ASSOCIATION BETWEEN HOUSEHOLD FOOD SECURITY AND INFANT FEEDING PRACTICES IN URBAN INFORMAL SETTLEMENTS IN NAIROBI COUNTY, KENYA

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DECLARATION

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

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DEDICATION

I dedicate this thesis to my husband, my children, my parents, family, friends and colleagues at the African Population and Health Research Center (APHRC) for their immence support in the course of my studies. I also dedicate it to future generation who will find the information hereby contained worth in their quest for knowledge.

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ABBREVIATIONS AND ACRONYMS

ACF	Action Against Hunger
AOR	Adjusted Odds Ratio
APHRC	African Population and Health Research Center
CF	Complementary Feeding
CSI	Coping Strategy Index
DALYS	Disability-Adjusted Life Years
DDS	Dietary Diversity Score
EBF	Exclusive Breastfeeding
FANTA	Food and Nutrition Technical Assistance
FAO	Food Agricultural Organization
IYCF	Infant and Young Child Feeding
KDHS	Kenya Demographic and Health Survey
KEMRI	Kenya Medical Research Institute
KNBS	Kenya National Bureau of Statistics
LOCF	Last Observation Carried Forward
MAD	Minimum Acceptable Diet
MCH	Maternal and Child Health
MIYCN	Maternal Infant and Young Child Nutrition
MoH	Ministry of Health
NUHDSS	Nairobi Urban Health and Demographic Surveillance System
UNICEF	United Nations International Children’s Fund
WHO	World Health Organization

DEFINITION OF TERMS

Low birth weight	Birth weight less than 2500g regardless of the gestation age which the baby is born (World Health Organization, 2010).
Normal birth weight	Birth weight between 2500g and 4000g regardless of the gestation age when the baby is born (World Health Organization, 2010).
Informal Settlements	Housing units that have been built and occupied illegally and hence have limited access to basic infrastructure and amenities including health, education, sanitation etc.
Complementary feeding	refers to the process starting when breast milk is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are introduced to the infant, along with breast milk.
Complementary feeding practices	includes the time children are introduced to solid and semi-solid foods or soft foods; frequency of feeding, dietary diversity; minimum acceptable diet

ABSTRACT

Despite various strategies to reduce child malnutrition and death, millions of children under five years of age die every year due to preventable causes. Appropriate infant and young child feeding (IYCF) practices play a major role in the healthy growth and development of children and helps reduce malnutrition and mortality. Studies in the urban informal settlements show widespread inappropriate infant and young child feeding (IYCF) practices and high rates of food insecurity. These together with the unique challenges with regards to child survival in these settings has led to widespread and persistent under-nutrition rates. This study assessed the association between household food security and IYCF practices in two urban informal settlements in Nairobi, Kenya. The study adopted a longitudinal study design that involved a census sample of 1500 children less than 12 months of age and their mothers aged between 14-49 years. A researcher-administered questionnaire was used to collect data on IYCF; household food security; and maternal demographic and socio-economic characteristics. Logistic regression was used to determine the association between food insecurity and IYFC practices. The findings showed high household food insecurity as only 19.5% of the households were food secure. Breastfeeding practices were comparable to the national rates as most of the children (84.2%) had been initiated to breastfeeding within one-hour of birth and were exclusive breastfed (60.4%). However, infant feeding practices were inappropriate as only 41% of the children attained a minimum dietary diversity; 76% attained minimum meal frequency and 27% attained minimum acceptable diet. With the exception of the minimum meal frequency, adjusted logistic regression findings showed that infants living in food secure households were significantly more likely to achieve appropriate infant feeding practices than those in food insecure households: minimum meal frequency (AOR 1.26, p= 0.530); minimum dietary diversity (AOR 1.84, p= 0.046) and minimum acceptable diet (AOR 2.35, p= 0.008). The findings of this study add to the body of knowledge by demonstrating an association between household food security and infant feeding practices in low-income settings. The findings imply that interventions aimed at improving infant feeding practices and ultimately nutritional status should consider a holistic approach to include improving household food security. The findings of this study provides evidenced-based information useful in decision making by programmes whose aim is to improve the nutrition status of children amongst the urban poor.

CHAPTER ONE: INTRODUCTION

1.0 Background to the study

Globally, malnutrition has persisted in all its forms, with children paying a high price. In 2020, over 149 million children under the age of five years were estimated to have been stunted while more than 45 million (6.7%) were wasted and nearly 39 million overweight (FAO, 2021). The report further reported that hunger affects 21% percent of the population in Africa with more than a third of the worlds (282 million) undernourished residing in Africa (FAO, 2021). The Eastern Africa burden of malnutrition among children aged under 5 years is also significant. The 2020 Global Nutrition Report reported a prevalence of stunting at 34.5% and wasting at 5.3%. In Kenya, malnutrition among children under five-years stood at 26% for stunting, 11% for underweight and 4% for wasting in 2014 (Kenya National Bureau of Statistics, 2015). The statistics improved from 2008 when wasting was at 7%, stunting at 35%, and underweight was at 16% (Kenya National Bureau of Statistics, 2015). In the urban informal settlements (UIS) levels of stunting have remained persistently high, higher than national levels according to studies carried out from 2008 to 2015, but levels for wasting and underweight are comparable to the national statistics. For instance, studies in Kibera found prevalence rates for stunting, underweight and wasting at 47%, 11.8% and 2.6 %, (Olack, 2011) and in Korogocho and Viwandani the prevalence rates were 46%, 11% and 2.5% (Kimani-Murage, 2015). A comparative assessment of health status in urban informal and non-urban informal settlements, as well as among populations in rural and urban areas of Kenya, Egypt, India and Bangladesh showed that children in urban informal settlements had poorer health outcomes compared to those in all other residential settings (Mberu, 2016).

Appropriate infant and young child feeding (IYCF) practices, including breast-feeding and complementary feeding, are critical in ensuring healthy growth and development among children, and helps reduce under-nutrition (Owais, 2016; WHO, 2015a). According to the 2013 Lancet series on Maternal and Child Nutrition, inadequate breastfeeding is a major contributor to in increased mortality risk in the first 2-years of age (Black, 2013b). According to UNICEF, appropriate breast-feeding practices comprise exclusive breast-feeding in the first six months after birth, a combination of breast milk and complementary solid foods after sixth month, and continued breastfeeding alongside providing suitable complementary solid foods for at least first two years of age and thereafter (UNICEF, 2019).

Non-adherence to WHO IYCF guidelines or sub-optimal infant feeding practices has been reported. In 2018 globally, only 42.2% of the children were exclusively breastfeed, 69.5% were timely introduced to solids, and semi-solid or soft foods, 53.1% were fed the minimum number of times per day while only 29.3% were given the minimum dietary diversity. This translated to only 18.9% of the children receiving a minimum acceptable diet (Global Nutrition Report, 2020). In Kenya's urban informal-settlements (Fotso, 2012; Korir, 2013) for instance, in Korogocho and Viwandani urban informal-settlements in Nairobi, only 2% of infants less than 6 months of age were exclusively breastfed (Kimani-Murage, 2011). A study conducted in Korogocho revealed that a relatively small proportion (15.4%) of children aged 6-23 months received a minimum acceptable diet in 2013 (Korir, 2013).

Food insecurity has been shown to influence the nutritional status of children through the quality and quantity of dietary taken (Mulu, 2017). Globally, food and nutrition insecurity

remain a major challenge. Nearly one tenth of the population went hungry in 2020 with close to 12% of the global population being severely food insecure. The Global Food Reports indicate that in Kenya, nearly a third (29.4%) of the population was undernourished between 2016 and 2018 (FAO, 2019). In Kenya's urban poor, only one household in five is food secure (Faye, 2011; Kimani-Murage, 2014a); which means that only a small proportion of the population has the necessary physical and economic ability to allow them access sufficient, safe and nutritious food to allow them meet their dietary needs and food preferences for an active and healthy life. In the urban informal settlements negative coping strategies are widely used to tackle food insecurity. These include strategies such as reducing the number of meals eaten in a day, compromising the quality and variety of food consumed, scavenging for food items regardless of safety, and consuming foods prepared in streets among others (Kimani-Murage, 2014a).

While household food insecurity is prevalent among the urban poor, studies linking IYCF practices and household food security in Kenya are few just like in many other parts of the world. This is despite that some evidence point to this linkage as revealed by a study in rural Bangladesh, which demonstrated an association between better household food security status and improved IYCF practices among children between three and six months old but was associated with improved IYCF practices after six months of age (Saha, 2008). Separate studies in Ghana and Bangladesh showed that children in food secure households stood a significantly better chance to attain a minimum acceptable diet compared to those in food insecure settings (Agbadi, 2017; Owais, 2016). In Kenya, there is paucity of data on the influence of household food security on IYCF practices. However, a study

conducted in Viwandani and Korogocho in Nairobi reported that maternal perception of food insecurity negatively affected breastfeeding (Kimani-Murage, 2014b).

The process of urbanisation is steadily growing across Africa with estimates showing 50 percent will be living in urban areas by 2030 (World Bank, 2015). With the increasing urbanization and natural growth, more households are likely to end up in slums given that about 72% of the urban population in Africa lives in slums (Garvelink, 2013). Urban informal settlements present unique challenges with regards to child health, nutrition and survival including lack of social amenities, high unemployment, overcrowding, insecurity and social fragmentation (African Population and Health Research Center, 2002, 2014; Lamba, 1994; Mberu, 2016). With the increasing urbanization, malnutrition and food insecurity in urban informal settlements is likely to increase unless there is effort to mitigate the problem. This emphasizes the need to investigate how household food insecurity among low-income urban dwellers influences infant feeding practices. Therefore, bridging the information gap on the association between IYCF practices and food insecurity in a local context is necessary to guide future interventions such as nutrition sensitive programming aimed at improving the nutrition and overall health of children in urban poor households.

1.2 Problem statement

Malnutrition causes an exponential decrease of the chances of survival per exposure to disease, within any given population. Among the urban poor, high stunting rates have been reported in children under five years (Olack, 2011). Many studies have been conducted on the consequences of food insecurity on the nutrition status of children. Globally, studies have reported a significant relationship between food insecurity and health and nutrition

status of children. Children in food insecure households generally experience ill health and are at an increased risk of being hospitalized due to ill-health. They are also of poorer nutritional status and are at increased risk of wasting, stunting and being underweight) (Chege, 2016; Gundersen, 2017; Kajjura, 2019; Onah, 2014; Osei, 2010; Saaka, 2013; Shamah-Levy, 2017). Studies carried out in urban informal settlements in Kenya have demonstrated the same linkage between IYCF practices and child nutritional status (Fotso, 2012; Korir, 2013; Mutisya, 2015). While household food insecurity is prevalent in these settings at 80% (Kimani-Murage, 2014a), few studies have investigated the association between IYCF practices and household food security. In Kenya, there is scarcity of research linking household food security on IYCF practices. A study conducted in Viwadani and Korogocho information settlements reported that breastfeeding is affected by maternal perception of food insecurity (Kimani-Murage, 2014b). This discovery highlights the need to investigate how household food insecurity among low-income urban residents affects infant feeding practices. As urbanization is taking place in Kenya, the issue of malnutrition and food insecurity in urban informal settlements is likely to escalate unless specific efforts are taken to mitigate the problem. To address the unique challenges facing urban informal settlements relating to child health, nutrition and survival, bridging the knowledge gap on how food insecurity and IYCF practices are associated in a local context is critical. This will be crucial in guiding potential interventions such as responsive strategies aimed at improving nutrition and overall health of children in poor urban informal settings.

