 86% complementary feeding practices were inadequate in quality, quantity, frequency and consistency (Sethi *et al.,* 2003). In a similar study in south India, mothers were counseled about the choice of appropriate complementary foods and feeding frequency. The intervention group had improved feeding practices such as avoiding feeding bottles and improved on dietary diversity and the types of complementary foods (Hague *et al.,* 2002).

On the contrary, knowledge may not translate to practice. A study by Subedi *et al*. (2012) on infant and young child feeding practices in Chepang communities in Nepal showed that, only 35% had knowledge about breastfeeding initiation within one hour, 62% had known about exact time for exclusive breastfeeding and 81% mothers had knowledge about appropriate time for introduction of complementary feeding and total time for

breastfeeding. Mothers who initiated breastfeeding within one hour were 37% and exclusive breastfeeding up to 6 months were 82% and about 90% of the mothers initiated complementary feeding at the age of 6 months.

2.2. Continued breastfeeding for 2 years and beyond

Continued, frequent, on-demand breastfeeding until 2 years of age and beyond makes an important nutritional contribution for a child (WHO, 2010). Globally, over one-third of infants are exclusively breast-fed up to 6 months, while 90% continue breast-feeding during the second half of infancy (Jone *et al.*, 2003). In Kenya, the median duration for any breastfeeding among children is 21 months (KNBS and ICF Macro, 2010). Maternal characteristics are related to breastfeeding up to two years of age and beyond. In India, a study on determinants of duration of breast feeding amongst women in Manipur, Bangladesh revealed that, living in a rural area and maternal unemployment were found to be associated longer breastfeeding duration (Singh and Singh, 2012). In Kenya, the median duration of any breastfeeding is slightly longer in rural areas (21 months) than in urban areas (19 months), where shortest periods (15 months) of breastfeeding are reported in Nairobi Province (KNBS and ICF Macro, 2010).

During complementary feeding, for infants and young children aged 6-23 months, breastfeeding contributes significantly to the overall nutrient intake, fills most of the energy needs and remains an important source of vitamin A and C, as well as essential fatty acids and can provide to their total energy needs (Mukuria, Kothari and Abderrahim, 2006).

2.3 Complementary feeding practices

2.3.1 Frequency of meals

The WHO recommends that breastfed children 6-8 months old be fed 2 times per day and those 9-23 months old be fed 2-3 times per a day while the non-breastfed ones be fed 4 times per day (WHO, 2007). In Kenya, the minimum meal frequency is low as per WHO recommendations, the Kenya Demographic and Health Survey of 2008-09 revealed that of all the children 6-23 months, only two thirds were fed the minimum number of times (KNBS and ICF Macro, 2010).

A nutrition survey conducted in Marsabit County (Ministry of public of Health and sanitation/UNICEF, 2011), found out that children 6-8 months who were fed at least 2 times or more were 37.3%, and those 9-23 months old who were fed 3 times or more per day were 27.6%. This was low noting that WHO recommends that breast fed children 6-8 months are fed at least 2 times, and those 9-23 months old be fed 3 times per day. In other countries, child feeding frequencies are higher compared to Kenya. A study done in rural Utter Pradesh (Kumudha et al, 2010) on the frequency of feeding showed higher number of children (63%) aged 6-23 months who were given the minimum recommended number of feeds.

2.3.2 Dietary diversity of complementary foods

A diverse diet is likely to provide a variety of nutrients making it healthy. The WHO (2007) recommended minimum dietary diversity for children 6-23 months old is the consumption of foods from ≥ 4 groups out of 7. The consumption is based on a 24-hour

recall to avoid recall bias if it were the recall period was longer (WHO, 2007). The consumption of foods from at least 4 food groups means that the 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). Providing a variety of foods from different food groups is seen as a challenge to many mothers. A study done in rural Utter Pradesh (Kumudha *et al,* 2010) of children aged 6-23 months revealed that only 30% were fed at least three types of food. Another study by Masresha *et al* (2013) on the feeding patterns and stunting during early childhood in rural communities of Ethiopia showed that the median diet diversity score for the study participants was two, where 86% of the children had dietary diversity below the minimum dietary diversity recommended by the WHO (> 4 food groups).

A study by Qiong *et al* (2013) in Wuyi county, China among children aged 6-23 showed similar results, their dietary diversity was quite poor as only one out of ten children (10.0%) was fed with foods from at least four food groups. Similarly, a study by Nisha (2012) on inadequate feeding of infants and young children in India revealed that although 92% of children were between the ages 12 and 18 months, only 17% of them were fed adequately from four or more food groups.

In Kenya, minimum acceptable diet is not achieved by many children. According to the KDHS (KNBS and ICF Macro, 2010), only 54% of the children 6-23 months had the minimum dietary diversity. A nutrition survey in Marsabit County (MOPHS/UNICEF, 2011), showed that only 34.9% of the children 6-23 months were fed with the minimum

dietary diversity (≥4 food groups). This gives an indication of inadequate diversity of foods among the children.

2.3.3 Timely introduction to complementary foods

WHO recommends exclusive breastfeeding for 6 months and introduction of complementary foods at 6 months of age with continued breastfeeding (PAHO/WHO, 2003).The time of introduction and type of complementary food given to an infant are very important for the child's nutritional status. According to current recommendations (WHO, 2007), complementary feeding should be introduced into the child's diet at the age of 6 months. Early introduction of complementary foods increases infant morbidity and mortality while late introduction of complementary foods is harmful to the health of the baby, because infant growth stops or slows down and the risk of malnutrition and micronutrient deficiency increases (PAHO/WHO, 2003).

In most cases, mothers practice early complementary feeding. A study in Vhembe District of Limpopo Province in South Africa on infant feeding practices of mothers and nutritional status of infants revealed that about 43.2% of the infants had been introduced to foods at the age of three months, 18.9% at four months and above and 15.2% at two months and below (Mushaphi *et al.*, 2008). Another study by Kumudha *et al.*, (2010) in the rural Utter Pradesh on increasing appropriate complementary feeding showed that only 13% of children were started on complementary food at the correct age of 6 months.

A study in the slums of Dhaka City showed that although complementary feeding is started early by some mothers, majority started at 6 months, as (64%) mothers started

complementary feeding at 6-7 months while only 19.2% started at 4-5 months (Akhtar, *et al.*,2012). In Kenya, 60% of children aged 4-5 months are given complementary foods (KNBS and ICF Macro, 2010), and by 6 months 84% of the infants are already receiving complementary feeds (MOPHS, 2007-2010). This is an indication that majority of the mothers in Kenya practice early complementary feeding in contrast to the WHO (2007) recommendation (introduction of solid, semi-solids and soft foods at 6-8 months).

2.4 Bottle feeding in complementary feeding

Complementary foods should be given using a spoon and cup/ glass (PAHO/WHO, 2003). Baby feeding bottles should be avoided because, in addition to being an important source of contamination for the infant, they interfere with oral dynamics (WHO, 2001). The tendency to use the bottle increases in relation to child's increasing age.

A study by Shamin et al (2006), about infant feeding practices including the use of bottle and their determinants, from economically underprivileged mothers in a Peri-urban area of Karachi, Pakistan, showed that only 17% of the infants under the age of 3 months were offered bottle, 69% between 4 to 6 months increased to 76% in infants from 7 months to 1 year. The continued practice of bottle feeding is a concern because of the possible contamination leading to higher morbidity rates in children.

2.5 Hygiene in preparation and storage of complementary foods

Contaminated complementary foods are the major route of transmission of diarrhoea among infants (MOPHS, 2007-2010) and the higher incidence of diarrhoea coincides with the increase in the intake of these foods. Maternal practices regarding the

management, preparation, administration and storage of complementary foods may reduce their contamination (Monte, 1993). Safe food hygiene practices include the following: those who handle the food during preparation or feeding should wash their hands properly with soap and water, after using the toilet and before meals, the infants hands should be washed likewise; kitchen utensils and cooking surfaces should be kept clean; a meal should be prepared and served immediately after preparation; the infant should be fed from a glass or cup, spoon and plate a infants should not be given leftovers from the previous meal; and, if using a fridge, it should be cleaned regularly and any spoilt foods should be thrown away (WHO, 2006b).

2.6 Complementary feeding and child nutritional status

Adequate nutrition during the first few years of life is fundamental for child survival and prevention of malnutrition (Amosu, et al., 2011). The immediate consequences of inadequate nutrition include morbidity, mortality and delayed mental and physical development, while the long term consequences include impaired intellectual performance, reproductive performance, work capacity and increased risk of chronic diseases (WHO, 2001). The introduction of appropriate complementary foods after 6 months is a critical issue on child survival and can save 6% of all under five deaths (Jones *et al.*, 2003). Higher rates of malnutrition for the under five are observed in this critical period of complementary feeding. In Kenya, both moderate and severe stunting are highest (46%) in the age of 18-23 months and wasting is highest (11%) in the age of 6-8 months (KNBS and ICF Macro, 2010).

Several studies have shown a positive relationship between complementary feeding practices and child nutritional status. In Nigeria, complementary feeding frequently begins too early or too late and the food given are often nutritionally inadequate and unsafe and consequently the under 5 nutrition status showed that 25% of the children are stunted, 9% underweight 7% were wasted. In a study, done in Limpopo Province, 16% of underweight infants were reported to have been introduced to solid foods within the first month of life (Mushaphi *et al.,* 2008).

A study by Vyas, (2013) on feeding practices among infants and toddlers in developing countries observed that children in whom the frequency of feeding was inadequate had maximum prevalence of under nutrition (85.1%), children who were fed inadequate foods were found to be undernourished (76.0%). A study in Anganwari area of urban Allahabad, on infant feeding practices and the nutritional status of children under five years (Kumar *et al.,* 2006), showed that 36.4% of the children were underweight, 51.6% stunted and 10.6% wasted, where the prevalence of underweight and stunting by 45.5% and 81.8% respectively was maximum during mid period of complementary feeding (13-24 months). Another study on the nutritional status of children under five years attending a mother-child-clinic in Mahraui, Delhi (Rosania and Sachdev, 2005), showed high rates of malnutrition on children 6-23 months, where 71.5%,70.1% and 67.7% were underweight, stunted and wasted respectively.

2.7 Summary of literature review

In Kenya, the National Strategy on Infant and Young Child Feeding (2007-2010) provides a strong framework for accelerating action to improve IYCF practices that are proven to play a major role in enhancing the health, nutrition, survival and development of infants and young children. One of the aims of this strategy is to improve knowledge and skills on IYCN at all levels and promote positive care practices on complementary feeding to mothers and caregivers (MOPHS, 2007-2010).

The high rates of malnutrition in the early years of life can be associated with inappropriate complementary feeding practices and faulty knowledge regarding complementary feeding. The relationship between maternal knowledge and complementary feeding practices and the relationship between complementary feeding practices on the nutritional status of children in Kenya has not been fully investigated.

CHAPTER THREE: METHODOLOGY

3.1 Research design

A cross-sectional analytical design was used in this study. This is because a cross-sectional research gives an overview of what is going on with the variable of interest. In this study, it provided information on mothers' knowledge on complementary feeding and the level of malnutrition in Kahawa West Public Health Centre at that particular time. The study was analytical in that it showed the association between mothers' knowledge and practices on complementary feeding and the nutritional status of their children.

3.2 Definition of variables

3.2.1 Dependent variable

The dependent variable for the study was the child's nutritional status (wasting, stunting and underweight).

3.2.2 Independent variable

The independent variables for the study were mother's knowledge on complementary feeding and complementary feeding practices.

3.3 Study location

The study was carried out in Kahawa West Public Health Centre, which is 25 kilometers from the Nairobi City center in an easterly direction along Thika and Kamiti road. The main features bordering the Health centre are Kahawa Barracks in the North-East, Kamiti Prison in the West and Kamiti road in the South. The health centre serves multi-ethnic population. Kahawa West Public Health Centre is owned and operated by Nairobi City Council. The surrounding estates that is; Soweto slums, Kahawa West, Kamae,

Kiamumbi, Kiwanja and Zimmerman are connected to the main electricity system and served with Nairobi water. Its mothers of low socio-economic status from the surrounding estates who mostly visit the public health centre (Personal Communication, Sister-in-Charge, Kahawa West Public Health Centre, on16th August 2012).

Recent research in the Kenyan context shows ill health and poor nutrition as characteristic of children living in the urban areas (APHRC, 2002). In Kahawa West Public Health Centre, there is an outpatient therapeutic programme (OTP) mothers with moderately and severe malnourished children under five years and. The OTP is supported by the Ministry of Health, and Concern World-Wide. There is a strict rule from the sister-in charge that all mothers with children under five years attending the child welfare clinic attend nutrition education sessions every morning by the dispensary nutritionists and community health workers employed by Concern World Wide. The health centre was chosen to assess if mothers' knowledge on complementary feeding is related to their children's nutritional status.

3.4 Target population

The target population was mothers and their children aged 6-23 months attending Kahawa West Public Health Centre child welfare clinic.

3.5 Inclusion and exclusion criteria

3.5.1 Inclusion criteria

Only mothers of children aged 6-23 months, attending Kahawa West Public Health Centre and willing to participate were included in the study.

3.5.2 Exclusion criteria

Mothers whose children were physically deformed, mentally or chronically ill children based on maternal self reports and information of the health card were excluded from the study as it would affect their anthropometric measurements. Such children may also need special care that may influence their feeding practices. Such mothers and their respective children were referred for special attention at the relevant section in the health centre.

3.6 Sample size and sampling technique

3.6.1 Sample Size

The sample size was calculated using Yamane (1967) Formula for an estimated population of 1000 mothers and respective children.

The Yamane (1967:886) Formula is expressed as: $n = \frac{N}{1 + Ne^2}$

n is the required sample size

N is the size of the population (monthly, 1000 mothers and children 6-23 months visit KWHC (child welfare clinic welfare records)

e is the level of precision (0.05).

So the above expression becomes

$$n = \frac{1000}{1 + 1000 * 0.05^2}$$

$$= 286$$

Thus the final sample was 286 mothers and their respective children.

3.6.2 Sampling technique

Mothers and their children aged 6-23 months were selected at the Child Welfare Clinic at Kahawa West Public Health Centre. The sampling frame was 16 mothers per day based on the health center's average daily attendance. To calculate the sampling interval, the number in the sampling frame per day (16) was divided by the number of mothers (8) who could be interviewed per day as established during the pre-testing of the questionnaire and therefore the resulting sampling interval was 2. The first mother to was randomly sampled by use of Table of Random Numbers. The number to represent the first mother was between 1 and the sampling interval 2. The mother who corresponded with the sampled umber in the queue was the first one to be sampled, and then systematic sampling technique was continuously used to select every second mother and her child. An estimated 16 mothers visited the child welfare clinic daily from Monday to Friday. Thus 8 mothers were sampled and interviewed per day for five days a week (Monday-Friday), during a seven weeks data collection period. On the 8^{th} week data was collected on the first day (Monday) were six mothers were sampled and interviewed (Figure 3.1).