1.3 Purpose of the study

The purpose of this study was to assess the association between household food security and infant feeding practices in the urban informal settlements of Korogocho and Viwandani in Nairobi County, Kenya.

1.4 Objectives of the study

1. To describe the socio-demographic and socio-economic characteristics of mothers aged between 14 and 49 years together with their children below one year in Korogocho and Viwandani urban informal settlements.
2. To establish the status of food security status among households with infants (0-11 months old) in the two urban informal settlements of Viwandani and Korogocho.
3. To establish infant feeding practices namely; exclusive breastfeeding; age of initiation of complementary feeding; dietary diversity; frequency of feeding and minimum acceptable diet among infants of Korogocho and Viwandani.
4. To assess the relationship between household food security and infant feeding practices in the urban informal settlements of Korogocho and Viwandani.

1.5 Hypotheses

H_{01}: There is no significant association between food security at household level and exclusive breastfeeding among infants in Korogocho and Viwandani urban informal settlements.

H_{02}: There is no significant association between food security at household level and age of initiation of complementary feeding among infants in Korogocho and Viwandani urban informal settlements.

H_{03}: There is no significant association between food security at household level and dietary diversity among infants in Korogocho and Viwandani urban informal settlements.

H_{04}: There is no significant association between food security at household level and frequency of feeding among infants in Korogocho and Viwandani urban informal settlements.

H_{05}: There is no significant association between food security at household level and minimum acceptable diet among infants in Korogocho and Viwandani urban informal settlements.

1.6 Significance of the study

The study has generated evidence that could guide interventions for alleviating child malnutrition in urban informal settlements situations and inform policy for decision-making for infant and young child nutrition or child health survival programmes. The study findings have also contributed to knowledge on the association between food security and IYCF practices. In addition, the mothers in the urban informal settlements are likely to benefit through interventions formulated as a result of the awareness generated by the study.

1.7 Delimitations of the study

This study focused on children 0-11 months of age in Viwandani and Korogocho informal settlements of Nairobi County and thus the research findings can only be generalized to areas with similar characteristics and children of same age group.

1.8 Limitation

The WHO (2010) IYCF indicators are for children 0-23 months but the study assessed infants 0-11 months old hence the findings can only be generalized for infants of this age category

1.9 Conceptual framework

The study adapted the UNICEF conceptual framework that depicts malnutrition as an outcome of various causes at different levels (UNICEF, 1990). In this conceptual framework, inadequate dietary intake is an immediate cause of malnutrition. Dietary intake is an underlying cause of malnutrition that comprises the status of household food security as well as the social and care environment. While access to health services is also included, it is not the focus of this study.

Food security is determined based on four components/pillars which are essentially the physical availability of food, the economic accessibility, adequate utilization and stability of these three components. The framework adapted for this study (Figure 1.1) concentrated on the association between the food accessibility component of food security and infant feeding practices using WHO indicators (WHO, 2011). This conceptual framework promotes a broader understanding of factors impacting on nutrition status and seeks to further understand the interconnectedness between food security and infant feeding practices.

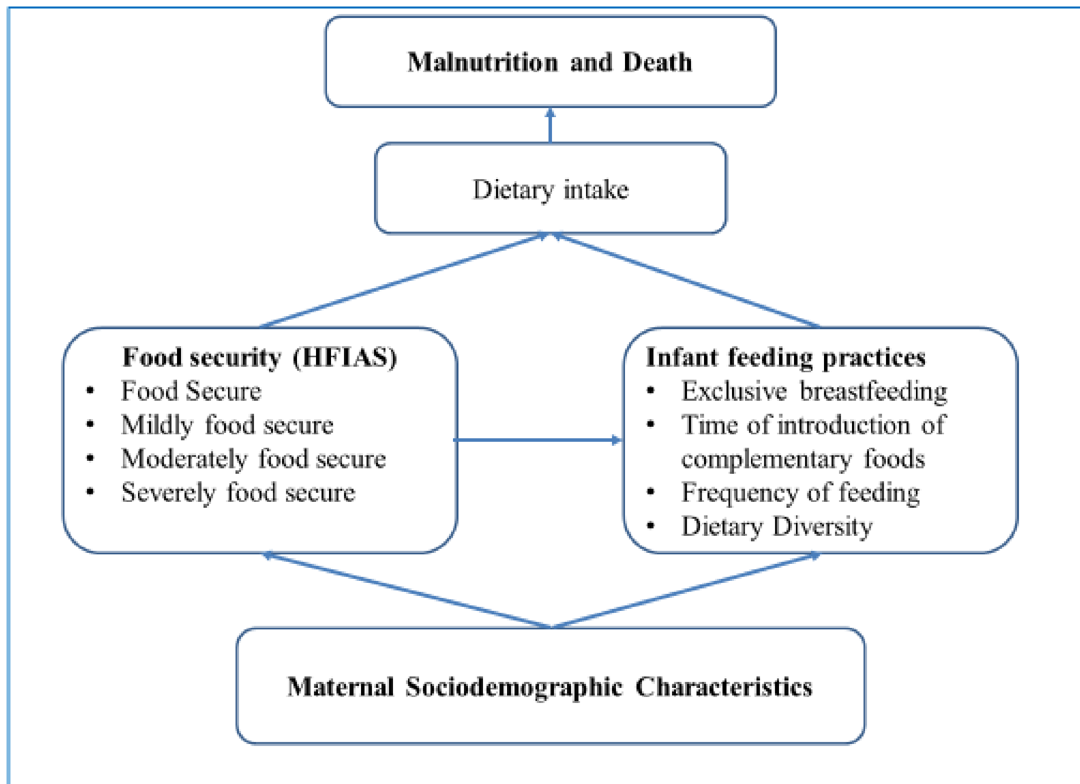

Figure 1.1: Conceptual framework for analysing the relationship between IYCF and food security adapted from (UNICEF, 1990) strategy for improved nutrition of children and women in developing countries.

CHAPTER TWO: LITERATURE REVIEW

2.1 Socio-demographic and socio-economic characteristics

Socio-economic status is a multi-factorial condition which is embedded in environmental, material and personal characteristics. Poverty and poor standards of living have been shown to considerably contribute to IYCF practices in Nairobi informal settlements (Faye, 2019; Kimani-Murage, 2011; Mutisya, 2015). The community or environment has also been shown to influence IYCF practices with factors such as prevalent street foods and poor sanitation enabling poor infant feeding habits (Goudet, 2016). The Nairobi urban informal settlements have been reported to have poor housing and are characterized by high poverty and unemployment (African Population and Health Research Center, 2014; Fotso, 2012). Maternal employment status, education level as well as socioeconomic status have all been shown to be associated with IYCF practices (Harvey, 2017; Kimani-Murage, 2011). The 2020 global nutrition report indicated that IYCF practices were substantially lower among children with less educated mothers (Global Nutrition Report, 2020). A study conducted in Kisumu in 2019 found that infant feeding practices did not always align with IYCF recommendations due to financial and employment barriers (Reynolds, 2021).

2.1 Infant and Young Child Feeding Practices

The infant feeding practices entails how, what and when infants are fed lays the foundation for their survival, growth, and development. WHO/UNICEF recommends that infants be put to breast within one hour of birth, breastfed exclusively for the first 6 months of life and should be allowed to continue breastfeeding until they are two years of age and beyond. From six months, breastfeeding should be complemented or combined with safe, age-appropriate nutritious solid, semi-solid and soft foods (WHO, 2021).

2.1.1 Breastfeeding practices

The 2013 Lancet Nutrition Series emphasizes the significance of optimal IYCF on child survival that is the importance of breastfeeding within an hour of birth, exclusively breastfeeding for the first six months of life, and continued breastfeeding for up-to two years. Through this, above 800,000 child lives could be saved every year (Black, 2013a). Optimal breastfeeding not only boosts the immune system leading to reduction of morbidity but provides optimal nutrition for infants which prevent growth faltering due to illnesses. It also leads to a higher performance in intelligence tests (Horta, 2010), enhances linear growth, can prevent up to 12% of all deaths and 10% of all morbidity especially diarrhoea and pneumonia among children aged below 5-years (Fisk, 2011). On long-term basis it lowers the chances of over-nutrition such as overweight and obesity as well as diabetes in later life (Horta, 2013). For the mother, breastfeeding prevents postpartum haemorrhage through the release of oxytocin (Mason, 2013); significantly reduces the risk of breast cancer (Awatef, 2010; González-Jiménez, 2014) and ovarian cancer (Luan, 2015).

EBF is recommended by WHO and UNICEF for the first 6 months of life - this means feeding a baby only on breast milk (including expressed breast milk), except for medications in form of syrups or drops, vitamins or mineral supplements (UNICEF, 2011). EBF is instrumental in reducing the risk of exposing a baby to life-threatening infectious diseases. Literature shows that non-breastfed infants are more likely to die from pneumonia (15 times) and and diarrhoea (11 times), compared to exclusively breastfed children (Black, 2008). In 2014, EBF rates were at 38% and 36% at global and in sub-Saharan Africa, respectively; all below the recommended WHO coverage target of 90% (UNICEF, 2014). In Kenya, the National Nutrition Action Plan 2012-2017 mainstreamed the promotion of

EBF as one of the priority nutrition interventions (Republic of Kenya, 2012). While this may have contributed to the significant improvement in EBF from 32% in 2008 to 61.4% in 2014 (Kenya National Bureau of Statistics, 2015), the rates in informal urban settlements remained low. Kimani-Murage et al., (2011) reported only 2% of the children in Korogocho and Viwandani slums were exclusively breastfeed while Ochola et al., (2013) found EBF rates of 15.6% among mothers on an intensive peer-counselling program for promoting breastfeeding compared to 3.2% for those not counselled in Kibera informal settlement (Ochola, 2013).

Breastfeeding provides key nutrients and energy beyond the first year of life (WHO, 2015c). Frequent breastfeeding is reported to be closely associated with greater linear growth of children, and in reducing the risk of morbidity and mortality in children (Muchabaiwa, 2018); may prevent dehydration in children recovering from infections, and provide continued protection against diarrhoea and respiratory infection (Victoria, 2000). Nationally,51% of children aged 20-23 months in Kenya are breastfed (Kenya National Bureau of Statistics, 2015) but in Korogocho urban informal settlements continued breastfeeding for children one year old was at 87.3% (Korir, 2013).

2.1.2 Complementary feeding practices

Complementary feeding (CF) is the process of introducing and giving other foods and liquids alongside breast milk when the later cannot sufficiently meet the nutritional requirements of infants alone (WHO, 2015b). The main indicators of complementary feeding are; time of initiation of giving complementary foods; frequency of feeding the complementary feeding and minimum acceptable diet (MAD) which is a composite

indicator that integrates appropriate frequency of feeding and MAD (WHO, 2007a) It is recommended that solid and semi-solid foods be introduced at the age of 6 months.

In order to ensure a child meets the minimum dietary diversity (MDD), children aged 6-23 months should be fed foods from four or more food groups out of seven possible groups daily. During this period the child should receive solid, semi-solid or soft food for a number of times in a day: two and three times, respectively, for children aged 6-8 months and 9-23 months who are breastfed; while non-breastfed children 6-23 months should be fed four times in a day (WHO, 2007a). However, this does not seem to be the case in the Kenyan context given that only two in ten children aged 6-23 months attain the minimum acceptable diet, a composite indicator that considers food diversity and frequency (Kenya National Bureau of Statistics, 2015).

Globally, studies demonstrate that a large proportion of children are not fed according to the global recommendations. In 2020, only one in four infants 6-8 months (27%) were receiving any solid foods, and when considering diet quantity and quality measures, the rates are much lower with only one in two children (48%) receiving meals at the recommended minimum meal frequency and one in three a minimum diet diversity 29% (WHO, 2021). In 2021, WHO reported that despite recommendation for children 6-23 months old to consume animal protein foods daily, only 36% of the global children were reported to be consuming eggs, fish and/or meat. In addition, disparities between poorer and wealthier households have remained the same with respect to minimum dietary diversity and widened for minimum meal frequency over the past decade (Global Nutrition Report, 2020; WHO, 2021). This implies poorer IYCF practices in the urban informal settlements (Global Nutrition Report, 2020; WHO, 2021). In Sub-Saharan Africa, UNICEF

(2015) reported a MAD rate of 10% while in Kenya DHS reports show 21% of the children consume the MAD (National Bureau of Statistics-Kenya, 2015; Samuels, 2020). The findings underscore the need to investigate factors associated with CF practices, including the role of food security at household level.

2.2 Household Food security

According to FAO, food security exists when all people at all times have access to adequate physical and economic access to sufficient, safe and nutritious food at all times to allow them meet their dietary needs and food preferences, for an active and healthy life (FAO, 2012). It has four pillars: availability; access; utilisation; and sustainability of the other three pillars. Food insecurity, which happens when food access to food is limited or uncertain drives households to adopt varying coping strategies to survive.

Globally, one in nine people is hungry or undernourished or over 820 million people faced hunger by 2019 as revealed by the state of Food Security and Nutrition in the World 2019 (FAO, 2021, 2019; Global Nutrition Report, 2020). Of concern is the fact that the number of undernourished people has been on the rise in Africa reaching almost 260 million in 2018, with more than 90 percent of them being in sub-Saharan Africa (FAO, 2019). Literature shows food insecurity exists among poor households in urban informal settlements in Kenya and elsewhere (Faye, 2011; Kimani-Murage, 2014a; Maitra, 2015). A study in north India reported 51% of households in underserved slums were food insecure (Agarwal, 2009). In Kenya’s urban poor, only one household in five is food secure according to Faye et al., (2011) and Kimani-Murage et al., (2014a). In Kenya’s urban informal settlements, food insecure households have low levels of income, limited sources of livelihoods, have bigger household sizes and higher dependency ratios (Kimani-Murage,

2014a), which is similar to findings by (Maitra, 2015) in India who reported associations between low income levels, education, gender, and household composition with household food security status.

2.2.1 Copies strategies

Food insecurity can be defined as limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways. Food insecurity has been documented to be characterized by regular behavioral responses that reflects vulnerability. This translates to coping strategies which are techniques that households apply to cope when the resources to acquire food are limited (Coates, 2007). Households at risk of food insecurity are known to plan strategically to minimize impact. Studies have been done worldwide to understand the experiences of households suffering from food insecurity. For instance, a study conducted in the urban slums of Delhi in 2015 observed coping strategies pertaining to compromising quality and quantity of food consumed to be the first step taken in order to mitigate the adverse effects of food shortage at the household level (Gupta, 2015). The study noted strategies such as relying on less expensive foods e.g., seasonal or locally available vegetables, limiting portion size of meals and reducing numbers of meals eaten in a day (Gupta, 2015). Another study in Ethiopia reported that when food supplies were insufficient, household members used coping strategies that compelled them to reduce the quality and quantity of foods. The report further stated that food insecure households were using coping strategies such as changing consumption patterns, eating inexpensive foods, reducing meal frequency and selling household assets, such as household food utensils (Asesefa Kisi, 2018).

The coping strategies used by the households can be seen as an expression of negotiated decisions to minimize the impact of food insecurity in the households with similar experiences also reported in Kenya's urban informal settlements. Studies conducted in Kenya's urban informal settlements noted that most residents eat for bare survival, with little concern for quality. In addition, the use of negative coping strategies to address food insecurity such as reducing the number of meals, reducing food variety and quality, scavenging, and eating street foods was prevalent (Faye, 2011; Kimani-Murage, 2014). As in other studies in the same setting, a multivariate analyses by APHRC identified factors associated with food security in the slum setting including level of income, source of livelihood, household size, dependence ratio; illness, perceived insecurity and location (Kimani-Murage, 2014).

2.3 Factors associated with infant feeding practices

Overall, studies show that infant feeding practices are influenced by various factors: maternal knowledge (Abasimi, 2014); marital status (Kimani-Murage, 2011); maternal socio-economic status (Rohner, 2013); child age (Joshi, 2012); sex of the child (Bork, 2013); maternal education level (Kimani-Murage, 2011); antenatal care (Bork, 2013); family and social influences (Andrew, 2011) among others. In urban informal settlements, sub-optimal infant feeding practices (breastfeeding and complementary feeding) have been associated with mothers' marital status, education level, place of delivery, livelihood sources, early and single motherhood, poor social and professional support, and knowledge on IYCF practices (Ayieko, 2011; Kimani-Murage, 2014b, 2011; Korir, 2013). Although the association between infant feeding practices and household food security has been understudied, (Lee, 2014) in Peruvian Amazon food insecurity was negatively associated

with the proportion of days a child was exclusively breastfed, and was also associated with a less timely (late) introduction of solid foods. Food security and its relationship with IYCF practices has not received attention in research.

2.4 Summary of literature review

Socio-economic characteristics have been shown to contribute to sub-optimal feeding practices especially among the urban poor. About 72% of the urban population in Africa lives in slums (Garvelink, 2013), which are characterized by food insecurity and poor IYCF practices. Studies have indicated a relationship between poor households and infant feeding practices. The 2020 Global Nutrition Report indicates that underweight persists in the poorest countries which impacts on feeding practices as the rates of introduction of solid, semi-solid or soft foods and minimum dietary diversity are substantially lower for children in the poorest households. With the increasing urbanization and natural growth, more households are likely to end up in slums aggravating the problem of food insecurity and inappropriate feeding practices among the poor in urban slums. There is food insecurity among households in urban informal settlements and suboptimal infant feeding practices. However, gaps exist on information on the association between household food security and infant feeding practices in urban informal settlements. Addressing this knowledge gap will contribute towards improving IYCF practices and thus improving the nutritional status of infants and young children in Kenya.

CHAPTER THREE: METHODOLOGY

3.1 Research design

This study adopted a longitudinal study design using quantitative methods in data collection, analysis and presentation. The study was nested within a broader study on Maternal Infant and Young Child Nutrition (MIYCN). The MIYCN study used a cluster randomized controlled study design whose main objective was to test the effectiveness of a home-based intervention on infant feeding practices, nutrition and health outcomes of infants born. The primary aim of the MIYCN study was to determine the change in the effect of the home-based interventions on exclusive breastfeeding. In the reported study, the researcher conceptualized and developed objectives relating to household food security and infant feeding practices.

3.2 Research variables and indicators

The outcome variables in this study were infant feeding practices measured using the WHO indicators (WHO, 2011) shown in Table 3.1 and 3.2. The indicators were: EBF for the first six months; time of initiation of complementary feeding; minimum dietary diversity, minimum frequency of feeding and minimum acceptable diet. The 24-hour recalls were employed to collect data on ccomplementary feeding practices. The main independent variable was food security at household level computed based on the Household Food Insecurity Access Score (HFIAS) method (Coates, 2007). Nine questions relating to three food insecurity (access) domains were relied upon to determine the score. The first question was on anxiety and uncertainty about the household food supply taking into consideration if there was worry that the household would not have enough food to eat; the second question focused on inadequate quality in terms of variety/diversity and food-type

preferences; and finally insufficient food intake which involved reducing the quantity of food as well as the number of meals (Coates, 2007).

Table 3.1: Independent variable

Outcomes	**Indicators**	**Measurement**
Food insecurity	Food Accessibility	Household Food Insecurity Access Scale (HFIAS) **Food secure:** The household experiences none of the conditions of food insecurity (access), or just experiences worry, but seldom. **Mildly food insecure:** The household worries about not getting enough food at times or regularly, and/or is unable to eat preferred foods, and/or consume a more monotonous diet than desired, and/or other foods deemed undesirable, though seldom. Yet it doesn't cut down on quantity or suffer any of the three most serious conditions (running out of food, going to bed hungry, or going out without eating all day and night). **Moderately food insecure**: The household compromises quality more often, by eating a monotonous diet or undesirable foods often, starts to cut back on quantity by reducing the number of meals or number of meals, rarely or occasionally. But it does not experience any of the three most severe conditions. **Severely food insecure:** The household has progressed to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely. A household that encounters one of these three conditions even once is considered severely food insecure.

Table 3.2: Dependent variables

Outcomes	Indicators	Measurement
Dependent variable: Infant feeding practices (Breastfeeding and complementary feeding practices		
Breastfeeding practices	Exclusive breastfeeding under 6 months	Proportion of infants 0–5 months of age who are fed on breastmilk alone
Complementary feeding practices	Correct or timely Introduction of solid, semi-solid or soft foods	Proportion of infants 6–8 months of who receive solid, semi-solid or soft foods
	Minimum dietary diversity	Proportion of children 6–11 months of who receive foods from at least 4 or more out of seven food groups
	Minimum meal frequency	Proportion of children aged 6–11 months who are breastfed and non-breastfed who received solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more • Breastfed children aged 6–11 months who received solid, semi-solid or soft foods the minimum number of times or more during the previous day • Non-breastfed children aged 6–11 months who received solid, semi-solid or soft foods or milk feeds the minimum number of times or more during the previous day
	Minimum acceptable diet	Proportion of children aged 6–11 months who received a minimum acceptable diet. Minimum acceptable diet considered those infants who received the minimum meal frequency and the minimum dietary diversity.

3.3 Study area

The broader MIYCN study was undertaken in Korogocho and Viwandani urban informal settlements of Nairobi, within the Nairobi Urban Health and Demographic Surveillance System (NUHDSS) by APHRC. The NUHDSS covered about 65,000 individuals in 24,000 households in the two urban informal settlements and involves a systematic collection of vital demographic information and events three times a year since 2003 (Beguy, 2015).

The two settlements have dense population and are characterized by poor housing, high levels of insecurity, high unemployment rates or dependency on informal unsustainable livelihoods, lack of critical infrastructure, poor availability and access to health services, as well as poor health indicators (Emina, 2011).

3.4 Target population

The study population was pregnant women 14 to 49 years in Korogocho and Viwandani and their respective children (once they were born).