3.6.3 Sampling procedure

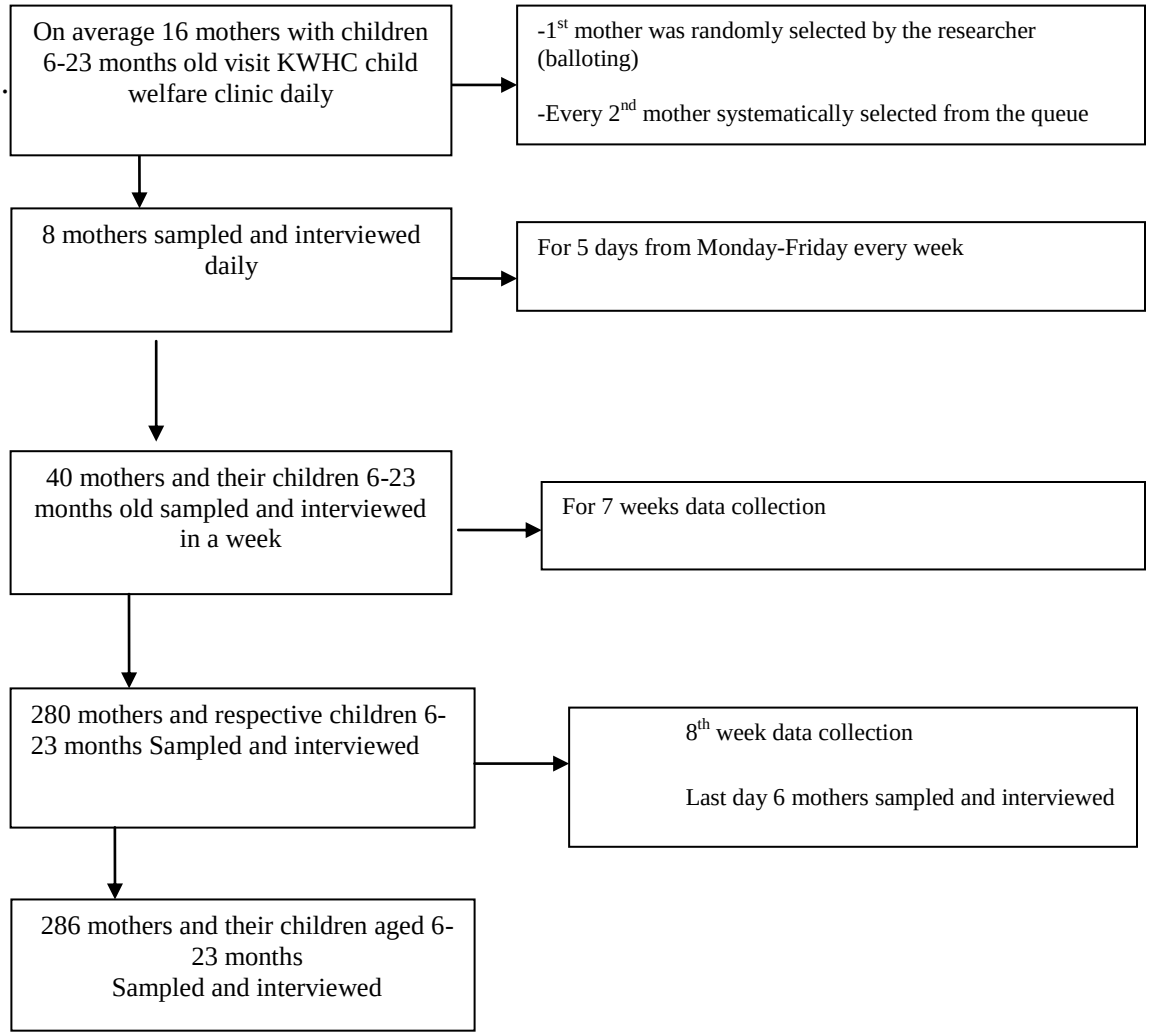

Figure 3.1: Flow chart on the sampling procedure.

3.7 Selection and training of research assistants

Three research assistants, a male and two females with at least secondary school education and experience in carrying out health and nutrition surveys were interviewed and selected. The research assistants were trained by the principal researcher on the study objectives, purpose and interviewing techniques based on the research instrument. They were trained on questionnaire administration and how to probe for comprehensive

responses. The training also included demonstrations and practice in taking of anthropometric measurements.

3.8 Data collection tools

Data were collected using a structured questionnaire (Appendix III) and focus group discussion guide (Appendix IV). The structured questionnaire was administered to the sampled mothers and their children aged 6-23 months attending Kahawa West Public Health Centre. It included information on; socio-economic and demographic characteristics, complementary feeding practices, mother's knowledge on complementary feeding practices and child's anthropometric measurements. Information on the above was collected using researcher-administered questionnaire. The focus group discussion guide was based on maternal perception on complementary feeding. It verified mother's knowledge and practices of complementary feeding and solicited their views on IYCN practices.

3.8.1 Anthropometric measurements

Weight was measured in kilograms at 10 grams accuracy. The child was in minimal clothing. Two weights were taken by the research assistants and recorded and, in cases of large variances the measurements were repeated until an acceptance variance was obtained. A UNICEF Salter Scale Model 235 6 S was used to measure the weight of the children. Since this study was carried out in a child welfare clinic, all the children had child health cards from where the children's age was recorded. The length of the child was measured in centimeters using a pediatric height board of standard design (SECA) with 0.1 Centimeter accuracy. Children were measured while lying on their back on the

length board. The length measurement was taken twice and an average of the two computed. In cases of large variances, the measurements were repeated until an acceptance variance was obtained.

3.9 Pre-testing of data collection tools

The questionnaire was pre-tested on 10 mothers and their respective children aged 6-23 months old attending Kasarani public Health Centre before the study. The structured questionnaire was then rephrased in the light of the responses. Kasarani Public Health Centre neighbours Kahawa West Public Health Centre.

3.9.1 Validity

Content validity was established in the structured questionnaire using the indicators for the assessment of Infant and Young Child Feeding Practices (WHO, 2007) and the guiding principles for complementary feeding for a breastfed child (PAHO/WHO, 2003). The questionnaire was presented to experts in nutrition from Kenyatta University in the department of Food, Nutrition and Dietetics to establish content validity.

3.9.2 Reliability

Test-retest reliability of the research instrument was established during pretesting. Pretesting was done on two occasions but on the same respondents, on Monday and Friday. Test retest reliability was established by examining the consistency of pre-test responses and reliability co-efficient calculated. The reliability co-efficient was 0.89 and therefore the questionnaire was considered reliable.

3.10 Data collection techniques

The principal researcher and the three research assistants reported to the Kahawa West Public Health Centre Child Welfare Clinic daily from Monday to Friday (13th August, 2012 to 1st October, 2012) to conduct interviews throughout the day. The research team sought informed consent from the respondents. The consent was either signed or verbal. One of the research assistants administered the questionnaire while the other two research assistants took anthropometric measurements. The principal researcher sampled, supervised and provided guidance during the data collection. Study participants were interviewed immediately after the visit to the child welfare clinic in a private hall used for counseling.

Two focus group discussions were conducted on two Saturdays during the time of the data collection. Out of the study participants sampled and interviewed from Monday to Friday; three were randomly selected from each day and given an appointment to come back on Saturday for the focus group discussion. Thus the focus group discussions were composed of 15 mothers selected by simple random sampling using the Table of Random numbers. The researcher facilitated and moderated the discussions; the research assistants recorded the discussions and also observed physical expression in responses. The focus group discussion lasted 1 ½ hours and were conducted at the social hall at the health facility. The FGDs were conducted to obtain mothers' knowledge and practices on complementary feeding and also to elicit information on the rationale for the practices.

3.11 Data analysis and presentation

Raw data was cleaned, coded and entered into the computer using Statistical Package for Social Sciences (SPSS) and Software for Emergency Nutrition Assessment for Standardized Monitoring and Assessment of Relief and Transitions (ENA for SMART). Socio-economic and demographic characteristics, maternal knowledge and practices on complementary feeding were analyzed using Statistical Package for Social Sciences (S PSS version 20).

The child nutritional status was analyzed using ENA for SMART and interpreted using the Z- Score (WHO, 2006a). Children with a Z-score of below -2SD for WFA, WFH and HFA were considered underweight, wasted and stunted respectively. Children below -3SD for WFA, WFH and HFA were considered severely malnourished. Children between -2SD and -3SD for the above indices were considered moderately malnourished. Those above -2SD were considered normal or well nourished (WHO, 2006a).

Mothers' knowledge on complementary feeding was determined based on 20 closed questions testing information from the guiding principles of complementary feeding for a breastfed child (WHO, 2001). A correct answer was given a score of "1"while a wrong answer was given a score of "0". Mothers who scored 0-10 were considered as having low knowledge on complementary feeding; mothers who scored 11-15 were considered as having average knowledge on complementary feeding practices while mothers who scored 16-20 had high knowledge on complementary feeding practices.

Complementary feeding practices indicators: Minimum dietary diversity, minimum meal frequency, minimum acceptable diet, and introduction of solids, semi-solids and soft foods. Minimum dietary diversity was based on a child having consumed foods from four or more of the food groups; grains/roots/tubers, dairy products, flesh foods (meat, fish, poultry), egg, vitamin A rich vegetables and others fruits or vegetables. Minimum meal frequency was adequate it was 2 times for breastfed infants 6-8 months, 3times for breasted infants 9-23 months and 4 times for non-breastfed children of 6-23 months. Introduction of solid, semi-solids and soft foods at 6-8 months and minimum acceptable diet was attained if a child had the minimum meal frequency and minimum dietary diversity (WHO, 2007).

Chi-square test ($p<0.05$) was used to investigate the relationship between mothers' knowledge on complementary feeding and child nutritional and complementary feeding practices. All the variables found to have a significant relationship with child nutritional status were subjected to logistic regression analysis to determine the strength of association. Data was presented by bar graphs, tables, means and percentages. Data from focus group discussions was transcribed, responses arranged in general categories identified in the discussion guide. Common themes were identified, inferences made from each theme and conclusion drawn then triangulated with the data from the questionnaire.

3.12 Logistical and ethical considerations

Authority to conduct the research was provided by Kenyatta University Graduate School. Ethical clearance was obtained from Kenyatta University Ethics and Review Committee

and a research permit was obtained from the National Council of Science and Technology (Appendix VII). Research authorization letters were obtained from Nairobi City Council, Nairobi North Medical District Officer, Kasarani District Commissioner, Kahawa West District Officer, Kahawa West chief and Sub Chief (Appendix VII). The research permit and authorization letters were presented to the sister -in -charge Kahawa West Public Health Centre who granted the final authority to conduct the study. Both written and verbal consent were sought from the participants before recruiting them into the study.

CHAPTER FOUR: RESULTS

This study was to determine the influence of maternal knowledge on complementary feeding practices and on nutritional status of children aged 6-23 months. Two hundred and eighty six (286) children aged 6-23 months were included in the study.

4.1 Characteristics of the study population

4.1.1 Characteristics of the children

Both sexes were almost equally represented with 49.3% being males and 50.7% females (Table 4.1). The majority of the children were in the age range of 6-12 months (75.2%) with an average age of 10 .56±3.96 months (Table, 4.1). A notable number of the children were first borns (43.4%); second borns were 33.6% and third borns (18.2%).

Table 4.1: Demographic characteristics of the children

Children's demographic characteristics	**N=286**	
	N	**%**
Sex of the child		
Male	141	49.3
Female	145	50.7
Age of the children(months)		
6-12months	215	75.2
13-23months	71	24.8
Mean (SD) Age 10.56±3.96		
Rank of the child in the family		
1st born	124	43.4
2nd born	96	33.6
3rd born	52	18.2
>4th born	14	4.8

4.1.2 Demographic and socio-economic characteristics of the mothers

In this study the youngest mother was 17 years while the oldest was 48 years with the mean age for all mothers being 26.1 ±4.7 years. Many (88.1%) of the mothers were married with the rest (11.8%) being either single or separated. On the whole, mothers had low level of education; over one percent (1.7%) had never gone to school while only 0.7% had reached the university; a notable proportion had primary school level of education (47.2%), secondary school level of education (35.3%) and vocational training (15%). The mothers' economic status was low as more than half (66.4%) of them were housewives, 22.4% were engaged in petty trade and domestic workers, only 9.8% were in waged labour while 1.3% were unemployed and students (Table 4.2).

Table 4.2: Maternal demographic and socio-economic characteristics

Mothers Demographic and socio-economic characteristics	N=286	
	N	**%**
Maternal age (years)		
17-20	25	8.6
21-30	210	64.9
31-48	51	26.5
Mean age (SD) 26.1±4.7		
Marital status:		
Married	252	88.1
Single	31	10.8
Separated	3	1.0
Mothers' education level:		
No education	5	1.7
Primary School	135	47.2
Secondary School	101	35.3
Vocational, College	43	15
University Degree	2	0.7
Mother's religion		
Catholic	75	26.2
Protestant	205	71.7
Muslim	1	0.3
None	5	1.7
Mothers' main occupation		
Waged labour	28	9.8
Pretty trade/ domestic help	64	22.4
Unemployed/student	4	1.3
Housewife	190	66.4

4.1.3 Demographic and socio-economic characteristics of the husbands

In this study more than half (55.6%) of the husbands to the study participants (mothers) had secondary education while the others had primary education (17.1%) and vocational training (25.7%). The major occupation for the husbands was either petty trade (43.4%) or casual labour (40.6%). The rest of the husbands were salaried labourers, unemployed and farmers; (14.5%), (1.2%), and (0.4%) respectively (Table 4.3).

Table 4.3: Husbands' demographic and socio-economic characteristics

Husbands' demographic and socio-economic characteristics	N=252	
	N	%
Husbands' education:		
Primary School	42	17.1
Secondary School	142	55.6
Vocational, College	65	25.7
University Degree	3	1.6
Husbands' main occupation		
Agricultural labour	1	0.4
Waged labour(salaried)	36	14.5
Waged labour (casual)	102	40.6
Petty trade	111	43.4
Unemployed	2	1.2

4.1.4 Socio-economic profiles of the households

The major source of income for most households was businesses (48.6%), followed by causal work (31.8%), salaried employment (15.3%), support by their parents (2.1%), farmers (1.7%) or relied on financial savings (1.0%) and charity organizations (1.4%).