3.4.1 Inclusion criteria

The inclusion criteria were mothers 14-49 years of age and their children aged 0-11 months once they were born.

3.4.2 Exclusion criteria

The study excluded mother-child pairs who dropped off before having any of the measures of infant feeding practices and infants suffering from chronic illnesses that contraindicate feeding practices were excluded from the study. The health status was based on the health records from health facilities.

3.5 Sample size determination

Sample size determination for this study was calculated taking into consideration the proportion of children with the exposure of interest (inappropriate IYCF practices) and its measure of association with food security from previous studies. The proportion of children who were exclusively breastfeed was 2% (Kimani-Murage, 2011a) and association with minimum acceptable diet of at least odds ratio of 3.0, power of 80% and a two-tailed alpha of 5%, a design effect of 1.2, a sample size of 1101 was established.

Sample size determination for the main MIYCN study was calculated considering the cluster randomised study design. A sample size (minimum) for both intervention and control was calculated based on the following: enough power (80%) to detect an increase in exclusive breast feeding at six months, and level of precision at five percent (two-sided t –test) (Chan, 2003). The study adjusted for expected intra-cluster correlation (ICC) using a design effect of 3.2 and a 20% potential attrition, which was based on experience from a previous research in the same area (Fotso, 2012). Exclusive breastfeeding rate of 2% (Kimani-Murage, 2011a) was used for the sample size calculation since it was the primary outcome of the study. A minimum sample size of 780 mother-child pairs was arrived at. The study targeted all pregnant mothers' eligible mothers during the recruitment period and their respective children. A total of 1500 mother-child pairs were recruited into the larger MIYCN study through census of all pregnant women. A total of 1500 mother-child pairs were recruited into the larger MIYCN study through a census of all pregnant women. This study targeted a census of all pregnant mothers who were eligible mothers during the recruitment period and their respective children as the number was higher than the sample size calculated.

3.6 Sampling techniques

All mother-child pairs who met the inclusion criteria and were willing to participate were recruited into the study. This was a census sample. The recruitment process was continuous from early pregnancy and on a rolling basis until the sample size was achieved. This was done through routine NUHDSS rounds and through use of antenatal care providers and community informants. The NHUDSS involved quarterly visits to all households with identified mothers that were eligible for recruitment. The antenatal care providers and

community informants supported the recruitment throughout on a rolling basis for a period of 15 months.

3.7 Research instruments

A researcher-administered structured questionnaire (Appendix II) was generated and administered at household level to collect data on food security and IYCF practices. The main information solicited on IYCF was on exclusive breastfeeding, age of initiation of complementary foods, dietary diversity and frequency of feeding using the WHO standard questionnaire and 24-hr recall period. Other aspects included information on household food security, morbidity, vaccination, maternal demographics, and socioeconomic characteristics.

3.8 Pre-testing of data collection tools

A pre-test of the questionnaire was conducted on 10 respondents during the field reconnaissance mission to ensure its validity and reliability. This was also meant to identify any problems with the questionnaire and to find possible solutions ahead of the data collection exercise. The pretesting was conducted in Mukuru Kayaba, an informal settlement neighbouring the study sites and with similar characteristics as Viwandani informal settlement. Consequently, adjustments were made where necessary. The process also oriented research assistants to the study concept.

3.8.1 Reliability and validity

Validity

The questionnaire was reviewed and validated by the supervisors who are experts in the subject of study as well as a panel of nutrition experts who ensured that the questions solicited the intended information.

Reliability

The Test-retest method was relied upon to test the consistency of the questionnaire in generating same results. Ten caregivers from another urban informal settlement that was not sampled as a study area were interviewed two times using the same questionnaire. A comparison was then made between the answers obtained from both interviews. A correlation coefficient of 0.7 was deemed acceptable as determined using Cronbach correlation formula (Cronbach, 2004).

3.9 Recruitment and training of research assistants

Ten research assistants with minimum KCSE level of education and conversant with the local area, were engaged and trained for five days. The training was conducted by the study team and included the study methodology, interview techniques and community entry behaviour. During the face-to-face training, the research assistants were also trained on research ethics.

3.10 Data collection techniques

A researcher-administered structured questionnaire was used to collect data on household food security at baseline and IYCF practices post-partum; morbidity, demographic information, and socioeconomic characteristics of involved mothers. Data on infant feeding practices were collected every two (2) months at the household level. Morbidity data were also collected every two months based on two weeks recall period.

3.11 Data analysis and presentation

Data management and analyses were undertaken using STATA 13.1. Descriptive statistics (frequencies and proportions) were used to summarize both the outcome of interest and the

independent variables. The association between food insecurity at household level and independent variables was tested based on Chi-square test for independence while Logistic regression models (bivariate and multivariate) was used to assess the association between food security and independent variables. All tests were done at 95% confidence level. The following variables were controlled for to allow for the identification of the relationship between an independent variable and a dependent variable in the multivariate analysis: marital status, religion, mother's age, parity, residence, mother's occupation, education level, household size, place of delivery, whether the household were in the intervention or control groups, sex and morbidity status of the index child.

The wealth index data used were from the NHUDSS where the MIYCN study was hosted. Wealth index was computed using principal component analysis, using key variables that assessed ownership of among 34 household infrastructure and amenities including number of rooms in the household, availability of water and sanitation facilities, and ownership of different household items. The resulting wealth index variable was categorized into five quintiles: Very poor, poor, medium, rich and very rich. This is a standard method used in Demographic and Health Surveys (DHS), and based on internationally agreed values.

Infant feeding Practices

Last observation was used to determine the breastfeeding practices. Among those who were lost due to follow-up, last observation carried forward (LOCF) was applied for those whose status as "not EBF" had been determined in the previous rounds of observation. For those whose status was not already established for any time point say two, four or six months (still exclusively breastfeeding in the last observation), LOCF was only used for the point that it was conclusively established but was not used for latter points.

The indicator for the correct timing of initiation of complementary feeding was the percentage of infants 6-8 months who ate solid or semi-solid foods. The minimum dietary diversity was determined based on the percentage of children below 12 months old who ate foods from a minimum of four food groups and the mean dietary score from the following seven groups of food (grains, roots and tubers; legumes and nuts; dairy products (milk, yogurt and cheese); flesh foods (meat, fish, poultry and liver/organ meats); eggs; vitamin A rich fruits and vegetables and other fruits and vegetables. Minimum meal frequency was established for the proportion of breastfed infants 6–11 months of age who received solid, semi-solid, or soft foods and for non-breastfed infants 6-11 months (but also received milk feeds). The indicator for minimum meal frequency is two (2) times for breastfed infants 6–8 months old, three (3) times for breastfed children 9–11 months old, and (four) 4 times for non-breastfed children 6–11 months old. Meals included both meals and snacks (other than trivial amounts less than 15gms).

Household food security

Household food security was calculated based on the nine food insecurity questions. A recall period of four weeks was considered when soliciting responses for each question. Three domains were taken into consideration for the responses ranging from never experienced conditions related to food insecurity, rarely experienceed them, and sometimes or often experiences them. Food secure households were considered as those that did not experience food insecurity or rarely experienced some worry. Mildly food insecure households were those that expressed some worry (though rarely) about not having enough food or were unable to eat their preferred foods, or ate a monotonous diet than what they desired, or ate some foods they did not consider desirable. Moderately food insecure

households were those that sacrificed quality more frequently, ate monotonous diets, sometimes or often ate undesirable foods, or were rarely/sometimes reducing on the quantity through a reduction in size or number of meals. Severely food insecure households often reduced the meal size or number of meals taken, and/or experienced at least one of these three severe conditions - going to bed hungry, running out of food or going a whole day and night without eating (Coates, 2007). Households were then categorized as food secure, mildly food insecure, moderately food insecure, or severely food insecure (Table 3.3).

Table 3.3: Categories of food insecurity (access)

Question	Frequency		
	Rarely 1	Sometimes 2	Often 3
1a	food secure	mildly food insecure	mildly food insecure
2a	mildly food insecure	mildly food insecure	mildly food insecure
3a	mildly food insecure	moderately food insecure	moderately food insecure
4a	mildly food insecure	moderately food insecure	moderately food insecure
5a	moderately food insecure	moderately food insecure	severely food insecure
6a	moderately food insecure	moderately food insecure	severely food insecure
7a	severely food insecure	severely food insecure	severely food insecure
8a	severely food insecure	severely food insecure	severely food insecure
9a	severely food insecure	severely food insecure	severely food insecure

- food secure
- moderately food insecure
- mildly food insecure
- severely food insecure

3.12 Logistical and ethical considerations

Ethical approval for the main MIYCN study was granted to APHRC by the Kenya Medical Research Institute (KEMRI) Ethics Review Committee after development of the MIYCN

study protocols (Appendix IV). Fundamental principles of research on human subjects were upheld by the investigators i.e., respect for persons, beneficence, and justice. Before any interviews were conducted, informed consent was sought from the respondents following full disclosure while proxy consent was sought from the mothers on behalf of the children. Access to collected data was only granted to members of the research team through use of passwords thereby maintaining confidentiality. In addition, approval and ethical clearance were sought and granted from Kenyatta University Graduate School and Kenyatta University Ethical Review Committee, respectively, given that the objectives of this thesis research were not part of the core tasks of the larger MIYCN study (Appendix V). The National Commission for Science, Technology, and Innovation (NACOSTI) granted the permission (through permit) to conduct this research (Appendix VI). Before the study commenced, community entry involved meeting with the chief to explain the objective of the study as well as with select community leaders representing the community to inform them about the project.

CHAPTER FOUR: RESULTS

4.1 Maternal demographic and socio-economic characteristics

A total of 1101 mothers were followed up from pregnancy until at least six months post-partum. The youngest mother was 14 and the oldest 45 years old, with most of the mothers (28.8%) were relatively young and less than 25 years of age. Majority of the mothers (83.7%) were either married or living with a partner and 82.1% had at least primary level of education. Most mothers were not involved in an income generating activity. In fact, the proportion of those who were working had declined compared to the baseline implying some had lost their livelihood opportunities.

Results further revealed that 39% of mothers had only one kid, 31.1% had two and the rest 30% had three or more. As per the wealth status, more (36.2%) were in the poorest category with only 33.6% being relatively better /least poor. This signals the poverty status characterizing the households in these informal settlements with possible implications on food security and child feeding practices. Table 4.1 summarizes the demographic and socio-economic characteristics of the sampled population.