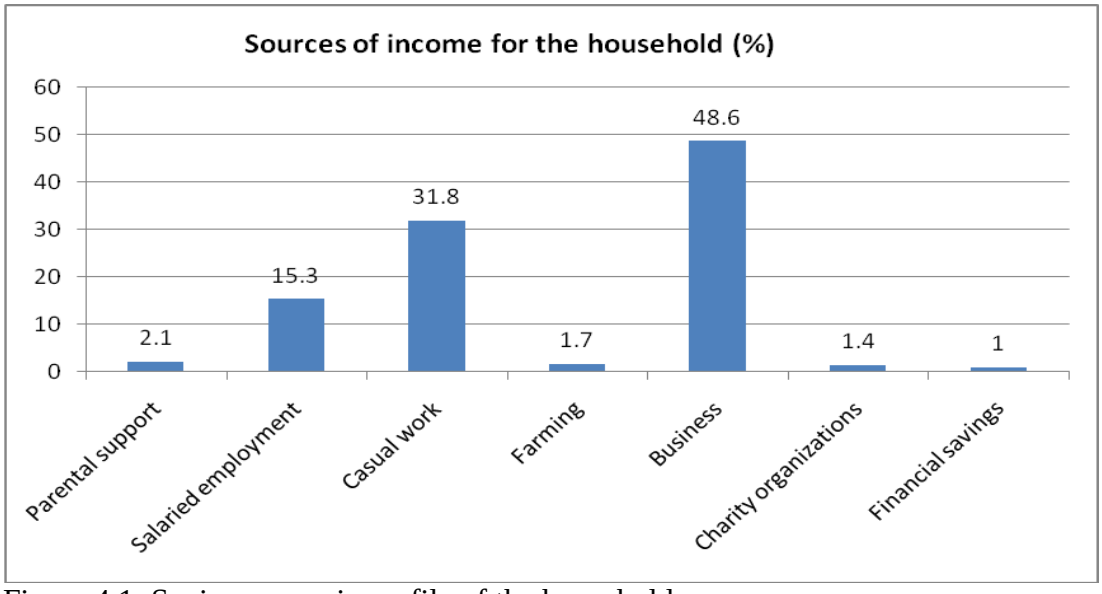

Figure 4.1: Socio-economic profile of the households

4.1.5 Household income and expenditure

The mean monthly income for the households was Kenya Shillings (Kshs) 19,454± 12,580. In terms of expenditure, the mean monthly rent was Kshs 2538 ±738, education expenses Kshs 663 ±1231, health Kshs 223±536, and expenditure on airtime, clothing, leisure, investments and assistance to other relative was Kshs 1779±1440. The respondents reported to be spending on average, a daily amount of Kshs 262± 95 on food for the whole household (Table 4.4).

Table 4.4: Household expenditure

Household expenditure	N=286	
	Mean expenditure (Kshs)	Standard deviation (SD)
Average monthly income	19,454	±12,580
Monthly expenditure on rent	2538	±1,738
Daily expenditure on food	262	±94
Monthly expenditure on education	663	±1230
Monthly expenditure on health	221.82	±535
Monthly expenses on airtime, clothing, leisure, investments and support to other relatives	1779.37	±1440

4.2. Mothers' knowledge on complementary feeding practices

In this study knowledge questions were based on the guiding principles of complementary feeding for a breast fed child (PAHO/WHO, 2003). The study showed most (90.9%) of the mothers had high knowledge on exclusive breastfeeding for the first 6 months and 77.3% of the mothers reported that infants and children should be breastfed

for two years and beyond (Table 4.5). The same proportion of mothers (90.9%) indicated that children should be introduced to complementary feeding at 6 months. Majority (71.3%) of the mothers were aware that adding ghee or oil enriches children's porridge nutritionally, while 63.6% of the mothers thought children, one year old breastfed should be feed two times a day, in the morning and evening. More than half (59.8) of the mothers said children should be fed when they are hungry (based on hunger cues).

Over half (54.9%) of the mothers knew that at 6 months children should be introduced to complementary foods that are sieved and/or pureed for optimal intakes. A higher percentage (72.2%) of the mothers reported that by one year children can be fed from the family pot. Majority of the mothers had high knowledge on hygiene practices; washing hands before preparing food for a child (93.4%) and treating of water used for preparing foods and drinks for the child (93.7%).

More than half (56.6%) of the mothers thought bottle feeding was a better option for feeding non-breastfed children. About one-quarter of the mothers (23.3%) indicated that sick children and those recovering from illness should not be fed on diluted porridge or fruit juices. Majority of the mothers reported the need for responsive feeding of complementary foods to ensure optimal intakes where 84.3% thought, the mother should be the primary feeder of her child, while 81.1% stated that the mother should assist her child to eat up to the age of 2 years. Majority (76.9%) of the mothers indicated that 1-2 table spoonfuls of food are enough meal for a one year old child (Table 4.5).

On the whole, majority (93.4%) of the mothers knew that children's meals should be balanced, while only 58.7% stated that breast milk is still adequate in proteins even after

6 months. More than three quarters of the mothers (78.7%) knew that fruits and vegetable should form part of a child's diet during complementary feeding. Low knowledge level was indicated on flour mixtures of legumes and cereals as 31.1% reported that flour mixtures of ndengu/millet/ sorghum/maize/ beans and *omena* are not nutritious flours for child's porridge (Table 4.5).

Table: 4.5: Maternal knowledge on complementary feeding

Aspects of knowledge on complementary feeding	**N=286** Scores	
	n	**%**
Breastfeeding:		
Infants exclusively breastfeed for the 1st 6 months of life	260	90.9
A child should be breastfed on demand	260	90.9
Continue breastfeeding for 2 years and beyond	221	77.3
Complementary feeding (CF) practices:		
CF should be introduced at 6 months	260	90.9
Meal frequency and energy density of CF		
Feed a breastfed 12 months child two times a day	182	63.6
Feed a child based on hunger cues	171	59.8
Ghee or oil enrich child's porridge	204	71.3
Consistency of CF		
Feed a 6 months old child on pureed / sieved foods	157	54.9
Children should eat from the family pot from 1 year	208	72.7
Safe preparation and storage of CF		
Hands should be washed before preparing children's food	267	93.4
Feeding bottles are not appropriate for feeding non-breastfed children	162	56.6
Water for preparing food and drinks for children should be treated	268	93.7
Feeding during illness		
Do not fed sick /recovering child on dilute porridge / fruit juices	68	23.8
Responsive feeding		
Mother should assist a child to eat until 2 years	232	81.1
A mother should be the primary feeder of the child	241	84.3
Amount of CF		
1-2 table spoonfuls of food is adequate meal for a one-year old child	220	76.9
Nutrient content of CF		
Flour mixtures of *ndengu*/millet/ sorghum/maize/ beans and *omena* are not best for child's porridge	90	31.1
Fruits and vegetables are complementary foods	225	78.7
Breast milk is adequate in proteins even after 6 months	165	57.7
A child's main meal should be balanced	267	93.4

CF= Complementary Feeding; *ndengu*= lentils; *omena*=silver cyprinid fish

4.2.1 Maternal knowledge score on complementary feeding

Mother's knowledge on complementary feeding was based on a two scales ("1", "0"). A score of '1'was awarded for a correct response while a score of '0' was awarded for a wrong response and a total score computed for each mother out of a maximum score of 20. The mothers' knowledge on complementary feeding was categorized into three; low for those who had a score of 1-10; average for those with a score of 11-15 and high for those who scored >16. Two-thirds (66.4%) of the mothers had average knowledge on complementary feeding, close to one third (26.9%) of the mothers had high knowledge whereas a few (6.6%) of the mothers had low knowledge on complementary feeding practices. The mean knowledge score for all mothers on complementary feeding was 14.11± 2.33 (Table 4.6).

Table 4.6: Maternal knowledge score on complementary feeding

Maternal knowledge score	N=286	
	n	%
Score categories:		
Low knowledge (0-10)	19	6.6
Average knowledge (11-15)	190	66.4
High knowledge (16-20)	77	26.9
Mean knowledge score (SD) 14.11± 2.33		

4.3 Breastfeeding practices

Since complementary feeding is a period during which other foods or liquid are provided along with breast milk as defined by World Health Organization (WHO, 2006b),

breastfeeding was considered important. Almost all (99%) of the children in the study had been breast fed but at the time of the study it had declined to 93% (Table 4.7).

Table 4.7: Breastfeeding practices

Breastfeeding practices	N=286	
	N	%
Ever breastfed	283	99
Still breastfeeding	266	93

4.4 Complementary feeding practices

In this study mother's complementary feeding practices were assessed using WHO indicators for infant and young child feeding practices for children 6-23 months (WHO, 2007). These indicators included: introduction of solid, semi-solid or soft foods to children aged 6-8 months, minimum dietary diversity, minimum meal frequency, minimum acceptable diet, consumption of iron-rich and iron-fortified foods and consumption of vitamin A-rich foods. Mother's hygiene during complementary feeding was also included since it was an important guiding principle during complementary feeding.

4.4.1 Introduction of solids, semi-solids and soft foods

Introduction of solids, semi-solids and soft foods to children at 6-8 months is an indicator of infant and young child feeding practices and an important aspect in complementary feeding. The proportion of breastfed infants 6–8 months of age who receive solid, semi-solid or soft foods indicate timely introduction of complementary feeding (WHO, 2007). Based on a 24-hour recall, 100% of the children, 6-8 months old had received solid or

semi-solid foods although 21.6% had been complemented earlier (before 6 months), while a few of the children (0.3%) had not started feeding by 9 months (Figure 4.2).

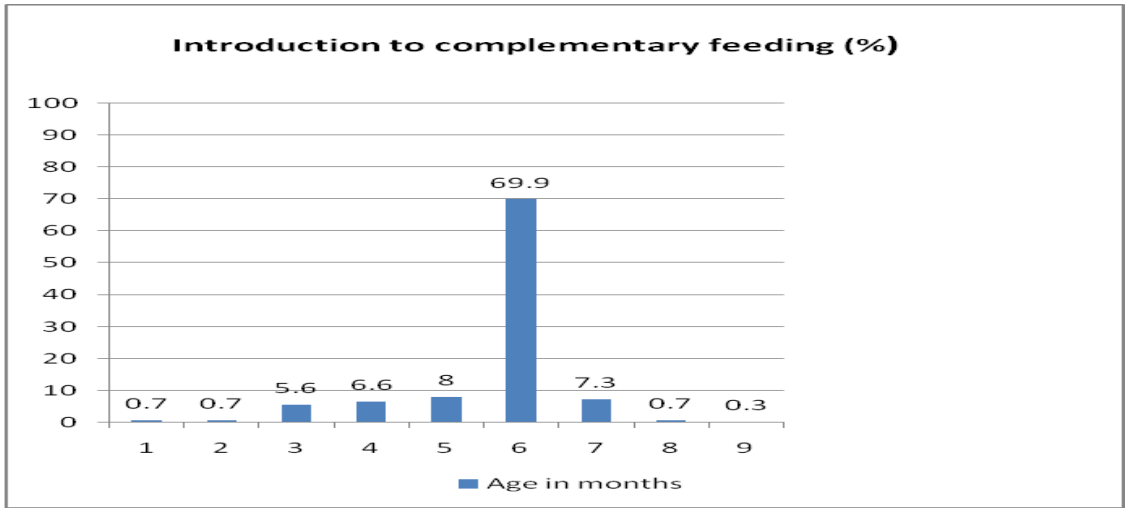

Figure 4.2: Introduction to complementary

4.4.2 Minimum meal frequency

Feeding frequency based on the breastfeeding status of a child 6-23 months is an important indicator of infant and young child feeding practices and an important aspect in complementary feeding. The WHO indicator for this variable was based on the breastfeeding status of the child of children 6–23 months of age. Breastfed infants 6–8 months old should receive solid, semi-solid, or soft foods 2 times per day inclusive of snacks. Whereas those who are not breastfed should receive these foods 3 times per day inclusive of snacks. Breastfed children 9–23 months old should eat semi-solid and or soft foods 3 times per day and those who are non-breastfed 4 times per day inclusive of snacks for non-breastfed children 6–23 months (WHO, 2007). Majority of the breastfed children 6-8 months old and 9-23 months old had attained the recommended minimum meal frequency of 2 times and 3 times per day at 95.9% and 96.4% respectively. Among

the non- breastfed children 6-23 months old, those who had attained the minimum meal frequency were 55% (Table: 4.8)

Table 4.8: Minimum meal frequency

Age in months	N=286	
	Frequency of feeding	**n (%)**
Breastfed children (N=266)		
6-8months (n=98)	≥2times	94(95.9)
	<2times	4(4.1)
9-23 months (n=168)	≥3times	162(96.4)
	<3times	6(3.6)
Non breast-fed children (n=20)		
6-23months(n=20)	≥4times	11(55.0)
	<4times	9(45.0)

4.4.3 Consumption of iron-rich foods and vitamin-A rich fruits and vegetables

Consumption of vitamin A rich foods and iron rich foods are important in the overall growth and health of a child.. Based on a 24-hour recall, children who had eat paw paws, water melon, avocado, *sukuma wiki*, spinach, carrots and cowpeas leaves were consider to have taken vitamin A rich fruits and vegetables while those who had taken flesh meats (meat, fish, poultry and liver/organ meats) had taken iron rich foods. Overall two thirds (60.2%) of all the children had consumed vitamin A rich fruits and vegetables. Higher percentages were reported in the age of 12-17 months (66.2%), followed closely by children aged 6-11 months (59.6%). The least was among children aged 18-23 months (52.4%) (Table 4.9). Vitamin A is an essential micronutrient for immune system and its

deficiency can lead to severe illness and slow recovery from illness in children (United Nations Children's Fund, 2005).

In this study iron source was considered as flesh meats, WHO (2007). Its consumption was low as only 11.5% of all the children had consumed. Children aged 6-11 months had the least consumptions (8.5%) of iron rich food. Only 18.2% of the children aged 12-17 months and 14.3% of the children aged 18-23 months had consumed iron rich foods (Table 4.9). Iron is an essential micronutrient that plays a critical role in many cellular functions and processes, including growth and development and that infants have smaller iron stores at birth which are depleted after 6 months (WHO, 2002).

Table 4.9: Consumption of vitamin A rich foods and iron rich foods

Children aged 6-23 months	**N=286**	
	Vitamin A-rich Foods n (%)	Iron-rich foods n (%)
Children 6-23 months (N=286)		
Consumed	174(60.8)	33(11.5)
Not consumed	112(39.2)	253(88.5)
Children 6-11months (n=188)		
Consumed	112(59.6)	16(8.5)
Not consumed	76(40.4)	172(91.5)
Children 12-17 months(n=77)		
Consumed	51(66.2)	14(18.2)
Not consumed	26(33.8)	63(81.1)
Children 18-23 months(n=21)		
Consumed	11(52.4)	3(14.3)
Not consumed	10(47.6)	18(85.7)

4.4.5 Minimum dietary diversity

The consumption of a varied diet suggests a possibility of a child to having taken a balanced diet which is an important aspect in the child's nutritional status. Minimum dietary diversity was established based on the number of food groups the index child consumed in the previous 24 hours prior to the data collection. Seven food groups as recommended internationally by WHO (2007) were considered in the study. The food groups were: grains, roots and tubers; legumes and nuts; dairy products; meat and animal products; eggs; vitamin A rich fruits and vegetables and other fruits and vegetables.

Majority of the children (95.5%) had eaten food prepared from grains, tubers and roots. The intakes of vitamin A rich fruits and vegetables were 60.8%, iron rich foods intakes (flesh meats) was 11.5% while the consumption of other fruits was relatively higher (71.4%). Consumption of proteins was highest from dairy products (83.2%), and lower in legumes (28%) and least for flesh meats and eggs (11.5%) and (2.4%) respectively (Figure 4.4).

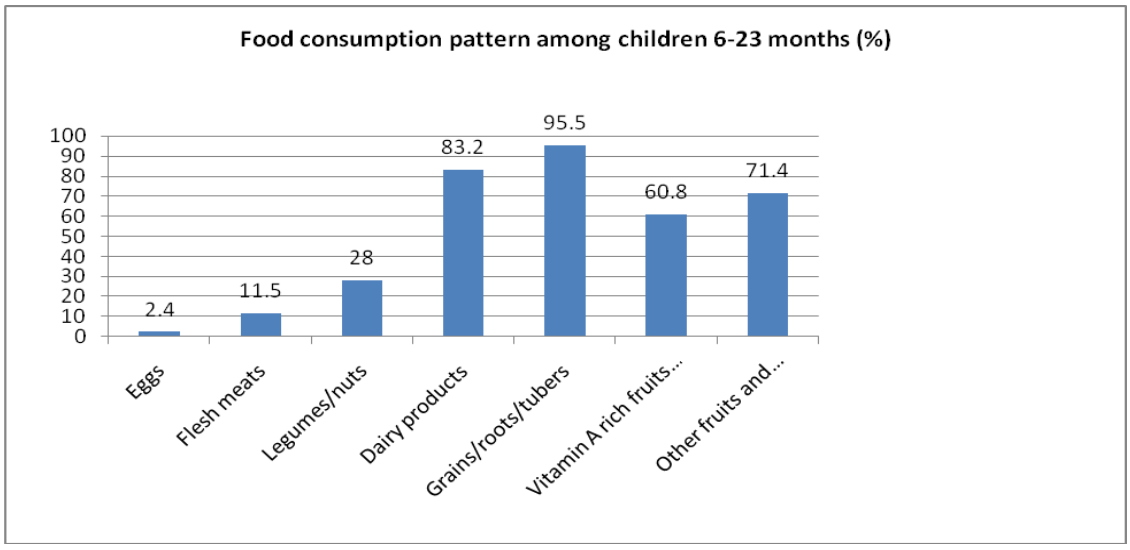

Figure 4.4: Food consumption among children 6-23 months

Children of 6–23 months of age both breastfed and nonbreastfed who receive foods from 4 or more food groups are considered to have a diverse diet (WHO, 2007). Hence a minimum dietary diversity score was determined where more than three quarters (79.0%) of the children had received food from the four food groups and above with a mean dietary intakes of 3.66 (1.03) (Table4.10).

Table 4.10: Dietary diversity score for complementary feeding

	N=286	
dietary diversity score (children 6-23 months)	**N**	**%**
Children 6-23 months		
<4 food groups	60	21.0
≥4 food groups	226	79.0
Mean dietary diversity score(sd)	**3.66± 1.03**	
Children 6-11 months		
<4 food groups	43	22.9
≥4 food groups	145	77.1
Children 12-17 months		
<4 food groups	12	15.6
≥4 food groups	65	84.4
Children 18-23 months		
<4 food groups	5	23.5
≥4 food groups	16	76.2

4.4.6 Minimum acceptable diet

These are the children 6-23 months who receive minimum meal frequency and minimum dietary diversity (WHO, 2007). Three quarters (75.9%) of all the children had achieved minimum acceptable diet. Those children aged 6-11 months (75.5%), 12-18 months (79.2%) and 18-23 months (66.7%) had achieved minimum acceptable diet. (Table, 4.11).

Table 4.11: Minimum acceptable diet

Minimum acceptable diet	N=286	
	n	%
Children 6-23 months(n=286)		
Achieved	217	75.9
Not achieved	6	24.1
Children 6-11months (n=188)		
Achieved	142	75.5
Not achieved	46	24.5
Children 12-17 months(n=77)		
Achieved	61	79.2
Not achieved	16	20.8
Children 18-23 months(n=21)		
Achieved	14	66.7
Not achieved	7	33.3

4.5 Maternal hygiene practices

According to WHO (2003) one of the guiding principles of complementary feeding is good hygiene. Mothers' hygiene practices during complementary feeding are important especially in the preparation and feeding of a child to avoid food contaminations. Almost three quarters (74.5%) of the mothers reported washing hands before feeding the child, 53.8% after defecation and 46.2% before eating. Almost the same percentage of mothers washed hands during food preparation (18.9%) and after working from outside the house (18.2%) (Table 4.12).

Table 4.12: Maternal hygiene practices

Hygiene practices	N=286	
	N	%
Treatment of drinking water	233	81.5
Washing hands		
Before food preparation	54	18.9
Before eating	132	46.2
Before feeding children	212	74.5
After defecation	154	53.8
After returning from outside the house	52	18.2
After handling garbage	12	4.2
Use of soap to wash hands	251	87.8

4.6 Maternal knowledge and practices on complementary feeding practices from the focus group discussions

Mothers cited cultural beliefs and household economic status as the major challenges in adequate complementary feeding practices especially in provision of balanced meals. Mother's main source of nutrition education was the health centre through the health care workers. Mothers suggested the following to improve on complementary feeding practices; provision of food aid to the households, income generating activities for women and adequate knowledge on the correct child porridge flours (Table 4.13).

Table 4.13: Main findings on maternal knowledge and complementary feeding practices from the focus group discussions

Main areas of focus from FGDs	**Main and common findings on maternal knowledge and perceptions on complementary feeding practices**
Timely introduction of CF	• Mothers knew the correct time to introduce complementary foods.
Dietary diversity	• Mothers knew the contents of a balanced diet, but were not able to put this into practice because of economic challenges. Cultural beliefs also constrained the provision of balanced meals because some foods were considered to be taboo for children for example eggs. Some of the food combinations were: o *Ugali* (stiff porridge) accompanied with sour milk, boiled rice mixed with Irish potatoes , boiled green bananas, while vegetables and fruits (pawpaw, oranges, watermelon) milk and meats products in rare cases
Feeding frequency	• Based on child hunger cues, mothers' time availability and food availability.
Consumption of Vitamin A rich fruits and vegetable and supplementation	• Not aware of the foods that contain vitamin A. Were also not aware of the importance of vitamin A supplementation. Majority of the mothers stopped attending child welfare clinics after 9 months (after completion of immunization) and therefore the children did not receive vitamin A supplementation in accordance with the WHO protocol.
Consumption of iron rich and fortified foods	• Not aware of the sources of iron. • Even families with this knowledge were not able to translate this into practice because of inadequate income to as they found such foods expensive • Cultural factors also played a role: for example, some communities believed eggs delayed speech development in children
Factor influencing complementary feeding practices	• Low socio-economic status of most households, culture, advice from family members/ friends and availability of the foods in the market, and advice from the health workers
Sources of IYCN information	• Health facilities (main source), family, friends • Information focused on exclusive breastfeeding, breastfeeding for 2 years and beyond, starting complementary feeding at six months and dietary diversity
Mothers cultural beliefs on complementary foods	• Sugar compromised child's immunity • Fish is preferred as it is associated with intelligence development in children • Pawpaw cures pneumonia • Green bananas have a high satiety value • Eggs delay speech and walking in children
Flours used for making porridge flours	• Mixtures of maize (*unga baridi)*, beans, *ndengu*, millet sorghum, *omena* (silver fish), and cassava. • These mixtures were readily available in the shops and therefore mothers bought the flours from the shops by just mentioning the age of the child to the shopkeeper. (*give me porridge flour for a 9 month child-mother orders from a shopkeeper)*
Maternal opinion on the importance of appropriate complementary feeding practices	• Children 6-23 months old 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/ inadequate money to buy food
Mothers suggestions for optimal IYCN practices	• Provision of income generating activities for all households • Adequate knowledge on complementary food especially the appropriate porridge flours.

4.7 Nutritional status of the children

4.7.1 Stunting (height-for-age) based on Z scores

Height-for-Age index is an indicator of linear growth retardation and cumulative growth deficits. Children who are below the -2SD or – 2 Z-scores are considered short for their age (stunted) and are chronically malnourished, while children who are below -3SD of the Z-scores are considered severely stunted (WHO, 2006). Stunting reflects failure to receive adequate nutrition over a long period of time and is also affected by recurrent chronic illness. In this study, 13.3% (9.8- 17.7 95% CI) of all the children were stunted with more boys 18.4 % (12.9 - 25.6 95% C.I.) than girls 8.3 % (4.8 - 13.9 95% C.I.) stunted. About one-tenth 8.4% (5.7-12.2 95% C.I.) were moderately stunted, while 4.9% (2.9-8.0 95% C.I.) were severely stunted (Table 4.14).

Table 4.14: Prevalence of stunting by sex based on Z-scores

	All n = 286	**Boys** n = 141	**Girls** n = 145
Stunting (<-2 z-score)	(38) 13.3% (9.8 - 17.7 95% C.I.)	(26) 18.4 % (12.9 - 25.6 95% C.I.)	(12) 8.3 % (4.8 - 13.9 95% C.I.)
Moderate stunting (<-2 z-score and >=-3 z-score)	(24) 8.4 % (5.7 - 12.2 95% C.I.)	(16) 11.3 % (7.1 - 17.6 95% C.I.)	(8) 5.5 % (2.8 - 10.5 95% C.I.)
Severe stunting (<-3 z-score)	(14) 4.9 % (2.9 - 8.0 95% C.I.)	(10) 7.1 % (3.9 - 12.6 95% C.I.)	(4) 2.8 % (1.1 - 6.9 95% C.I.)

4.7.2 Wasting (weight-for-height) based on Z scores

Wasting describes the current or short term nutritional status due to inadequate dietary intake or recent episodes of illness causing loss of weight and the onset of malnutrition. Wasting is also referred to as acute malnutrition. Children whose weight- for- height is below -2SD or -2 Z-score are considered thin or wasted and are acutely malnourished while children whose weight-for-height is below -3 SD or below -3 SD are considered

severely wasted (WHO, 2006). The global wasting rate in this study was 11.9% (8.6-16.2 95% C.I.) with more boys 17.0% (11.7-24.1 95% C.I.) than girls 6.9% (3.8-12.2 95% C.I.) wasted. One-tenth of the children 9.8% (6.9-13.8 95% C.I.), were moderately wasted and 2.1% (1.0-4.5 95% C.I) were severely wasted (Table 4.15).

Table 4.15: Prevalence of acute malnutrition by sex- based on Z-scores and/or oedema

	All n = 286	**Boys** n = 141	**Girls** n = 145
Global malnutrition (<-2 z-score)	(34) 11.9 % (8.6 - 16.2 95% C.I.)	(24) 17.0 % (11.7 - 24.1 95% C.I.)	(10) 6.9 % (3.8 - 12.2 95% C.I.)
Moderate malnutrition (<-2 z-score and >=-3 z-score)	(28) 9.8 % (6.9 - 13.8 95% C.I.)	(19) 13.5 % (8.8 - 20.1 95% C.I.)	(9) 6.2 % (3.3 - 11.4 95% C.I.)
Severe malnutrition (<-3 z-score)	(6) 2.1 % (1.0 - 4.5 95% C.I.)	(5) 3.5 % (1.5 - 8.0 95% C.I.)	(1) 0.7 % (0.1 - 3.8 95% C.I.)

4.7.3 Underweight (weight-for-age) based on Z-scores

Weight for age is a composite index of height- for-age and weight- for- height. It takes into account both acute and chronic malnutrition. Children whose weight for age are below-2SD or below -2 Z scores are considered underweight while children who are below -3SD of the Z-score are considered severely underweight. In this study 16.8% (12.9-21.5 95% C.I.) of the children were underweight, whereas almost double the percentages of boys 22.0% (15.9-29.5 95% C.I.) than girls 11.7% (7.5-18.0 95% C.I) were underweight. On the whole, 13.3% (9.8-17.7 95% C.I.) of all the children were moderately underweight while 3.5% (1.9-6.3 95% C.I.) were severely underweight (Table 4.16).

Table 4.16: Prevalence of underweight based on weight-for-age Z-scores by sex

	All n = 286	**Boys** n = 141	**Girls** n = 145
Underweight (<-2 z-score)	(48) 16.8 % (12.9 - 21.5 95% C.I.)	(31) 22.0 % (15.9 - 29.5 95% C.I.)	(17) 11.7 % (7.5 - 18.0 95% C.I.)
Moderately underweight (<-2 z-score and >=-3 z-score)	(38) 13.3 % (9.8 - 17.7 95% C.I.)	(24) 17.0 % (11.7 - 24.1 95% C.I.)	(14) 9.7 % (5.8 - 15.6 95% C.I.)
Severe underweight (<-3 z-score)	(10) 3.5 % (1.9 - 6.3 95% C.I.)	(7) 5.0 % (2.4 - 9.9 95% C.I.)	(3) 2.1 % (0.7 - 5.9 95% C.I.)

4.8 Factors associated with Complementary feeding practice

4.8.1 Relationship between complementary feeding practices and socio- economic and demographic factors

Demographic factors: sex of the child, mothers' age and marital status, mothers' education level, mothers' occupation, husbands' education level and occupation, main source of income for the household and their association with mother's complementary feeding practices was determined. Complementary feeding practices were determined by the following indicators: minimum meal frequency, minimum dietary diversity and minimum acceptable diet whereas introduction of solids, semi-solids and soft foods was left out since all infants 6-8 months old had been introduced to complementary foods appropriately as recommended (WHO, 2007). Chi-square tests showed no significant associations between mother's complementary feeding practices and all the socio economic and demographic factors (Table, 4.17).