Table 4.1: Maternal demographic socio-economic characteristics

Characteristics	**Options**	**Total (%) N (%)**
Total	N	1101(100%)
Mothers' age	• 14-21	317(28.8)
	• 21-25	344(31.2)
	• 25-30	272(24.7)
	• 30-46	168(15.3)
Marital status	• Not in a union	179(16.3)
	• In a union	922(83.7)
Religion	• Christian	1033(93.8)
	• Muslim	68(6.2)
Education	• Less than Primary	204(18.5)
	• Primary School	626(56.9)
	• Secondary School	271(24.6)
Parity	• 1	429(39)
	• 2	342(31.1)
	• 3+	330(30)
Mother's occupation at baseline	• Not working	791(71.8)
	• Working	310(28.2)
Mother's occupation at follow-up	• Not working	975(88.6)
	• Working	126(11.4)
Ethnicity of the participants	• Kikuyu	306(27.8)
	• Luhya	204(18.5)
	• Luo	184(16.7)
	• Kamba	271(19.7)
	• Other	190(17.3)
Place of delivery	• Home	51(4.6)
	• Health Facility	1016(92.3)
	• Missing	34(3.1)
Wealth Index	• Poorest	399(36.2)
	• Middle	333(30.2)
	• Least poor	370(33.6)
Child's Sex	• Male	569(51.7)
	• Female	532(48.3)

4.2 Child Morbidity

A total of 24.6% of all children were reported to have had at least one episode of either diarrhea, fever, cough, cough with rapid breathing two weeks prior to the study visit that occurred every two months. There was a higher prevalence of morbidity in older children (above six months). The results showed that 9.4% had fever while 15% had cough with a high number of cases being observed among children below six months. Only 3.97% of all observations reported cough associated with rapid breathing at least once during the follow-up period. Diarrhea occurred at least once in the two weeks recall period in 8.4% of the children with increased prevalence in older infants above six months. Seizures were reported to have occurred but only for 0.35% of the children.

4.3 Infant feeding practices

Most of the children (84.2%) had been initiated to breastfeeding within one-hour of birth and the EBF rate for 6 months was 60.4% (Table 4.2). Nearly all infants 6-8 months old (97%) had received solid, semi-solid or soft foods meaning that they were introduced to complementary meals in a timely manner. The majority (76.3%) of the children aged 6-11 months attained a minimum meal frequency hence only about a quarter of the children were not fed the minimum number of times daily. Forty one percent (41.0%) of children aged 6-11 months attained the minimum dietary diversity while approximately 27% achieved the minimum acceptable diet (Table 4.2) meaning about three-quarters of the children did not receive quality diet.

Table 4.2: Infant feeding practices

Indicator	n (%)
Timely initiation of breastfeeding (N=1101)	927(84.2)
Children ever breastfed (N=1101)	1100(99.9)
% EBF at 6 months (N=1101)	665(60.4)
Introduction of solid, semi-solid or soft foods (6-8 months old) (N=699)	678(97.0)
Minimum dietary diversity (6-11 months old) (N=737)	302(41.0)
Minimum meal frequency (6-11months old) (N=785)	606(77.2)
Minimum acceptable diet (6-11 months old) (N=785)	212(27.0)

Grains, roots, and tubers were consumed by 78.3% of the children, 26.1% consumed legumes and nuts while 62.6% consumed dairy products. The consumption of animal foods was low as only 22.4% consumed flesh foods and only 16.1% consumed eggs. Vitamin-A rich fruits and vegetables consumption was also not optimal as they were consumed by 52.7%. Only 39% consumed other fruits and vegetables (Figure 4.1).

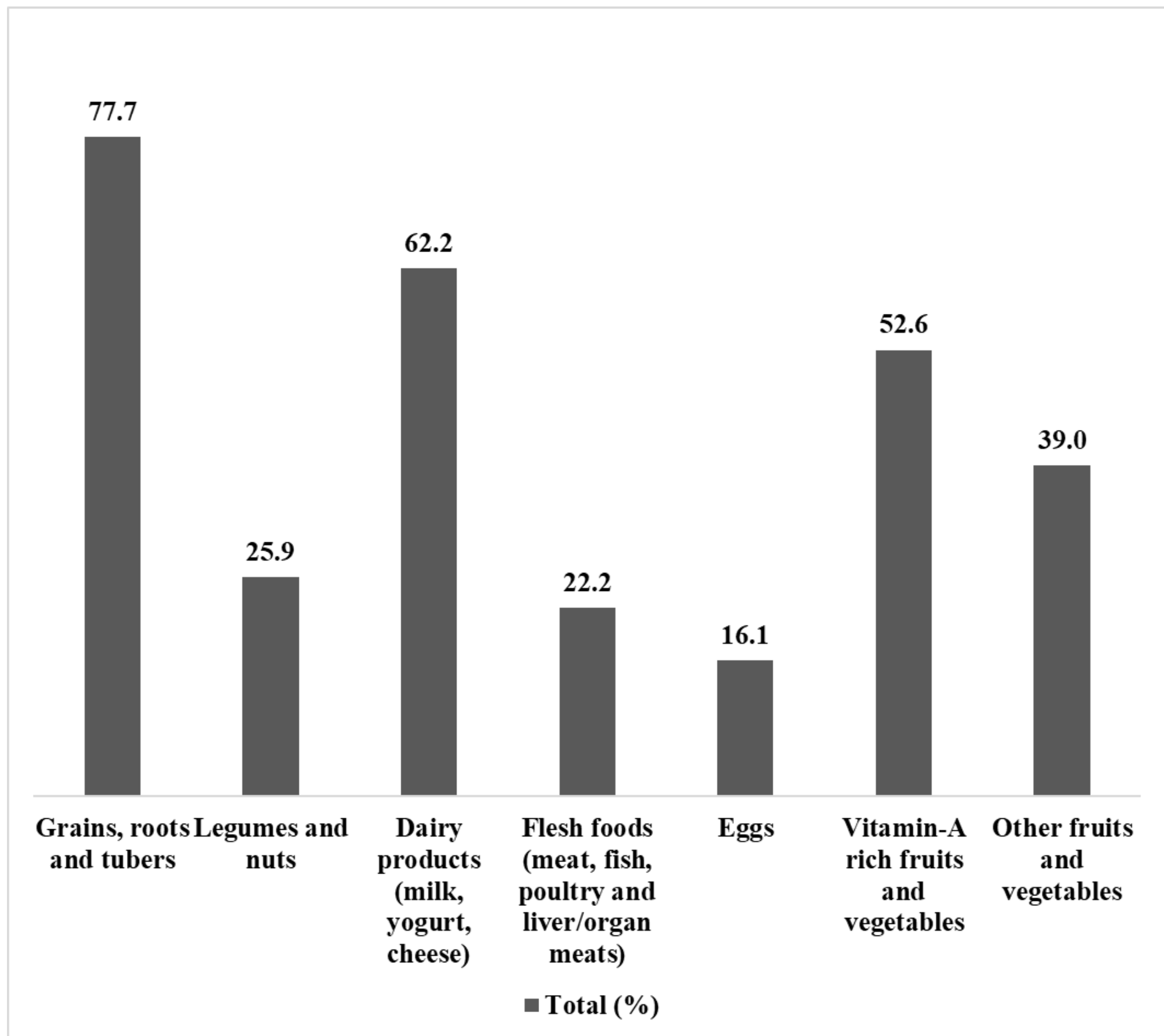

Figure 4.1: Food groups consumed

4.4 Household food security

A large percentage of households (80.5%) were food insecure (mildly, moderately, and severely food insecure) and only 19.5% of the households were food secure based on the Household Food Insecurity Access Scale HFIAS (Figure 4.2). The HFIAS have been used in several countries and are able to differentiate food secure from food insecure households even across different cultural contexts.

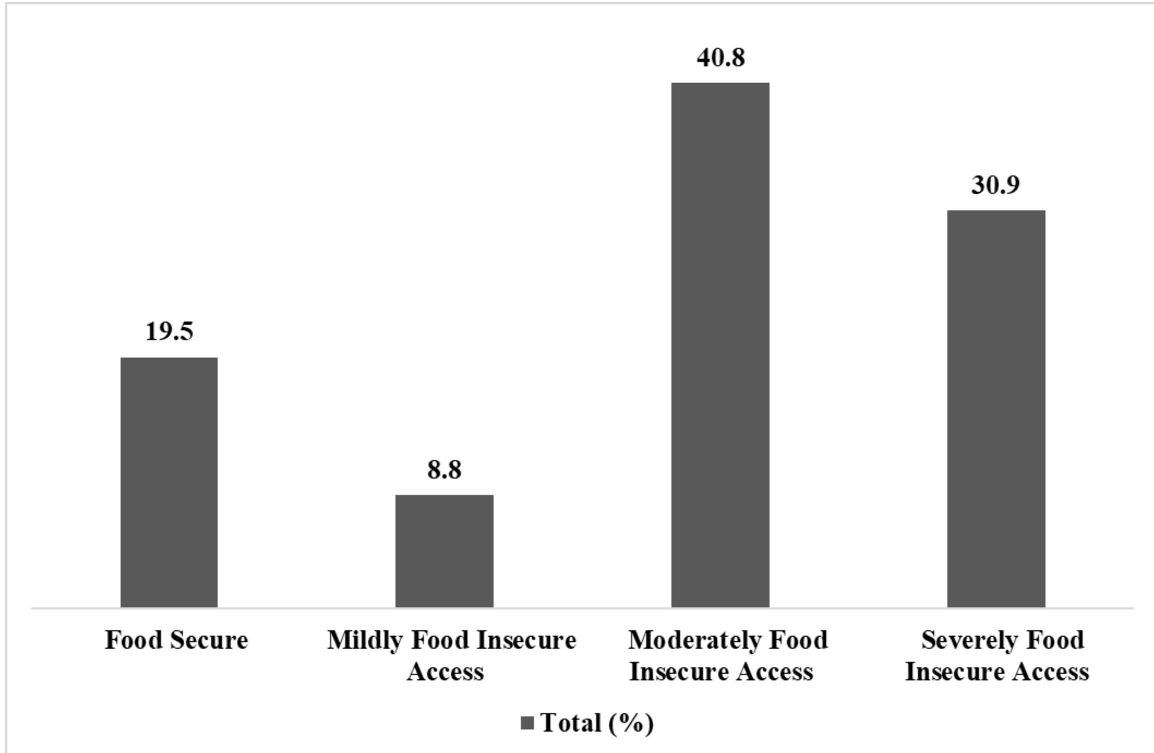

Figure 4. 2: Household food security status

4.4.1 Coping strategies

Households reported using various coping strategies in the four weeks preceding the interview due to household food insecurity. The most frequently used strategies related to not eating preferred foods and eating limited variety of foods whilst about 50% of the households reported that a member of the household ate fewer meals per day because food was not enough. Table 4.4 shows household food insecurity measures/indicators that were used to calculate the food security status (Figure 4.2).

Table 4.3: Household food insecurity access related conditions

Household food insecurity measure/ indicator (N=984)	Frequency	n (%)
Worry that household would not have enough food in the last four months	Never	46.5
	Rarely	17.4
	Sometimes	24.7
	Often	11.4
Household member not able to eat preferred food because of a lack of resources in the last four months	Never	30.5
	Rarely	18.4
	Sometimes	35.5
	Often	15.7
Household member had to eat a limited variety of foods due to lack of resources in the last four months	Never	35.3
	Rarely	18.4
	Sometimes	32.3
	Often	14.0
Household member ate food that was not preferred because of a lack in resources in the last four months	Never	30.9
	Rarely	20.8
	Sometimes	35.2
	Often	13.1
Household member ate a smaller meal because there was not enough food in the last four months	Never	45.3
	Rarely	22.2
	Sometimes	24.9
	Often	7.6
Household member ate fewer number of meals/day because food not enough in the last four months	Never	48.9
	Rarely	22.5
	Sometimes	22.0
	Often	6.7
There was no food in household because of lack resources in the last four months	Never	75.7
	Rarely	12.1
	Sometimes	10.6
	Often	1.6
Household member slept hungry because there was not enough food in the last four months	Never	84.9
	Rarely	9.4
	Sometimes	4.5
	Often	1.3
Household member went day & night without eating because food was not enough in the last four months	Never	91.7
	Rarely	5.2
	Sometimes	2.5
	Often	0.6
Total		**984**

4.5 Association between household food security and infant feeding practices

The socioeconomic status (SES), marital status, mother's age, religion, education, parity, ethnicity, health facility, birth weight, and morbidity were controlled in the analysis of the association between household food security and infant feeding practices. These factors were likely to influence infant feeding practices. Infants, less than 6 months of age living in food secure households were 104% (Adjusted Odds Ratio [AOR] 2.04, p= 0.019) significantly more likely to be exclusively breastfed up to six months of age compared to infants from households that are food insecure (Table 4.4).