Table 4.17: Relationship between socio- economic and demographic factors and mothers complementary feeding practices

Characteristic N=286	Complementary feeding practices	Chi-square test; p value
Sex of the child	Frequency of feeding	0.381
	Minimum dietary diversity	0.772
	Minimum acceptable diet	0.333
Mothers' age	Frequency of feeding	0.767
	Minimum dietary diversity	0.203
	Minimum acceptable diet	0.334
Mothers' marital status	Frequency of feeding	0.159
	Minimum dietary diversity	0.655
	Minimum acceptable diet	0.342
Mothers' education level	Frequency of feeding	0.779
	Minimum dietary diversity	0.946
	Minimum acceptable diet	0.883
Mothers' occupation	Frequency of feeding	0.545
	Minimum dietary diversity	0.592
	Minimum acceptable diet	0.582
Husbands' education level	Frequency of feeding	0.260
	Minimum dietary diversity	0.752
	Minimum acceptable diet	0.583
Husbands' occupation	Frequency of feeding	0.495
	Minimum dietary diversity	0.833
	Minimum acceptable diet	0.856
Households' source of income	Frequency of feeding	0.945
	Minimum dietary diversity	0.483
	Minimum acceptable diet	0.530

*Significant relationship at p-value <0.05

4.8.2 Relationship between mothers' knowledge and complementary feeding practices

Complementary feeding practices were investigated against mother's knowledge on complementary feeding (categorized into high, average and low knowledge). A chi-square test showed no significant relationship between mother's knowledge on complementary feeding and complementary feeding practices; minimum dietary diversity, minimum meal frequency and minimum acceptable diet, (p=0.833, p=0.534 and p=0.923 respectively) (Table 4.18).

Table 4.18: The association between mother's knowledge on complementary feeding and complementary feeding practice

Complementary feeding practices	N=286			
	Mothers knowledge on complementary feeding			
	Low knowledge on CF	Average knowledge on CF	High knowledge on CF	Chi –square (p-value)
Minimum dietary diversity				
≥4 food groups(n=226)	16(7.1)	150(66.4)	60(26.5)	0.833
<4 food groups(n=60)	3(5.0)	40(66.7)	17(28.3)	
Minimum meal frequency				
Consumed (n=264)	18(6.8)	173(65.5)	73(27.7)	0.534
Not consumed(n=22)	1(4.5)	17(77.3)	4(18.2)	
Minimum acceptable diet				
Achieved(n=207)	15(7.2)	143(69.1)	59(28.5)	0.923
Not achieved(n=69)	4(5.8)	47(68.1)	18(26.1)	

*Significant relationship at p-value <0.05

4.9 Factors associated with child nutritional status

4.9.1 Relationship between socio- economic and demographic factors and child nutritional status

Socio-demographic factors: mothers age and marital status, mothers education level, mothers occupation, husbands education level and occupation, main source of income for the household and their association with child nutritional status (wasting, stunting and underweight) were investigated. Both age of the mother and her marital status were significantly associated with wasting among the children (Chi-square test; p=0.030 and p=0.012 respectively). Single and separated mothers were more likely to have wasted children while, older mothers (31-48 years) were more likely to have wasted children than younger mothers (17-20 years). Mothers involved in waged labour were more likely to have underweight and stunted children (chi square test; p=0.003 and chi square test; p=0.012 respectively) than mothers in other forms of occupation.

Households which relied on charity organization as the main source of income were more likely to have underweight and stunted children (chi-square test; p=0.032 and chi- square test; p= 0.031) than children in the households which relied on other sources of income (Table 4.19). There was no significant association between nutritional status of children and the other demographic and socio -economic factors (Appendix VI).

Table 4.19: Significant relationship between socio- economic and demographic factors and child nutritional status

socio-demographic/ economic factors	N=286	
	Child nutritional status	Chi-square test p-value
	Wasting	
Mothers' age in years	Wasted Normal	
17-20 (n=25)	0(0.0% 25(100%)	
21-30 (n=210)	26(12.4%) 184(87.6%)	
31-48 (n=51)	8(15.7%) 43(84.3%)	0.030*
	Wasting	
Mothers' marital status	Wasted Normal	
Married (n=252)	28(11.1%) 224(88.9%)	
Single(n=31)	4(12.9%) 27(87.1%)	0.012*
Separated(n=3)	2(66.7%) 1(33.3%)	
	Underweight	
Mothers' occupation	Underweight Normal	
Waged labour (n=28)	11(39.3%) 17(60.7%)	
Petty trade/domestic worker (n=64)	5 (7.8%) 59(92.2%)	0.003*
Unemployed/student (n=4)	1 (25.0%) 3(75.0%)	
Housewife (n=190)	32 (16.8%) 158(83.2%)	
	Stunting	
Mothers' occupation	Stunted Normal	
Waged (n=28)	9(32.1%) 19(67.9%)	
Petty trade/domestic worker(n=64)	6(9.4%) 58(90.6%)	0.012*
Unemployed/student (n=4)	1(25.0%) 3(75.0%)	
Housewife(n=190)	22(11.6%) 168(88.4%)	
Households' main source of income	**Underweight**	
	Underweight Normal	
Parental support(n=6)	1 (16.7%) 5(83.3%)	
Salaried(n=44)	7(15.9%) 37(84.1%)	
Casual work (n=91)	22(24.2%) 69(75.8%)	0.032*
Farming (n=3)	0(0.0%) 3(100%)	
Business(135)	17(12.6%) 118(87.4%)	
Charity organization (n=6)	2(33.3%) 4(66.7%)	
Savings(n=1)	0(0.0%) 1(100%)	
	Stunting	
Households' main source of income	Stunted Normal	
Parental support(n=6)	1(16.7%) 5(83.3%)	
Salaried(n=44)	4(9.1%) 40(90.9%)	
Casual work (n=91)	15(16.5%) 76(83.5%)	
Farming (n=3)	0(0.0%) 3(100%)	0.031*
Business(135)	16(11.9%) 119(88.1%)	
Charity organization (n=6)	2(33.3%) 4(66.7)	
Savings(n=1)	0(0%) 1(100%)	

*Significant relationship at p-value <0.05

4.9.2 Relationship between mother's knowledge on complementary feeding and child nutritional status

Mother's knowledge on complementary feeding practices based on 20 questions was computed and its association with child nutritional status investigated. A chi-square test

showed a significant relationship between mothers' knowledge on exclusive breastfeeding and underweight and wasting status of their children (p=0.025 and p=0.022 respectively). Mothers who were not knowledgeable on exclusive breastfeeding for six months were more likely to have underweight and/or wasted children than the mothers who were knowledgeable on exclusive breastfeeding for six months. Mothers who stated that sick and recovering children should be fed on diluted porridges and fruit juices were less likely to have underweight and/or stunted children (chi-square test; p=.0.026 and p=0.063 respectively) than those who thought otherwise.

Mothers who responded positively on feeding bottles as appropriate for feeding non-breastfed children were more likely to have underweight and/or wasted children (chi-square test; p= 0.011 and p=0.005 respectively) than those who responded negatively. Mothers who were knowledgeable that 1-2 tablespoonfuls is an adequate meal for 1 year old child were more likely to have their children stunted (chi-square test; p=0.061) than those who were aware that 1-2 tablespoonfuls is not an adequate meal for 1 year old child. Mothers who knew that a child's main meal should be balanced were less likely to have underweight children (chi-square test; p=0.027) than those who did not possess this knowledge (Table; 4.20). There was no significant relationship between all the others aspects of mother's knowledge on complementary feeding and child nutritional status (Appendix VI).

Table 4.20: Significant relationship between mother knowledge on complementary feeding and child nutritional status

Knowledge aspects on complementary feeding	N=286 Child nutritional status			Chi-square p-value
Infants exclusively breastfeed for the 1st 6 months of life		**Wasting**		
		Wasted	Normal	
	Yes response	27(10.4%)	233(89.6%)	0.022*
	No response	7 (26.9%)	19(73.1%)	
Infants exclusively breastfeed for the 1st 6 months of life		**Underweight**		
		Underweight	Normal	
	Yes response	40(15.4%)	220(84.6%)	0.025*
	No response	9 (34.6%)	17(65.4%)	
Feeding bottles are appropriate for feeding non-breastfed children		**Wasting**		
		Wasted	Normal	
	Yes response	27 (16.7%)	135(83.3%)	0.005*
	No response	7(5.6%)	117(94.3%)	
Feeding bottles are appropriate for feeding non-breastfed children		**Underweight**		
		Underweight	Normal	
	Yes response	36(22.2%)	126(77.7%)	0.011*
	No response	13(10.5%)	111(89.5%)	
Feed sick /recovering child on dilute porridge / fruit juices		**Underweight**		
		underweight	Normal	
	Yes response	18(26.5%)	50(73.5%)	0.026*
	No response	31(14.2%)	187(85.8%)	
1-2 table spoonfuls of food is adequate meal for a one-year old child		**Stunting**		
		Stunted	Normal	
	Yes response	34(15.5%)	186(84.5%)	0.045*
	No response	4(6.1%)	62(93.9%)	
child's meals should be balanced		**Underweight**		
		Underweight	Normal	
	Yes response	42(15.7%)	225(84.3%)	0.027*
	No response	7(36.8%)	12(63.2%)	

*Significant relationship at p-value <0.05

4.9.3 Relationship between mothers' complementary feeding practices and child nutritional status

Relationships between child nutritional status (wasting, underweight and stunting) and complementary feeding practices in terms of minimum dietary diversity, minimum meal frequency and minimum acceptable diet, consumption of iron rich foods and vitamin A were investigated. Timely introduction of complementary foods (consumption of solid, semi-solid and soft foods for children 6-8 months old) and its association with child nutritional status was not investigated since all (100%) the children aged 6-8 months had consumed a solid, semi-solid and soft food.)

A chi-square test revealed a significant relationship between minimum meal frequency and both wasting and underweight (p=0.001and p=0.013) respectively. Children who had consumed fewer meals in a day than recommended by WHO were more likely to be wasted and underweight than those who were fed the minimum meal frequency as WHO recommendations (Table, 4.21). There was no significant relationship between minimum dietary diversity, minimum acceptable diet and child nutritional status (Appendix VI).

Table 4.21: The association between mothers' complementary feeding practices and child nutritional status

Mothers complementary feeding practices	N=286 Child nutritional status			Chi-square p-value
Minimum meal frequency		**Wasting**		
		Wasted	Normal	
	Consumed (n=264)	26(9.8%)	236(89.4%)	0.001*
	Not consumed (n=22)	8(36.3%)	14(63.6%)	
Minimum meal frequency		**Underweight**		
		Underweight	Normal	
	Consumed (n=264)	41(15.5%)	223(84.5%)	0.013*
	Not consumed (n=22)	8(36.3%)	4 (63.6)	

*Significant relationship at p-value <0.05

4.10 Predictors of child nutritional status

The mothers' socio-economic and demographic factors and knowledge aspects on complementary feeding practices that had significant relationships with child nutritional status based on chi-square –test analysis were subjected to logistic regression analysis to establish the predictors of child nutritional status in the study population. Age of the mother (Odds Ratio [OR] =1.257, p=0.004) and mothers' marital status (OR =1.186, p=0.001) were predictors of wasting among the children. Occupation of the mother predicted underweight in children (OR=1.072, p=0.001), while mother's occupation predicted stunting in children (OR =1.44, p=0.044).

Mothers' knowledge on exclusive breastfeeding (Odds Ratio [OR] =2.912, p=0.017), feeding bottles as inappropriate for feeding non-breast children (OR=2.173, p=0.021), not feeding sick /recovering child on dilute porridge / fruit (OR=2.445, p=0.011) and a child's main meal should be balanced (OR=3.125, p=0.024) were predictors of underweight in children. Mothers' knowledge on the correct amount of food for a meal for a one-year old child (OR=2.104, p=0.045) was a significant predictor of stunting in children. Predictors of wasting in children were mother's knowledge correct knowledge on the duration of exclusive breastfeeding (OR=3.174, p=0.017) and feeding bottles being inappropriate for feeding non-breastfed children (OR=3.342, p=0.006) (Table 4.22).

Table 4.22: Predictors of child nutritional status

Predictors of child nutritional status	Odds ratio	95%CI	p value
Age of the mother	1.257	**Wasting** 0.27-5.72	0.004*
Mothers' marital status	1.186	**Wasting** 0.27-2.58	0.001*
Mothers' occupation	1.072	**Underweight** 0.53-2.12	0.001*
Mothers' occupation	1.44	**Stunting** 0.33-1.42	0.044*
Households' source of income	2.267	**Stunting** 0.58-8.77	0.038*
Infants exclusively breastfeed for the 1st 6 months of life	2.912	**Underweight** 1.21-6.99	0.017*
Infants exclusively breastfeed for the 1st 6 months of life	3.174	**Wasting** 1.22-8.26	0.017*
Feeding bottles are appropriate for feeding non-breastfed children	3.342	**Wasting** 1.40-7.96	0.006*
Feeding bottles are appropriate for feeding non-breastfed children	2.173	**Underweight** 1.12-4.20	0.021*
1-2 table spoonfuls of food is adequate meal for a one-year old child	2.104	**Stunting** 1.02-4.33	0.045*
Feed sick /recovering child on dilute porridge / fruit juices (n=68)	2.445	**Underweight** 1.23-4.83	0.011*
Child's meal should be balanced	3.125	**Underweight** 1.16-8.40	0.024*

*Significant relationship at p-value <0.05

CHAPTER FIVE: DISCUSSION

5.1 Introduction

Malnutrition is a major underlying cause of the child morbidity and mortality in Kenya. Knowledge on feeding practices of infants and young children is crucial for undertaking or improving health and nutrition programme in a country. The knowledge and practices for infant and young children feeding, one of the determinants of health and nutrition, has not been well studied in Kenyan urban areas.

A search through the available literature only found one recent study in Korogocho slum, Nairobi that focused on complementary feeding practices and nutritional status of children aged 6-23 months old (Kipruto, 2013). Other studies in the informal slums of Nairobi have focused on prevalence and risk factors of malnutrition of children 6-23 months old (Kariuki *et al.*, 2000), and on patterns and determinants of breastfeeding practices and complementary feeding (Murage *et al.*, 2011) whereas other studies have focused on breastfeeding practices Ochola, (2008) and Muchina (2007). Most of the comparisons of the findings of this study will therefore be made with the study conducted in Korogocho slum in Nairobi (Kipruto, 2013) as it is the most relevant and comparable to the present study.

To improve infant and young child feeding practices, mothers' knowledge is considered key. This study was carried out in an urban setting, among 286 mothers and their children 6-23 months of age randomly selected from KWHC health centre. The study adopted a cross -sectional analytical study design to determine the influence of mothers' knowledge on complementary feeding and the nutritional status of their children.