The other factors associated with EBF were being in an intervention group. Those in an intervention group were 64% (AOR 1.64, p=0.032) significantly more likely to be exclusively breastfed than those in the control group. In addition, place of residence had a significant difference with those in Viwandani 87% less likely to exclusively breastfeed (AOR 0.13, p=0.000).

Table 4.4: Unadjusted and adjusted logistic regression for relationship between EBF and household food security

Household food security indicators	Aspect	Unad OR [95%CI	P-value	AOR [95%CI	P-value
Food security	• Food insecure	1.00 [1.00;1.00]		1.00 [1.00;1.00]	
	• Food secure	1.28 [0.87;1.87]	0.205	2.04 [1.13;3.71]	**0.019***
Sex	• Male	1.00 [1.00;1.00]		1.00 [1.00;1.00]	
	• Female	0.84 [0.62;1.12]	0.236	0.69 [0.44;1.07]	0.099
Intervention	• Control	1.00 [1.00;1.00]		1.00 [1.00;1.00]	
	• Intervention	1.02 [0.76;1.38]	0.883	1.64 [1.04;2.57]	0.032*
Mothers Occupation	• Not working	1.00 [1.00;1.00]		1.00 [1.00;1.00]	
	• Working	0.69 [0.50;0.95]	0.024	0.65 [0.39;1.07]	0.090
Place of residence	• Korogocho	1.00 [1.00;1.00]		1.00 [1.00;1.00]	
	• Viwandani	0.37 [0.27;0.51]	0.000	0.13 [0.06;0.29]	0.000*

AOR= Adjusted ODDS Ratio; unadOR= Unadjusted ODDS Ratio

**P<0.05=statistically significant*

Controlled for SES, Marital, Mother's age, religion, education, parity, ethnicity, health facility, birth weight. Morbidity

Infants living in food insecure households were 77% (AOR 0.23, p= 0.013) significantly less likely to be initiated timely to complementary feeding compared to infants from households that are food insecure (Table 4.5). In addition, the area of residence showed significant differences with infants from Viwandani being five times more likely to be initiated to complementary feeding on time (AOR 5.22, p= 0.011).

Table 4.5: Unadjusted and adjusted logistic regression for relationship between age of initiation of complimentary feeding and household food security

Factors	Aspect	unadOR [95%CI	P-value	AOR [95%CI	P-value
Food security	• Food insecure	1.00 [1.00;1.00]		1.00 [0.00;0.00]	
	• Food secure	0.62 [0.23;1.62]	0.328	0.23 [0.07;0.73]	**0.013***
Sex	• Male	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• Female	0.36 [0.14;0.94]	0.036	0.39 [0.13;1.13]	0.084
Place of residence	• Korogocho	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• Viwandani	5.81 [1.93;17.49]	0.002	5.22 [1.46;18.68]	0.011*

AOR= Adjusted ODDS Ratio; unadOR= Unadjusted ODDS Ratio
**P<0.05=statistically significant*
Controlled for intervention, marital, Mother's age, education, parity, occupation, health facility delivery

There was no significant association in the frequency of feeding between infants living in food secure households and food insecure households (Table 4.6)

Table 4.6: Unadjusted and adjusted logistic regression for relationship between frequency of feeding and household food security

Factors	Aspect	AOR [95%CI	P-value	unadOR [95%CI	P-value
Food security	• Food insecure	1.00 [1.00;1.00]		1.00 [0.00;0.00]	
	• Food secure	0.90 [0.59;1.40]	0.651	1.26 [0.61;2.58]	0.53
Birthweight	• wt<2501	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• wt>=2501	1.20 [0.64;2.27]	0.572	2.00 [0.88;4.55]	0.098
Intervention	• Control	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• Intervention	1.54 [1.08;2.20]	0.017	1.85 [1.10;3.11]	0.021*
Marital status	• Not in a union	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• In a union	0.87 [0.53;1.42]	0.581	0.49 [0.22;1.11]	0.086

AOR= Adjusted ODDS Ratio; unadOR= Unadjusted ODDS Ratio
**P<0.05=statistically significant*
Controlled for Sex, birth weight, intervention, SES, marital status, Mother age, religion, education, parity, occupation, ethnicity

Infants living in food secure households were 84% (AOR 1.84, p= 0.046) significantly more likely to have a diverse diet compared to infants from households that were food insecure (Table 4.7).

Table 4.7: Unadjusted and adjusted logistic regression for relationship between dietary diversity and household food security

Factors	Aspect	AOR [95%CI	P-value	unadOR [95%CI	P-value
Food security	• Food insecure	1.00 [1.00;1.00]		1.00 [0.00;0.00]	
	• Food secure	1.18 [0.80;1.74]	0.397	1.84 [1.01;3.35]	**0.046***
Health facility birth	• No	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• Yes	0.54 [0.25;1.13]	0.103	0.27 [0.06;1.14]	0.074
Place of residence	• Korogocho	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• Viwandani	0.62 [0.45;0.85]	0.003	0.42 [0.21;0.82]	0.011*

AOR= Adjusted ODDS Ratio; unadOR= Unadjusted ODDS Ratio

****P<0.05=statistically significant***

Controlled for birthweight, intervention, SES, marital age, religion, education, parity, occupation, ethnicity

Infants living in food secure households were 135% (AOR 2.35, p= 0.008) significantly more likely to have minimum acceptable diet compared to infants from food insecure households. In addition, infants who lived in Viwandani were 55% less likely to have a minimum acceptable diet (AOR 0.045, p= 0.030) (Table 4.8).

Table 4.8: Unadjusted and adjusted logistic regression for relationship between minimum acceptable diet and household food security

Factors	Aspect	unadOR [95%CI	P-value	AOR [95%CI	P-value
	• Food insecure	1.00 [1.00;1.00]		1.00 [0.00;0.00]	
Food security	• Food secure	1.11 [0.73;1.68]	0.626	2.35 [1.26;4.39]	**0.008***
Health facility birth	• No	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• Yes	0.63 [0.30;1.35]	0.235	0.28 [0.07;1.11]	0.070
Place of residence	• Korogocho	1.00 [0.00;0.00]		1.00 [0.00;0.00]	
	• Viwandani	0.84 [0.60;1.18]	0.312	0.45 [0.22;0.93]	0.030*

P<0.05=statistically significant

AOR= Adjusted ODDS Ratio; unadOR= Unadjusted ODDS Ratio

Controlled for Sex, birth weight, intervention, SES, marital status, Mother age, religion, education, parity, occupation, ethnicity

CHAPTER FIVE: DISCUSSIONS

5.1 Introduction

This study assessed the association between household food security and infant feeding practices in two urban informal settlements in Kenya. Although most studies on IYCF are conducted on children 0-23 months old, the study population for this study was infants 0-11 months. Nonetheless, the study focused on an age of children whose findings provide information for timely intervention in the 0-23 months window period.

5.2 Socio-demographic and economic characteristics of mothers of children

Most of the study participants were young, in union (married) and had attained at least primary school level of education. The findings are in agreement with those conducted in an urban slum in Kenya by Korir, 2013. This implies that the findings on marital status are in agreement with those from studies conducted in other urban informal settlements in Kenya (Kimani-Murage, 2011; Ochola, 2013). On the whole, most of the mothers were unemployed, which is in agreement with other studies in urban informal settlements in Kenya (Kimani-Murage, 2011; Korir, 2013). Studies in other parts of the world Studies in other parts of the world have also shown similar results. A study carried out in Nigeria in 2014 reported that maternal education, socioeconomic class, and educational attainment were all predictors of exclusive breastfeeding (Onah, 2014). Another 2018 study conducted in Morocco reported a significant relationship between EBF and education, maternal employment and socio-economic status. In Uganda, a study carried out in 2019 reported that maternal level of education was significantly associated with minimum meal frequency (Kajjura, 2019). The fact that most mothers had no means of earning and were in the poorest category signals the fact that most are unable to access adequate food for their

consumption and for appropriate child feeding practices. Efforts to improve their livelihood options would be of great benefit in improving both the household food security status and feeding practices of their children.

5.3 Feeding practices among children 0-11 months of age

As a whole, the findings revealed inappropriate feeding practices among the infants living in the limited resource settings.

5.3.1 Breastfeeding practices

Breastfeeding has many benefits for both the mother and child as it contains all the nutrients an infant needs in the first 6 months of life (WHO, 2016). Provision of mother's breast milk to infants within one hour of birth which is referred to as early initiation of breastfeeding was observed by most of the mothers at 84%. Early breastfeeding initiation ensures the baby is given colostrum which is rich in protective factors and therefore enhances the child's immunity.

The exclusive breastfeeding rate in this study (60.4%) was comparable to the national rate of 61% (KDHS 2014) and higher than the World Health Assembly's (WHA 2025) target of 50%. This is even though 40% of infants were not exclusively breastfed, and hence missed on the health benefits of the practice. EBF is particularly critical in the informal settlements as breastfeeding protects infants by decreasing their exposure to food- and waterborne pathogens and by improving their resistance to infections. The findings showed an increased EBF rates resulting from use of intervention-based counselling to improve EBF from 2% reported in 2011 by Kimani-Murage et al in 2011. Similar findings on the importance of home-based intervention in enhancing EBF was demonstrated in Kibera informal settlement in Nairobi, Kenya (Ochola 2013). In this study, the key lesson was

that consistent support of mothers to breastfeed through home-based personalized enhances the practice of EBF among mothers in informal settlements. This is partly because the community health volunteers are members of the society and can be trusted by women/mothers. The health workers are also more accessible than health facility health care providers.

5.3.2 Complementary feeding

In terms of complementary feeding, nearly all the children (97%) 6-8 months of age in this study had been introduced to solid, semi-solid or soft foods between six and eight months implying timely introduction of complementary feeding. This is a positive finding given that the infant‘s needs for energy and micronutrients start to exceed what is provided by breast milk at 6 months (WHO, 2007b). The finding is comparable to the rate of 100% found in a prior study in Korogocho informal settlement Nairobi (Korir, 2013), but higher than those reported in Ethiopia and India at 79.7% and 77.5% respectively (Mekbib, 2014; Rao, 2011). The discrepancies in the infant feeding practices in the various settings may be because of variations in socio-cultural practices, geographical location, policies and economic status. In addition, there may be better and more effective implementation of essential nutrition action towards the strengthening complementary feeding practices in the region. This may be contributed to by the fact that this was an intervention study that involved home based one-on one consistent MIYCN counselling every two months where individualized counselling is more effective than at the community level.

In the present study, the majority of the children (76.3%) attained the minimum meal frequency; this is similar to the KDHS report and other findings in informal settlements in Nairobi (Korir, 2013). However, the minimum meal frequency was higher than reported

in a study conducted in Ethiopia at 50% (Beyene, 2015); Ghana 57% (Saaka, 2016); and India 42% (Patel, 2012). The possible reasons for the differences in the findings of these studies could be the difference in socio-cultural beliefs and regional variations all of which can influence appropriate infant and young child feeding practices.

Less than 50% of the children achieved minimum dietary diversity, implying that while the majority received meals at the appropriate frequency, the meals were limited in the variety of foods consumed. This means that children are receiving low quality meals despite getting them at the recommended frequency. The findings were not exceptional as consumption of animal foods in Korogocho informal settlements was very low, with less than 25% of children having consumed flesh foods (meat, fish, poultry and liver/organ meats), and only 26.1% consumed eggs (Korir, 2013) other studies showing low animal food consumption include a study conducted in Ethiopia that reported rates as low as 8% (Demilew, 2017) as well as a study conducted in Kibera in 2015 (James, 2015).

The study found that most children aged 6-11 months (80%) consumed foods mainly comprised of starch (grains, roots, and tubers). This explains the low dietary diversity found, which may be attributed to the high poverty rates and limited income available to purchase high valued foods. Similarly, when households are faced by food inadequacy and not able to even provide these foods, they tend to adopt coping strategies such as reducing the variety of foods consumed, which lowers diet diversity. A study on coping strategies among urban poor in 2014 in Viwandani and Korogocho reported that food accounted for 52% of the total household expenditure, and the most frequently used coping strategy is reduction in food consumption (Amendah, 2014). The reduction may have also affected the consumption of a variety of foods by the children.

The minimum acceptable diet is a composite indicator comprising dietary diversity and feeding frequency by breastfeeding status and consumption of milk feeds for children who are not breastfed. The indicator provides a useful way to track progress and simultaneously improve the quality of children's diets. The low percentage of children who achieved the minimum acceptable diet implies the infants in this study were consuming a poor diet. The findings are comparable to those by Joshi et al in 2012 in rural India, and Korir in 2013 in Kenya in Nairobi informal settlement (Joshi, 2012; Korir, 2013). The rate in the current study is slightly higher than national rate reported for Kenya (21%) (Kenya National Bureau of Statistics, 2015).

5.4 Household food security status and infant feeding practices

Undernutrition is estimated to be associated with 2.7 million child deaths every year or 45 per cent of all child deaths (WHO, 2020). Adequate nutrition during infancy and early childhood is a key area to improve child survival and promote healthy growth and development through appropriate infant and young child feeding. The first two years of a child's life are especially critical, as adequate nutrition during this time reduces morbidity and mortality, reduces the risk of chronic disease, and generally promotes better child development. Inappropriate nutrition can also lead to childhood obesity which is a growing public health concern.

The findings reveal high prevalence of household food insecurity in informal settlements given that only 19.5% of the households were food secure based on HFIS standards. This implies that most households have poor consumption which also translates to poor nutrition among children. Food insecurity in urban informal settlements in Kenya and elsewhere is associated with socioeconomic status and has been widely published (Agarwal, 2009; Faye,

2011; Kimani-Murage, 2014a; Maitra, 2015), implying it is a common problem that faces informal settlements and may be a major contributor to malnutrition among children.

This study is one of the few that have investigated how household food security is associated with infant feeding practices in Kenyan urban informal settlements. The findings showed an association between infant feeding practices and food security, as infants living in food secure households were significantly more likely to achieve appropriate infant feeding practices than those in food insecure households. Similar findings have been reported in rural Bangladesh (Owais, 2016; Saha, 2008); rural Ghana (Agbadi, 2017); rural Tanzania (Hanselman, 2018); rural and urban India (Chandrasekhar, 2017).

This study focused on an age of children whose findings provide information for timely intervention in the 0-23 month's window period. The findings reveal high prevalence of household food insecurity implying that most households have poor consumption which also translates to poor nutrition among children. The findings showed an association between infant feeding practices and food security implying that persistent malnutrition among urban poor children could be related to food insecurity that consequently impacts on the infant feeding practices. The study findings found that there was indeed a significant association between household food security and exclusive breastfeeding, age of initiation of complementary foods, dietary diversity, and minimum acceptable diet and therefore the null hypotheses H_{01}, H_{O2}, H_{O3} and H_{O5} were rejected. However, there was no significant association between household food security and frequency of feeding among infants in the two urban informal settlements and therefore H_{O4} was not rejected.

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of findings

1. Most mothers were young, married and having attained primary education with the majority of them not being engaged in income generating activities.
2. Most mothers were from poor households. Lack of income and poor status is a major hinderance to accessing adequate food, adequate consumption and appropriate child feeding practices.
3. Majority of the children were exclusively breastfed and had been introduced to complementary feeding on time. The frequency of feeding of the children was appropriate but the dietary diversity of the meals was inadequate making many children not to attain the minimum acceptable diet.
4. Household food insecurity was high based on behavioral and psychological aspects of inadequate access to food. In turn households adopted various coping strategies to survive such as reducing the number of meals consumed or reducing food quality due to a lack of resources.
5. Household food security was significantly associated with various indicators of infant feeding practices (timely initiation of breastfeeding, exclusive breastfeeding, timely introduction of complementry feeding, minimum dietary diversity and minimum acceptable diet). The food secure households were more likely to feed their children appropriately/optimaly based on the indicators listed here.

6.2 Conclusions

In conclusion, the present study provided information that household food security is a major factor influencing infant feeding practices. Children from food insecure households were more likely not to be fed appropriately.

1. Considering that most mothers were unemployed and came from poor households, interventions should also include emphasis towards diversifying households and poverty reduction. The findings imply that interventions aimed at improving IYCF practices and consequently nutritional status need to take into consideration the issue of food security. This means that interventions to improve child nutritional status in resource-limited settings should consider multidisciplinary approaches engaging nutrition-sensitive interventions to improve household food security. Strengthening livelihood options and promoting safety net programs will go a long way in enhancing nutrition and food security among the most vulnerable population.
2. The fact that very few children attain the minimum acceptable diet due to poor dietary diversity implies the need for better diets. While nutritionists have focused on giving knowledge, there is limited emphasis on household food security. To improve complementary feeding practices, nutritionists need to also focus on food security issues particularly in informal settlements where food security is a major issue.
3. The study adds to the body of knowledge on infant feeding that household food security is associated with infant feeding practices in low-income settings of urban informal settlements. Given the high food insecurity and the significant association between household food security and various indicators of infant feeding practices, there is need for interventions to target food security status in the households.

4. There was significant relation between complementary feeding practices and the residence of households within which the child came from. Residents of Viwandani stand some chance of accessing wage labour/employment in neighbouring industries compared to those in Korogocho. This signifies the fact that strengthening the livelihood aspects, including income sources, through relevant initiatives and enhancing market functionality will be key to achieving the required food security and nutrition in urban informal settlements. Government and other stakeholders also need to consider social safety nets such as cash transfers for the urban poor as a strategy to alleviate food insecurity and nutrition related issues.

6.3 Recommendations

6.3.1 Recommendations for policy and practice

Policy

There is need to consider social safety nets and livelihood programming targeting the urban poor in efforts to enhance their access to income for food.

Practice

The Kenya Ministry of Health and other organizations working on child survival programmes in poor resource settings should integrate IYCF interventions with those that promote food security.

6.3.2 Recommendations for research

1. A longitudinal study should be conducted to track infant and young child feeding practices from birth to 23 months of age to assess variability, if any, in household food security and its effect on infant and young child feeding practices. The study recommends collection of data and monitoring of food security status of households at

regular intervals to understand its dynamics and how it influences child feeding practices.

2. A similar study to be carried out among the rural population and other urban settings to establish if food insecurity has the similar implications on infant and young child feeding practices in different contexts. Linkages between infant feeding practices and household food security has not been adequately investigated to provide information for programming.
3. A more in-depth study should be carried out to investigate how food insecurity status affect child feeding practices at different age categories (0-23, 24-59 months).

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APPENDICES

Appendix 1: Informed consent

Introduction

Hello. My name is Teresia Njoki, I am a student in Kenyatta University. I will be conducting research in Korogocho and Viwandani informal settlements to determine the association between household food security and infant feeding practices in urban informal settlements**.** Your participation in this study will help us understand perceived or real changes associated with the intervention. This will inform us better on designing effective nutrition interventions. We will then share what we have learned from this community with policy-makers and encourage them to make proper decisions that will help the people of these communities.

Explanation of procedures

Being part of this study involves participating in an interview that will take about 45 - 60 minutes. In the interview we will ask you questions regarding yourself, food security status, about your baby and what he/she is fed.

Confidentiality and Voluntary Participation

To enter in this study you have been randomly picked as a member of this community. The information that we collect in this research will be kept confidential. Your name will not appear on any reports or publications from this study. Your participation is **voluntary**, and if you choose not to participate, you will not be treated with prejudice. Please note that if at any point in time you feel you do not want to continue participating, you can withdraw freely. If at any point you feel uncomfortable about any of the questions, you do not have to answer them. You can skip the question or end the interview at any time.

Benefits

You will not get any material gift for participating in this study. The data collected from you will be useful in informing policy and interventions that would benefit your community/the community you serve as a whole.

Questions and Your Rights as a Participant

You have the right to ask, and have answered, any questions you may have about this research. If you have any questions or concerns about this study or the results you can ask me before or after the interview or you can contact me on **+254 020 400 1000**. If you have questions about your rights as a research participant, or concerns or complaints about the research, you may contact the Scientific Steering Committee Member on **+254 020 2722541**. **Do you have any questions now?**

Part II: Certificate of Consent/ Assent

1. **Participant's consent:**

Declaration of participant: I declare that the purpose and other details about the study have been given to me. I have also been given an opportunity to ask any questions I may have had and all such questions or inquiries have been answered to my satisfaction. I hereby give my consent to participate in this study. I understand that I will be given a signed copy of this document to keep.