5.2 Socio-demographic and economic characteristics of the mothers and children 6-23 months old

Majority of the mothers were young with low levels of education and were housewives. These findings are comparable to those by Murage *et al.,* (2011) and Ochola (2008) conducted in Kibera slum, Nairobi. Education is one of the most important resources that enable women to provide appropriate care for their children, which is an important determinant of children's growth and development (Engle *et al*., 1996). Working outside the home is associated with early complementary feeding and cessation of breast feeding (Abbi et al., 1991). In the present study, low levels of education may have probably contributed to most of the mothers being housewives. A mother who spends most of the time at home with her child may be available to practice optimal feeding practices on her child (Leslie, 1998).

The major source of income for most households in this study population was business and casual labour. These sources do not attract high income and this was confirmed by mothers during the FGDs. Mothers reported that the household income was not adequate to provide for food and other necessities. Priority of the household expenditure was therefore placed on house rent first and then food and health services. Being an urban setting, where food is acquired through purchases, the low income level was a major constraining factor to household food security. The low incomes may therefore have contributed to the majority of the household's inability to achieve minimum meal frequency for the non- breastfed and minimum meal dietary diversity consequently minimum acceptable diet for the children

5.3 Complementary feeding practices

5.3.1Breastfeeding practices

In this study, almost all the children had been breast fed and this compares with the Kenya national figures as reported in Kenya Demographic Health Survey KDHS (KNBS and ICF Macro, 2008-09), and in Kibera slum Nairobi (Murage *et al.*, 2011) and in Korogocho slum Nairobi (Kipruto,2013). This was also expected given that culturally Africans breastfeed their children. During complementary feeding, for infants and young children aged 6-23 months old, breastfeeding contributes significantly to the overall nutrient intake, fills most of the energy needs and remains an important source of vitamin A and C, as well as essential fatty acids and can provide to their total energy needs (Mukuria, Kothari and Abderrahim, 2006).

5.3.2Timely introduction to solids, semi-solids and soft foods

The mothers introduced complementary feeding foods to their children timely; all the children 6-8 months had been appropriately introduced to solids, semi-solid and soft foods. This finding compares to those of in Korogocho slum Nairobi (Kipruto, 2013) where all the children of this age had been introduced to complementary feeding. At the age of 6 months, an infant's need for energy and nutrients starts to exceed what is provided by breast milk, thus complementary foods are necessary to meet energy and nutrient requirements, (WHO, 2006b) and if complementary foods are not introduced when a child has completed 6 months of age, an infant's growth may falter (WHO, 2001).

5.3.3 Minimum dietary diversity

Dietary diversity has long been recognized as a key element of high quality diets and increasing the variety of foods consumed is thought to ensure adequate intake of essential nutrients and thus promote good health and nutrition (Hatloy *et al.,* 1998). Majority of the children had eaten food prepared from grains, tubers and roots like porridge, *ugali*, rice, *chapatti*, bread, potatoes, yams and cassavas. This is comparable to the Kenya national figures as reported in Kenya Demographic Health Survey KDHS (KNBS and ICF Macro, 2008-09), and findings of a study by Amanda (2011) in Rift Valley and Ekesa *et al.,* (2011) in Butembo-Democratic Republic of Congo. This can be related to the fact that being a low income community, the mothers would go for the cheaper foods which are usually grains/roots/tubers and their products and the fact that cereals form the staple food of any community. Porridge was also taken by almost all the children in this study since this is a common complementary food. Other studies have also reported the same findings; Mbagaya, (2009) a study in the rural western Kenya and Kumudha *et al.,* (2010) a study conducted in Utter Pradesh.

Intakes of vitamin A rich fruits and vegetables were not adequate and decreased with age unlike for the Kenya national figures reported in Kenya Demographic Health Survey KDHS (KNBS and ICF Macro, 2008-09), where its intake increased with age. Vitamin A deficiency is among the nutritional deficiencies of greatest public health significance in the world today. Almost one third of children in developing countries are affected to some degree by vitamin A deficiency, which impairs their growth, development, vision and immune function, and in extreme cases leads to blindness and death (Sommer and West, 1996). Consumption of iron-rich foods (flesh meats) was low. Being a resource

poor community, foods of animal origin are most likely out of the financial reach for the majority of the households.

The consumption of proteins was highest from dairy products mostly milk, concurring with the study findings by Hellen Keller International, (2010) in Batudu District of Nepal and Ekesa *et al*., (2011) in Gitega (Burundi) and Butembo (Democratic Republic of Congo). The lower consumptions of legumes and least for flesh meats and eggs could be as a result of financial constrains and cultural beliefs as mothers reported in the focus group discussion. Mothers reported that eggs are prohibited for children as they interfere with speech and walking (*consumption of eggs will make* c*hild slow in walking and speech.).*The majority of the households could not afford expensive food items like eggs and flesh meats which are rich in iron. This sentiment was expressed by the mothers during the FGDs.

The mean dietary diversity was below the recommended ≥4 food groups (WHO, 2007) although higher than Kenya national figure as reported in Kenya Demographic Health Survey KDHS (KNBS and ICF Macro, 2008-09), (58.4%) In the present study, mothers' knowledge on the importance of providing balanced diet for their child was adequate and probably their low socio-economic status may have affected their ability to give a diverse diet to the children. Additionally, in the FGDs, mothers reported that cultural beliefs influenced the type of foods given to children; for example some of the communities did not give children eggs because it was considered taboo.

5.3.4 Minimum meal frequency

In this study majority of the breast fed children attained minimum meal frequency unlike their counterparts, the non- breastfed children. This finding was in agreement with that of a study conducted in Kibera, Nairobi (Adere, 2006). Frequent meals are required to ensure the child receives enough energy (PAHO/WHO 2003). In this study, over half of the mother s knew that children should be fed based on hunger cues which could be one of the influences on their feeding frequencies since some children may not necessarily show hunger cues.

5.3.5 Minimum acceptable diet

In this study, majority of the breastfed children attained minimum meal frequency, a lower percentage attained the minimum dietary diversity and consequently, a lower percentage attained the minimum acceptable diet. This is comparable to the findings in Korogocho slum (Kipruto, 2013), and Kariuki *et al*., (2002) in Kibera slum Nairobi, where many children attained minimum meal frequency but did not attain minimum dietary diversity. Minimum acceptable diet is considered adequate if a child consumes varied diets and at the recommended meal frequencies.

5.4. Mother's knowledge on complementary feeding

Overall, mothers had average knowledge on complementary feeding practices. Based on the information from the FGDs with mothers, most of this information was obtained from the; health centre, and community health workers from Concern World Wide, and NGO that works in the study area. Other studies conducted in informal settlements in Nairobi have also reported that the mothers' main source of information is the health facilities

(Kipruto,2013; Mututho,2012 and Ochola, 2008). Knowledge on feeding practices of infants and young children is crucial for the health and nutrition well being of a child (Sethi, *et al.*, 2003)

Almost all the mothers were knowledgeable on the duration of exclusive breast feeding, correct timing of introduction of complementary foods and duration of breastfeeding. The knowledge level on breastfeeding and the recommended duration of breastfeeding was lower comparable to the findings of mothers in Korogocho slums (Kipruto, 2013). UNICEF and WHO recommendations stipulate that children be exclusively breastfed fed for 6 months and that breast feeding continues for two years and beyond (WHO, 2006a).

Mother' knowledge on complementary food frequency, was that children should be fed based on hunger cues, ideal complementary feeding practices comprises of adequate meal frequency depending on whether the child is breasting (WHO, 2001). Majority of the mothers were aware of the importance of enriching complementary foods and providing a diverse diet to their children. This is an important aspect in the infant and young child feeding practice as evidenced in Korogocho slum (Kipruto, 2013).

Mothers did not know the correct flours for making child porridge as indicated in the National strategy on infant and young child feeding 2007-2010 (MOPHS, 2007-2008) that there is wide spread use of inappropriately constituted cereal and legume mixes in Kenya. The focus group discussions revealed that mothers did not know the correct flour for their child. Mothers went to the cereal shops and asked for porridge flours by mentioning the age of the child to the shopkeeper who is possibly not knowledgeable of

the presence of phytates on the legumes (*give me the porridge flour for an 8 month old child).* Still through the focus group discussions mothers reported that the most appropriate flours for making children's porridge flour was a mixture of maize, *ndengu*, beans, millet, sorghum, finger millet, *omena* and cassava. Flour mixtures of cereals and legumes are not appropriate for children; legumes contain phytates which bind iron (MOPHS, 2007-2010). Additionally, legumes take longer to cook than legumes and if not precooked can led to gastro-intestinal disturbances in children.

Even though appetite may be reduced during illness, continued consumption of complementary foods is recommended to maintain nutrient intake and enhance recovery (Brown, 2001). Many mothers indicated that sick and those recovering illness should be fed on dilute porridge and fruit juices only. This would be probably one of the causes of high malnutrition rates especially underweight and wasting. After illness, the child needs greater nutrient intake to make up for nutrient losses during the illness and allow for catch-up growth. Extra food is needed until the child has regained any weight lost and is growing well again (WHO, 2001).

Hygienic practices during food preparation and feeding is critical for prevention of gastrointestinal illness (WHO, 2001). Mothers were knowledgeable on treating drinking water given to their children, but few of them thought washing of hands especially after returning from outside the house and after handling garbage was importance. This trend can be closely related to their low levels of education and may be more on the scarcity of water in urban areas. In the FGD, mothers reported challenges in obtaining water because it was scarce (water rationing in Nairobi town) and expensive (Kshs 10 per 20 litres).

5.5 The nutritional status of the children

Stunting rates of this study were lower than the national figures in children under five years. This was possibly because the study considered children aged 6-23 months old and also the fact the stunting rates increases with child age. Wasting was higher than the national figure. Underweight compared well with the national figure but was double the prevalence of underweight children in Nairobi province. However, underweight was similar to underweight rates in Central province as reported in KDHS (KNBS and ICF Macro, 2008- 09), The malnutrition rates were higher compared to Korogocho slum (Kipruto, 2013) and Kibera slum (Kariuki *et al.*, 2002). This study only examined the influence of maternal knowledge on complementary feeding practices hence nutritional status of children. Therefore, it is not possible to explain what factors could have contributed to the high prevalence of malnutrition in the study population.

5.6 Relationship between mother's knowledge and complementary feeding practices

A mother who is not knowledgeable on various aspects of complementary feeding is more likely to have a malnourished child (Sommerfelt *et. al*., 1994*).* In this study, mothers' knowledge on complementary feeding practices was not related to feeding practices in terms of minimum meal frequency, minimum dietary diversity and minimum acceptable diet. This is in disagreement with the findings of a study conducted in Korogocho slum in which mothers' knowledge on complementary feeding practices was related to dietary diversity and minimum acceptable diet (Kipruto, 2013). Hence the study's null hypothesis that there is no significant relationship between mothers'

knowledge on complementary feeding and her practices in complementary feeding for children aged 6-23 months and attending KWHC was accepted.

In this study, mothers' complementary feeding practices could have been influenced by other factors like culture. During the FGDs mothers reported during that culture and low socio-economic status of the majority of the households was a major constraint to optimal child feeding practices.

5.7 Relationship between mothers knowledge on complementary feeding and child nutritional status

Mother's nutritional knowledge is considered to have a great impact on the infants nutritional status as she has the capacity to take diet related conscious decisions (Foote and Marriot, 2003). However a combination of mothers' self-perception, assessment of infant's well being, culture; food availability and financial status influence the actual complementary feeding, hence child nutritional status (Sellen, 2001).

In the present study, mothers' knowledge was related to child nutritional status. Mothers who knew the importance of providing a balanced diet to their children were less likely to have underweight children hence the rejection of the study null hypothesis that there is no significant relationship between mothers' knowledge on complementary feeding and the nutritional status of their children aged 6-23 months and attending KWHC.

5.8 Relationship between mothers' complementary feeding practices and child's nutritional status

Meeting the minimum dietary diversity, minimum meal frequency and minimum acceptable diet is associated with better nutritional status of children. Several studies have shown a positive relationship between complementary feeding practices and child nutritional status. A recent study in Korogocho slums (Kipruto, 2103) found that non-attainment of the minimum acceptable diet was a predictor of wasting in children 6-23 months. This study found a relationship between the frequency of feeding and child nutritional status (wasting and underweight).

CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This was a cross-sectional analytical study whose purpose was to determine mothers' knowledge on complementary feeding practices and relate this to the nutritional status of their children aged 6-23 months.

6.1.2 Summary of the findings

The respondents were mostly young women (mean age 26.1±4.7 years), married (88.1%), housewives (66.4%) with mainly primary school level of education (47.2%). They were mainly of low socio-economic status with the main sources of income being small-scale business (48.6%) and casual labour (31.8%).

Mothers were fairly knowledgeable on complementary feeding practices with a score of 14.11±2.33 out of a total of 20. Mothers' knowledge was high in terms of; correct timing of introduction of complementary foods (90.9%), appropriate hygiene practices in terms of hand washing before preparation of children's food (93.4%) and the importance of providing balanced meals to children (93.4%). Knowledge gaps were observed in appropriate feeding of the sick children (23.8%) and the fact that mixed flours are inappropriate for making children's porridge (31.1%).

All (100%) the children aged 6-8 months had been introduced to solids, semi-solids and soft foods. Majority of the breast-fed children received the recommended minimum meal frequency, children 6-8 months old (95.9%) and those 9-23 months old (96.4%) unlike

the non-breast fed children (6-23 months old) where only 55.0% received the recommended minimum meal frequency. Over three-quarters (79.0%) of the children attained the minimum dietary diversity whereas 75.9% attained the minimum acceptable diet.

Overall, 13.3% of all the children were stunted, 11.9% wasted and 16.8% underweight. Maternal knowledge on complementary feeding was significantly associated with nutritional status of the children. Mothers' who did not have the correct knowledge on feeding the sick and children recovering from illness were more likely to have underweight children (chi-square test; p=0.026). While mothers who did not know that a child's meal should be balanced were more likely to have underweight children (chi-square test; p=0.027).

Children who did not attain the minimum meal frequency were more likely to be underweight (chi-square test; p=0.013) and wasted (chi-square test; p=0.001) compared to those who consumed minimum meal frequency as per WHO (2007) recommendations.

6.2 Conclusions

The population was comprised of young mothers with low levels of education and low socio-economic status. Maternal knowledge on complementary feeding was on the whole appropriate; gaps were identified in appropriate feeding of the sick children and the appropriate use of mixed flours for making children's porridge

Complementary feeding practices were on the whole appropriate; in terms of introduction of solids, semi-solids and soft foods to children 6-8 months and minimum meal frequency especially for the breastfed children. Dietary diversity was low because of the limited socio-economic capability of the respondents to purchase a variety of foods. The prevalence of under-nutrition was high among the children and was influenced by maternal knowledge on complementary feeding practices and also the complementary feeding practices.

6.3 Recommendations

6.3.1 Recommendations for policy and practice

Messages on the promotion of appropriate IYCF practices by the Ministry of Health and other organizations dealing with child health should emphasize: appropriate feeding of the sick child and those recovering from illness; the importance of dietary diversity and frequency of feeding especially for non-breastfed children, to improve child's growth and health.

The Ministry of Health and Organizations involved in child health issues should explore factors which influence mothers' knowledge on complementary feeding hence child nutritional status with a view of taking appropriate action to improve complementary feeding practices. . Positive cultural beliefs on complementary feeding practices should be encouraged and negative ones discouraged.

6.3.2 Recommendations for further research

This study was done in an urban poor-resource setting among mothers recruited from a health facility and therefore the findings may not be representative of mothers from such a setting. It is therefore recommended that a similar study in a community setting be conducted to verify the findings of this study.

There is need to conduct a longitudinal study to establish the whole array of factors that influence complementary feeding practices and over a period of time since this study only focused on mothers' knowledge and socio-economic factors.

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APPENDICES

Appendix I: Letter of Introduction

Dear Respondent,

I am Angelica Mueni, a Master's student from Kenyatta University, in the Department of Foods, Nutrition and Dietetics. I am carrying out a research on "mother's knowledge on complementary feeding practices and the nutritional status of their children 6-23 months attending Kahawa West Health Centre.

I will be interviewing you the mother and take some measurements of your child. I would appreciate if you provide me with the information required. The information given will be treated with confidentiality and will only be used for the purpose of this study.

Thank You.

Yours Sincerely,

……..

Angelica Mueni

Appendix II: Consent

Please read the below consent and indicate your willingness to participate in the research and respond to the questionnaire.

Title of Research Study: Maternal knowledge on complementary feeding practices and nutritional status of children aged 6-23 months, attending Kahawa West Health Centre.

BY

Principal Investigator: Kimwele Angelica Mueni.

Consent

I am asking you to participate in a research study. Before agreeing to participate in the research, it is important that you read the information below. This statement describes the purpose, procedures, benefits, risks, discomforts, and precautions of the study. Also described are the alternative procedures, if any, available to you. You also have right to withdraw from the study at any time. You should feel free to ask any questions that you may have.

A. Purpose of the Research Study: To determine mother's knowledge, complementary feeding practices and the nutritional status of their children aged 6-23 months old attending Kahawa West public Health Centre. The study is also being conducted as my requirement for the award of Master of Science in Foods, Nutrition and Dietetics and possibly for publication in academic journals and presentations at academic conferences.

B. Procedures Description: In this study, I will be asking some questions to you the mother on your child dietary practices and take measurements of your child's weight using a Salter scale and height using a height board. In this study, only mothers with children aged 6-23months will be selected as they attend the child welfare clinic and only every 2nd mother will be selected. A total of 286 mothers will have been sampled at the end of the study to represent the others and Kahawa west health public centre as a community.

C. Duration: There is no limit time on how long you will take in responding to the question on child dietary practices and the taking of child weight and height. If you decide to stop participating in between, there will be no penalty for your decision and will not affect your future relationship with Kahawa West public health centre staff.

D. Risks or Discomforts of this study: Your risk of participation in the study is unlikely and low

- In taking child weight, the undoing of clothes may expose the child to cold weather which may have some health implications.

-on the weight and height measurements, the child may fall down or get hurt by the wooden or metallic ends.

-questions on demographic and socio-economic status (ethnicity, marital status, religion, education level, occupation, and amount of income earned) may make one upset.

-your participation may affect your relationship with health centre staff, government representatives and Nongovernmental organizations.

Protection against the risks

-both weight and height measurements will be done in an enclosed room and by a trained personnel under the supervision of the health centre nutritionists and principal researcher.

-the height boards for taking height and the Salter scale for taking the weight will be obtained from the health centre nutrition department and should have a mark of quality from a standardization body.

-the personnel will use new hand cloves on every child.

-participants are free to refuse to respond to any question which can result to any of the mentioned risks.

-confidentiality will be assured on all information provided and for that matter the participant identification form will be kept separate from the responses records and instead a unique identifier used.

E. Confidentiality: To secure the confidentiality of your responses, your name and other identifying information will never be attached to your answers. All codes and data will be kept in a locked drawer in a locker room or in a password protected computer that is kept secure. Data access will be limited to the Principal Investigator and researchers working directly on this study. All data will be destroyed responsibly after the required

retention period (usually three years.) Your privacy will be maintained in all published and written data resulting from this study. Your name or other identifying information will not be used in our reports or published papers.

F. Benefits of this study: You will receive no direct benefit from participating in this study; however your participation may help understand the community levels of child malnutrition and possible causes. The public health service may use the information to enhance implementation of health programs together with policy changes in health care provision.

G. Compensation/Incentive: There will be no payments for participating in this study.

H. Payment for research related injuries: There are no expected injuries as a result of participating in the study or for questions related to the study. In case of further clarification you may contact the people below (contact information)

I. Contact Information: If you have any questions, concerns and complaints contact the following people;

1. 1st Co-Researcher,
Sophie Ochola (PhD),
Department of Foods, Nutrition and Dietetics,
Kenyatta University.
EMAIL address; sochola@yahoo.com, telephone; 0721449803

2. 2nd Co-Researcher,
Elizabeth Kuria (PhD),
Department of Foods, Nutrition and Dietetics,
Kenyatta University.
Email address; enkuriakan@yahoo.com, telephone; 0721433619

3. Kenyatta University Ethics Review Committee
The chairman, email:kuerc.chairman@ku.ac.ke
The secretary, email:kuerc.secretary@ku.ac.ke
Website:www.ku.ac.ke

Participant Oral Consent:

Do you have any questions about the above information?

(YES/NO)

Do you wish to participate in this study?

(YES/NO

Participant Written Consent:

I have read and understand the above information. I agree to participate in the research study.

Participant Name: _____ Date: _____

Participant Signature: _____

Appendix III: Structured Questionnaire

Questionnaire no----- Name of respondent---------- Name of interviewer---------- Date----------

Section A: Socio- economic and demographic information

1.0 Sex of the child 1=male 2=female	**1.1 Birth date in months**	**1.2 Age verification 1=health card 2=mothers recall**	**1.3 Rank in the family**	**1.4 Mothers ethnicity** 1=Kikuyu 2=Kamba 3= Meru; 4= Luo 5=Luhyia 6=Kalenjin 7=Embu 8=others.	**1.5 Mother's marital status** 1=Married 2=Single 3=Divorced; 4=Separated 5=Widowed 6= Other (Specify) _____	**1.6 Mother's religion** 1=Catholic 2=Protestant 3=Muslim 4=Traditional 5=None	**1.7 Highest Education level Attained by mother/caregiver?** 1=No education 2=Primary School 3=Secondary School 4=Vocational, College 5=University Degree	**1.8 Main occupation of the mother/caregiver** 1=Agricultural labour 2=Livestock herding 3=Waged labour(salaried) 4= Waged labour (casual) 5= Pretty trade 6= Unemployed 7=Student 8= Housewife 9=Domestic help 10= other ---------- (specify
				Enter the code				

1.9	**Highest level of education of the husband** 1=No education 2=Primary School 3=Secondary School 4=Vocational, College 5=University Degree	
1.10	**Main Occupation of the husband** 1=Agricultural labour 2=Livestock herding 3=Waged labour(salaried) 4= Waged labour (casual) 5= Pretty trade 6= Unemployed 7=Student 9=Domestic help 10= other ---------- (specify	
1.11	**Main Source of Income for the household (indicate all mentioned)** 1=Parental 4= Casual work 7=Spousal support 2=Private sector Employment 5= Farming 8= Other (Specify 3=Government /Civil Servant 6=Business	**Enter Code**
1.12	**Average amount of money earned by household per month** (enter amount in Kshs)	
1.13	**On average how much money does the household use on -food daily----------** **-rent(monthly)----------** **- education (monthly)----------** **-health (monthly)----------** (Enter amount in Kshs) -others----------	

Section B: Child feeding practices

i. Dietary diversity and frequency

Background Information				**Infant Feeding information**					
2.1	**2.2**	**2.3**	**2.4**	**2.5**	**2.6**	**2.7**	**2.8**	**2.9**	**2.10**
Child's date of Birth: dd/mm/yy	**Source of birth date (**Record the appropriate code) 1 = CARD 2= Mother 3= DNK	**Age of child in months**	**Sex of child** 1= M 2= F	**Did you ever breastfeed [Name]?** 1= Yes 2= No 3= DNK If No, go to **2.6** If yes, go to **2.7**	**If No, why** See code below for the answers Go to **3.2**	**If yes, How soon after birth did you put [Name] on the breast?** See code below for the answers	**During the first 3 days after delivery, did you give [Name] the fluid/liquid that came from your breasts?** 1= Yes, 2= No, 3= DNK	**In the first 3 days after delivery, was [Name] given anything to drink other than breast milk?** See Codes below	**Are you still breastfeeding [Name]?** 1= Yes 2= No

Question 2.6: 1= No milk; **2=** did not want to breast feed;**3=**traditional beliefs (child will die) **4=** other;
Question 2.7: If less than an hour record **00**; if less than 24 hours record **number of Hours**; IF more than 24 hours record **number of Days**; If mother does not know, record: **88**
Question 2.9: **1=** Plain water; **2=** Sugar water or glucose water; **3=** powdered milk or fresh milk; **4=** infant formula (*Nan*), **5=** Gripe water; **6=** not given; **7=** Other (specify) **DNK**=Do Not Know

Now, I will ask you about what [Name] ate and drank YESTERDAY during the day and the night. During the day and the night, did [Name] receive any of the following fluids? Refer to the name of the child for each question.
Kindly probe the mother for responses and record the codes/responses as the mother names the fluids and liquids in their appropriate category

]3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
Breast milk Only one answer coded as below: 1. Yes 2. No 3. DNK	**Infant formula** *(Nan,s-26)* 1. Yes 2. No 3. DNK	**Other milks: animal milk, Reconstituted powdered milk, *eg*-** Sour milk. or mala 1. Yes 2. No 3. DNK	**Sweetened flavored juices** *(Soda or other commercial juices)* 1. Yes 2. No 3. DNK	**ORS** 1. Yes 2. No 3. DNK	**Tea/Coffee** 1. Yes 2. No 3. DNK	**Plain water** 1. Yes 2. No 3. DNK	**Thin porridge** 1. Yes 2. No 3. DNK	**Did (Name) feed anything from a bottle with a nipple** 1. Yes 2. No 3. DNK

KEY
DNK=DO NOT KNOW

Now, I will ask you about what solid/ semi solid foods [Name] ate yesterday during the day and the night. During the day and the night, what food items did [Name] receive? (Ask the mother /caregiver response to mention all foods given to the child and record as mentioned in the appropriate category)

4.1	**4.2**	**4.3**	**4.4**	**4.5**	**4.6**	**4.7**	4.8	**4.9**	**4.10**
Eggs 1. Yes 2. No 3. DNK	**Porridge made from** Sorghum Millet Maize *(Use the correct code. Only one answer)* 1. Yes 2. No 3. DNK	**Flesh Meats** (Chicken, Beef, Goat, Kidney, Liver, Fish) 1. Yes 2. No 3. DNK	**Legumes and Nuts** (Beans, Groundnuts, Cowpeas, Lentils, Green Grams, pigeon peas) 1. Yes 2. No 3. DNK	**Dairy Products** **(**Milk, cheese, ghee, yoghurt, mala) 1. Yes 2. No 3. DNK	**Grains, Roots &Tubers** (spaghetti, noodles, macaroni, rice, bread, potatoes, biscuits, *mandazi*, *chapatti*, *ugali)* 1. Yes 2. No 3. DNK	**Vitamin A Rich fruits & Vegetables** (Pawpaw, melon, *sukuma wiki*, carrots, cowpea leaves, spinach, avocado) 1. Yes 2. No 3. DNK	**Other Fruits and Vegetables** (Onions, tomatoes, cabbage, oranges, bananas, Okra) 1. Yes 2. No 3. DNK	**Oil, fats** 1= Yes 2= No 3= DNK	**Yesterday (During the day and at night). How many times did you feed [Name] solid and semi-solid foods?** No. of times child was given food to make it full.

KEY
DNK=DO NOT KNOW

How old was (name) when you first introduced the solids foods----------?

ii Other complementary feeding practices

1. Who is the primary feeder of (name) when you (the mother) are not present?"
   1=father
   2= House help
   3=Older children
   4= other relatives
   5=others (specify)

2. How do you feed (NAME)
   1=cup and spoon
   2=bottle feeding
   3=both

3. (Name) during and after illness, was (NAME) offered less than usual to drink/eat, about the same amount, or more than usual to drink?
   1=Less 2= Same 3=More 4=Nothing to drink 5=others (specify)

4. Do you treat your water in any way to make it safe for drinking?
   1=Yes 2=No 3=Don't know

5. How/where do you store food for (NAME)?
   1=Baby Bowl 2= Food Flask 3=Pot 4=Fridge

   5=Others (Specify)……..

6. Now I would like to ask you about hygienic practices on child feeding, under what circumstances do you usually wash your hands?
   1=before food preparation
   2= before eating
   3= before feeding children
   4=after defecation
   5=after cleaning babies
   6=after returning from outside
   7=after handling garbage
   8=other (specify)

7. Did you use soap of any kind for any reason to wash hands yesterday during the day/night? 1=Yes 2= No

Section C: Maternal knowledge on complementary feeding

	Questions	**Yes**	**No**
1	Infants should be exclusively breastfed for the first 6 months of life		
2	Breastfeeding should be continued up to 2 years and beyond		
3	Adding ghee or oil(blue band) to child's porridge is advisable		
4	Flour mixes of *ndengu*, millet, sorghum, maize, beans and *omena* are ideal for complementary feeding because they are nutritious		
5	A 6 months child should be fed on pureed or sieved foods		
6	Mother or a caregiver should feed a child based on hunger cues		
7	A breastfed child who is 12 months old should be fed solid foods two times per day		
8	Mothers/caregivers should wash hands before preparing children's food		
9	Sick and recovering children should be fed porridge or diluted fruit juices only		
10	Feeding bottles are the best option for feeding children who have refused to breastfeed		
11	Water used to prepare food and drinks for a child should be boiled or treated		
12	A mother or a caregiver should assist a child to eat until 2 years		
13	1-2 table spoonfuls of a food is adequate for a one meal of a 1 year child		
14	Children should eat from the family pot from 1 year onwards.		
15	Fruits and vegetables like carrots, mangoes, pawpaw and green leafy vegetables are suitable complementary foods		
16	A child should be breastfed on demand		
17	A mother should be the primary feeder of the child		
18	It's not advisable to give a child who is breastfeeding other protein foods such as poultry, eggs, fish even after 6 months since breast milk is adequate in proteins		
19	Complementary foods should be introduced at 6 months		
20	A child's main meal should be a mixture of many food items from grains/cereals, meats/eggs/poultry, fish, legumes, roots/tubers, fruits/vegetables, fats/oils		

YES for questions 1, 2, 3, 5, 8, 11, 12, 14, 15, 16, 17, 19, and 20.

NO for questions 4, 6,7, 9, 10, 13,18 .

Source: self generated based on guiding principles of a breastfed child

Section D: Child nutritional status

(Anthropometric for Children 6-23 Months)

Sex **1=M** **2=F**	**Date of Birth** _/___/_ d/m/y	**Age in months**	**Age verification** **1=health card** **2= mothers recall**	**Weight of the child in kg to the nearest 0.1 kg**			**length of the child to the nearest 0.1cm**		
				1st reading	2nd reading	Average weight	1st reading	2nd reading	Average height

Appendix IV: Focus Group Discussion Guide

For mothers with children aged 6-23 months on knowledge and complementary feeding –practices

1. In your view, are infant feeding practices in your community adequate?
    - Dietary diversity-(different kinds of foods given to the child before 2years)
    - Frequency of feeding, -(number of meals per day for 6-12 months child and 13-23 months child)
    - Hygiene practices, -(safety and adequacy of water, food preparation and storage, care of feeding utensils
    - who feeds the baby (name and reasons as why not the mother)
    - how should we feed the child (utensils, refusal to eat)
    - which foods are considered rich in vitamin A and iron
    - Nutrient density (adding oils, fats and sugar to children food
2. In your community when do most mothers introduce complementary foods and why?
3. What are the factors that influence complementary feeding practices in your community (elements in 1 above)?
4. Do traditional beliefs and culture influence CF practices? Which ones and how?
5. In your community which foods are considered appropriate for complementary feeding?

6. In your view, which is the preferred flour for preparing children's porridge and why is it preferred (affordable ,nutritious)?
7. What hygienic practices should a mother or caregiver observe when handling food? Are these practices common among the women in your community/where you live?
8. Are there important vitamins to children? What are the sources of vitamin A?
9. In your own view, how should a sick or a child recovering from illness be fed?

10. You as a mother where do you usually get information or acquire important knowledge, skills on child feeding practices and what kind of information

11. Any other information that you would want to tell me about complementary feeding practices.

Appendix V: Budget

No	ITEM	UNIT	COST PER UNIT	SUB-TOTAL	TOTAL (Ksh)
1	Preliminary prep. -Transport to the field -Communication	Principal researcher	10,000 x 2months	20,000.00	20,000.00
2	Photocopying	Questionnaire, presentation materials at department level.	@ 2sh per page	15,000.00	15,000.00
3	Transport to the field	Principal researcher and two assistants during data collection	500 @3 per day for 30 days	15,000.00	15,000.00
4	Anthropometric equipment	2 salter scales, one 2 length boards.	.each at 2000 for 30 days	6 @2000	12,000.00
5	Allowances	3 assistants	@500 x 30days	45,000.00	45,000.00
				SUB-TOTAL	**107,000.00**
6	Data analysis			30,000.00	30,000.00
7	Thesis preparation costs			15,000.00	15,000.00
8				**SUB-TOTAL**	**142,000.00**
9	Contingencies				10,000.00
10				**GRAND TOTAL**	**152,000.00**

Appendix VI: Factors not significantly associated with child nutritional status

Table 4.23: Insignificant relationship between demographic, socio-economic factors and child nutritional status

Characteristic N=286	Nutrition status	Chi-square test; p value,
Mothers' age	underweight	0.397
Mothers' age	stunting	0.686
Mothers' marital status	underweight	0.127
Mothers' marital status	stunting	0.325
Mothers' education level	stunting	0.759
Mothers' education level	wasting	0.859
Mothers' education level	underweight	0.260
Mothers' occupation	wasting	0.515
Husbands' occupation	underweight	0.240
Husbands' occupation	stunting	0.253
Husbands' occupation	wasting	0.682
Husbands' education level	underweight	0.240
Husbands' education level	stunting	0.275
Husbands' education level	wasting	0.682
Households' source of income	wasting	0.390

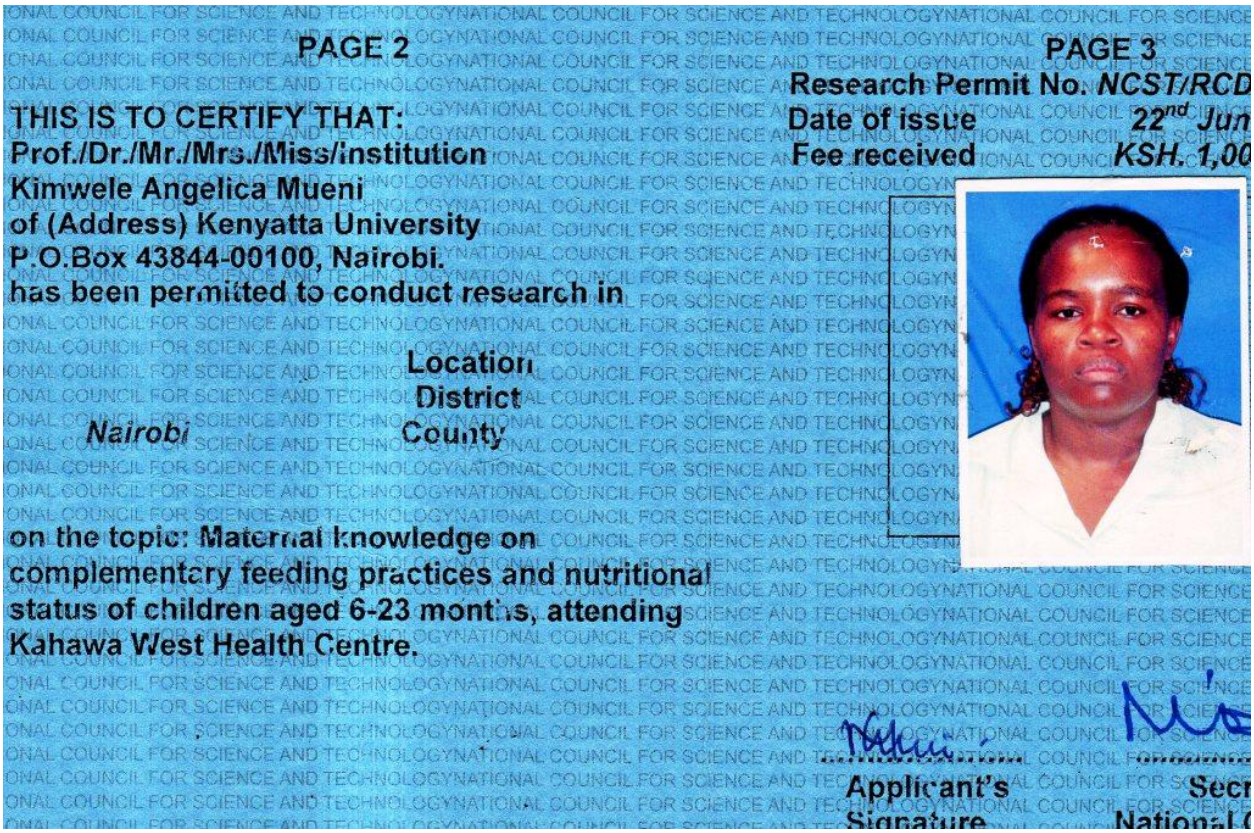
*significant relationship<0.05

Table 4.24: Insignificant relationship between mother knowledge on complementary feeding and child nutritional status

Characteristic N=286	**Nutrition status**	**Chi-square test; p value,**
exclusively breastfeed for the 1st 6 months of life	stunting	0.349
A child should be breastfed on demand	underweight/stunting/wasting	0.588/0.528/0.761
Continue breastfeeding for 2 years and beyond	underweight/stunting/wasting	0.712/0.405/0.100
CF should be introduced at 6 months	underweight/stunting/wasting	1.00/0.480/0.465
Feed a 12 months child two times a day	underweight/stunting/wasting	0.754/0.279/0.706
Feed a child based on hunger cues	underweight/stunting/wasting	0.875/ 0.480/0.854
Ghee or oil enrich child's porridge (n=204)	underweight/stunting/wasting	0.603/1.00/0.317
Feed a 6 month child on pureed / sieved foods	underweight/stunting/wasting	0.061/0.164/0.142
Children fed from the family pot from 1 year	underweight/stunting/wasting	0.861/0.172/0.686
Washed hand before preparing children's food	underweight/stunting/wasting	0.751/ 0.726/ 0.711
Feeding bottles are not appropriate non-breastfed	stunting	0.292
Treat water for children food and drinks for	underweight/stunting/wasting	1.000/1.000/1.000
Feed sick /recovering child on dilute porridge / fruit juices	wasting	0.206
Mother assist a child to eat until 2 years	underweight/stunting/wasting	0.428/ 0.662/0.352
A mother be the primary feeder of the child	underweight/stunting/wasting	0.833/0.634/0.802
1-2 table spoonfuls adequate meal for a one-year	underweight/wasting	0.712/0.830
Flour mixes of *ndengu*/millet/ sorghum/maize/ beans and *omena* best for child's porridge	underweight/stunting/wasting	0.240/ 1.000/ 0.457
Fruits and vegetables are CF	underweight/stunting/wasting	0.703/1.000/1.000
Breast milk is adequate in proteins after 6 months	underweight/stunting/wasting	0.430/0.860/0.268
A child's main meal should be balanced	wasting	0.830

*Significant relationship $p<0.05$

Appendix VII: Research permit and authorizations:



PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/institution
Kimwele Angelica Mueni
of (Address) Kenyatta University
P.O.Box 43844-00100, Nairobi.
has been permitted to conduct research in

Location
District
Nairobi County

on the topic: Maternal knowledge on complementary feeding practices and nutritional status of children aged 6-23 months, attending Kahawa West Health Centre.

Applicant's Signature

PAGE 3

Research Permit No. NCST/RCD
Date of issue 22nd Jun
Fee received KSH. 1,00

Secr
National

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/012/49**

Date: **22nd June 2012**

Kimwele Angelica Mueni
Kenyatta University
P.O Box 43844
Nairobi

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Maternal knowledge on complementary feeding practices and nutritional status of children aged 6-23 months, attending Kahawa West health centre, Nairobi County"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for a period ending **31st July , 2012.**

You are advised to report to **the Provincial Director of Education ,the Provincial Commissioner and the Provincial Director of Medical Services, 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:

Provincial Director of Education

CITY COUNCIL OF NAIROBI

TOWN CLERK
FAX: 2217704
TELEPHONE: 2224281
Web: www.citycouncilofnairobi.go.ke

CITY HALL
P.O. BOX 30075 00100
NAIROBI
KENYA.

EXT ....

Ref No. PHD/1/13(16) ....

10TH JULY 2012

KIMWELE ANGELICA MUENI
KENYATTA UNIVERSITY
P O BOX 43844-00100
NAIROBI

RE: REQUEST TO CONDUCT RESEARCH IN KAHAWA WEST HEALTH CENTRE

The City Council of Nairobi has no objection to sharing information and offering assistance to you for your research. "Maternal Knowledge on Complementary Feeding Practices and Nutritional Status of Children aged 6-23 Months, Attending Kahawa West Health Centre".

Please note the following conditions

1. Pay research fee ksh. 5,000/= to the City Council of Nairobi
2. You will be expected to adhere to the rules and regulations pertaining to the City Council of Nairobi.
3. That you undertake to indemnify the Council against any claim that may arise from the above activity.
4. A copy of the findings from the research must be submitted to the office of the undersigned.

By copy of this letter the District Medical Officer of Health (Kasarani) shall offer necessary assistance.

DR. GATHONI GATEMBU
FOR: TOWN CLERK

CC: District Medical officers of Health - Kasarani

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: kuerc.chairman@ku.ac.ke
kuerc.secretary@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844
Nairobi, 00100
Tel: 8710901/12

Our Ref: KU/R/COMM/51/33-2

Date: June 7th, 2012

Kimwele Angelica Mueni,
Dpt. of Foods Nutrition and Dietics,
Kenyatta University
P.O. Box 43844, Nairobi.

Dear Ms. Angelica,

APPLICATION NUMBER **PKU/024/120** OF 2012 - 'Maternal Knowledge on Complementary Feeding Practices and Nutritional Status of Children Aged 6-23 Months, Attending Kahawa West Health Centre, Nairobi County'. Version 2.

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic 'Maternal Knowledge on Complementary Feeding Practices and Nutritional Status of Children Aged 6-23 Months, Attending Kahawa West Health Centre, Nairobi County', Version 2. Dated 4th June, 2012.

2. APPLICANT

Kimwele Angelica Mueni,
Dpt. of Foods Nutrition and Dietics,
Kenyatta University
P.O. Box 43844, Nairobi.

3. SITE

Kahawa West Health Centre, Nairobi County.

4. DECISION REACHED.

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines, and is of the view that against the following elements of review,

(i) Scientific design and conduct of study,

(ii) Recruitment of research participant,

(iii) Care and protection of research participants,

(iv) Protection of research participant's confidentiality,

(v) Informed consent process,

vi) Community considerations.

AND APPROVED that the research may proceed for a period of ONE year from 7th June, 2012.

5. ADVICE/CONDITIONS

i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.

ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.

iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.

iv. Submit a soft copy of the protocol to KU-ERC.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

PROF. NICHOLAS K. GIKONYO
CHAIRMAN ETHICS REVIEW COMMITTEE

I ...Kimwele Angeleco Mumi... accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of...7th June, 2012..... 2012.

cc. Vice-Chancellor
Director: Institute for Research Science and Technology

OFFICE OF THE PRESIDENT
PROVINCIAL ADMINISTRATION

Telegrams "DISTRICTER".....
Telephone: Nairobi.....
When replying please quote

DISTRICT COMMISSIONER
KASARANI DISTRICT
P.O BOX 30124
NAIROBI.

REF: KASD/HRM/3/6 (98)

DATE: 6th July, 2012,

Kimwele Angelica Mueni
Kenyatta University
P.O Box 43844
NAIROBI

RE: RESEARCH AUTHORIZATION.

You are hereby given authority to carry out research on **"Maternal knowledge on complementary feeding practices and nutritional status of children aged 6 – 23 months, attending Kahawa West Health Centre, Nairobi County"**

You are advised to report to the District Officer Githurai, in whose jurisdiction Kahawa West falls under, before embarking on the research project.

DISTRICT COMMISSIONER

E.N. MUIRURI
FOR: DISTRICT COMMISSIONER
KASARANI