Participant's Name_____________Signature__________________Date _______________

Day/month/year

Declaration by researcher: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Signature of researcher: _______________________________Date

Appendix II: Questionnaire

1.0	**BACKGROUND**
1.1	VILLAGE OF RESIDENCE (CODESHEET B5)
1.2	START TIME (24HRS)
1.3	FIELD WORKER'S CODE
1.4	DATE OF INTERVIEW (DD/MM/YYYY)
1.5	HOUSEHOLD HEAD NAME
1.6	HOUSEHOLD ID
1.7	MOTHER'S NAME
1.8	MOTHER'S ID
1.9	What is your marital status? (1=CURRENTLY MARRIED; 2=LIVING TOGETHER; 3=SEPARATED; 4=DIVORCED; 5=WIDOWED; 6=NEVER MARRIED)

1.10	What is your MAIN occupation?		
	FW: MAIN OCCUPATION OF THE MOTHER	Unestablished own business (Informal)	**01**
	CIRCLE ONLY ONE RESPONSE	Established own business (formal)	**02**
		Informal casual	**03**
		Informal salaried	**04**
		Formal salaried	**05**
		Formal casual	**06**
		Rural agriculture	**07**
		Unemployed	**08**
		Student	**09**
		Housewife	**10**
		Job Searching	**11**
		Urban agriculture	**12**
		Other	**96**
		Specify_____________________	

1.11	In the last 4 weeks have you worked for cash or payment in kind?	Yes	1
	FW: PROBE FOR WORK PAID IN BOTH CASH AND KIND	No	2

2	**DETAILS OF THE CHILD**	
2.1	CHILD'S NAME	
2.2	CHILD'S ID	
2.3	CHILD'S DATE OF BIRTH (DD/MM/YYYY)	
2.4	CHILD'S SEX (1=MALE; 2=FEMALE)	

3	**BREASTFEEDING AND CHILD FEEDING PRACTICES** **Now I would like to ask you a few questions about (NAME)'s feeding patterns**		
3.1	Is (NAME) still breastfeeding/ feeding on breast milk? **FW: BABIES FEEDING ON EXPRESSED MILK ARE CONSIDERED TO BE BREASTFEEDING**	Yes No	1 (skip to 3.3) 2
3.2	Why did (NAME) stop breastfeeding? **DO NOT PROMPT; CIRCLE THE (ONE) MOST IMPORTANT REASON IF MORE THAN ONE REASON IS GIVEN, PROBE FOR THE MOST IMPORTANT AND CIRCLE AS APPROPRIATE**	Baby ill/unable to suckle Baby refused to suckle Mother refused to breastfeed Spouse recommended Mother was very sick No/little breast milk Mother was away Baby was old enough to stop Advice by health professional Advice by other person Other (Specify____________) Don't Know	01 02 03 04 05 06 07 08 09 10 96 98
3.3	Do you think think you produce sufficient breastmilk to satisfy name?	Yes No	1 2
3.4	Apart from breast milk, has (NAME) been introduced to liquid or solid food?	Yes No Don't Know	1 2 (skip to 3.7) 8
3.5	At what age were these liquids/ solid foods introduced to (NAME) **RECORD AGE IN MONTHS. IF LESS THAN A MONTH, RECORD 00, IF DON'T KNOW RECORD 97**	Age in Months……	

3.6	Is (NAME) still being fed on these liquids/ foods?	Yes 1 No 2 Don't Know 8
3.7	If NO, why has (NAME) NOT been introduced to solid/liquid food?	Baby ill/unable to eat food 01 Mother refused to feed baby 02 Spouse advised 03 Baby too young 04 Adequate breast milk 05 Advice by health professional 06 Advice by other person 07 Mother lazy to prepare child food 08 Other (Specify)______________ 09 Don't Know 10
	Now I would like to ask you about liquids or foods that (NAME) had yesterday during the day or night. **I am interested to know whether (NAME) ate the item even if it was combined with other foods**	

		Yes	NO	DK
3.8	**Did (NAME) DRINK or EAT;**			
	Plain Water	1	2	8
	Commercially produced infant formula	1	2	8
	Milk such as tinned, powdered or fresh animal milk	1	2	8
	Tea or Coffee	1	2	8
	Any other liquids	1	2	8
	Any fortified baby foods like Cerelac	1	2	8
	Any (OTHER) porridge or Gruel	1	2	8

	Now I would like to ask you about other foods (NAME) ate over the last 24 hours. **I am interested to know whether (NAME) ate the item even if it was combined with other foods**	
3.9	(Ask respondent to recount foods consumed and record each mentioned under appropriate food group) **[INDICATE 1 FOR CONSUMED AND 2 FOR NOT CONSUMED]** Yesterday, did (NAME) eat (.) or any foods made from: a. **Grains/cereals** (Bread, Nyoyo or any other food made from millet, sorghum, maize, rice, ugali, porridge, mandazi, chapati)	☐
	b. **Roots and tubers** (potatoes, sweet potato, cassava, nduma or any foods made from roots)	☐

	c. **Legumes and nuts** (Beans, peas, nyoyo, ndengu, nuts seeds or other foods made from these)			☐
	d. **Dairy products** (yoghurt, cheese, sour milk [mala])			☐
	e. **Flesh foods** (meat, fish, poultry, pork and organ meats like liver, kidney)			☐
	f. **Eggs**			☐
	g. **Grean leafy Vegetables** (sukuma wiki, managu, terere, sucha, saga, mitoo, mrenda, pumpkin leaves, cabbage, sweet potato leaves, osuga, kunde, and other locally available leaves)			☐
	h. **Vitamin A rich (non-leafy) vegetables** (pumpkin, yellow yams, butternut, carrots or yellow sweet potatoes)			☐
	i. **Vitamin A rich fruits** (mango, pawpaw, guava)			☐
	j. **Other Fruits** (Orange, lemon (or other citrus fruits), pineapple, banana (including Matoke) etc			☐
	k. **Oils and fat** (Oils, fats or butter added to food/used for cooking)			☐
	l. **Sugar** (Sugar/honey added to food such as tea, porridge)			☐
	m. **Others** (Specify……………………………………………………………..)			☐
3.10	How many times did (NAME) eat solid, semisolid or soft foods yesterday during day **AND** night?		Number of times Don't Know	☐☐ 98
4	**CHILD MORBIDITY AND HEALTH SEEKING PRACTICES**			
4.1	**Now I am going to ask you about a few illnesses that (NAME) may have now or had in the last 2 wks.**			
	Has (NAME) been ill with any of the following illness at any time in the	a	b	c d e

	last two weeks? FW: RECORD FOR 1 =YES; 2 = NO; 8 = DON'T KNOW, IN THE BOXES	Fever / Diarrhea / Cough / Cough + Rapid Breath / Conv-ulsions ☐ ☐ ☐ ☐ ☐

FW: IF CHILD HAD COUGH, ASK IF IT WAS ACCOMPANIED BY RAPID BREATH

FW: ASK THE FOLLOWING QUESTIONS FOR EACH OF THE ILLNESSES THE CHILD HAD. IF THE CHILD HAD COUGH AND RAPID BREATH, ASK THE QUESTIONS FOR THE COUGH +RAPID BREATH (AS OPPOSED TO COUGH ALONE). IF THE CHILD HAS NOT HAD ANY OF THE ILLNESSES SKIP **TO 7.15.**

NB: a = FEVER b = DIARRHEA c = COUGH d = COUGH + RAPID BREATH e = CONVULSIONS

4.2	For how many days has (NAME) been ill/ was ill with (NAME OF ILLNESS)? RECORD NUMBER OF DAYS IN BOXES PROVIDED. IF UNKNOWN, OR RESPONDENT IS UNSURE, RECORD '98' IN THE BOXES OTHERWISE RECORD '99 IF THERE WAS NO ILLNESS.	a Fever ☐☐ b Diarrhoea ☐☐ c Cough ☐☐ d Cough + Rapid Breath ☐☐ e Convulsions ☐☐
4.3	During (NAME)'s illness, did he/she feed more than usual, about the same, less than usual? 1 = More than usual; 2 = about the same; 3 = Less than usual	a b c d e ☐ ☐ ☐ ☐ ☐ Other (specify)________________________
4.4	During (NAME)'s illness, did he/she take liquids/ fluids more than usual, about the same, less than usual? 1 = More than usual; 2 = about the same; 3 = Less than usual 4 = None 8 = Don't Know; 9 = N/A	a b c d e ☐ ☐ ☐ ☐ ☐
4.5	Apart from the illness I have talked about, does/ did (NAME) have any other illness in the last 14 days? CIRCLE 1 =YES, 2 = NO, 8 = DON'T KNOW IF "1" RECORD CODE OF ILLNESS IN THE BOX IF MORE THAN ONE ILLNESS, PROBE AND RECORD THE MOST SERIOUS ILLNESS.	YES………….. 1 MOST SERIOUS ILLNESS NO………….. 2 DON'T KNOW 98 Other 96 Specify__________________________
5.0	**HOUSE HOLD FOOD SECURITY**	

Now I would like to ask you a few questions about food: sources, cost, consumption

5.1	In last 4 weeks, what was the **main** source of food for your household? **[CIRCLE THE APPROPRIATE RESPONSES]**	Purchase from market (raw) Purchase from street vendors/kiosks (cooked) Own production Borrow/relief food/ safetynets Discarded food (from dump sites, market etc) Other(specify……………………………)	01 02 03 04 05 96
5.2	How many meals did you consume yesterday (day and night)? **[FW: PROBE TO EXCLUDE TEA ALONE; IF TEA WAS SERVED WITH SOMETHING ELSE LIKE BREAD, THEN INCLUDE]**	Number of meals (no tea alone)	
5.3	Did you eat cooked food purchased from the streets Yesterday?	YES NO	01 02
5.4	How many meals did children (aged <15 years) in your household eat Yesterday? **[FW: PROBE TO EXCLUDE TEA ALONE]**	**FW: If NO CHILDREN IN THE HH skip to Q4.10** Number	
5.5	Did children eat cooked food purchased from the streets Yesterday?	YES NO	01 02
5.6	In the past 4 weeks, did you worry that your household would NOT have enough food? How often? 0=Never 1=Rarely (once or twice in the last 4 weeks) 2=Sometimes (Once or twice every week… or 3 to 10 times in the last 4 weeks,) 3=Often (more than twice a week in the last 4 weeks… or more than 10 times in the last 4 weeks) **[CIRCLE THE APPROPRIATE RESPONSE]**		0 1 2 3
5.70	In the past 4 weeks, were you or any household member NOT able to eat the kinds of food you preferred because of a lack of resources? How often?		

0=Never | 0
1=Rarely (once or twice in the last 4 weeks) | 1
2=Sometimes (Once or twice every week... or 3 to 10 times in the last 4 weeks,) | 2
3=Often (more than twice a week in the last 4 weeks... or more than 10 times in the last 4 weeks) | 3

[CIRCLE THE APPROPRIATE RESPONSE]

5.8 In the past 4 weeks, did you or any household member have to eat a limited variety of foods due to lack of resources?

0=Never | 0
1=Rarely (once or twice in the last 4 weeks) | 1
2=Sometimes (Once or twice every week... or 3 to 10 times in the last 4 weeks,) | 2
3=Often (more than twice a week in the last 4 weeks... or more than 10 times in the last 4 weeks) | 3

[CIRCLE THE APPROPRIATE RESPONSE]

5.9 In the past 4 weeks, did you or any household member eat food that you preferred not to eat becaı a lack of resources to obtain other types of food?

0=Never | 0
1=Rarely (once or twice in the last 4 weeks) | 1
2=Sometimes (Once or twice every week... or 3 to 10 times in the last 4 weeks,) | 2
3=Often (more than twice a week in the last 4 weeks... or more than 10 times in the last 4 weeks) | 3

[CIRCLE THE APPROPRIATE RESPONSE]

5.10 In the past 4 weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was NOT enough food?

0=Never | 0
1=Rarely (once or twice in the last 4 weeks) | 1
2=Sometimes (Once or twice every week... or 3 to 10 times in the last 4 weeks,) | 2
3=Often (more than twice a week in the last 4 weeks... or more than 10 times in the last 4 weeks) | 3

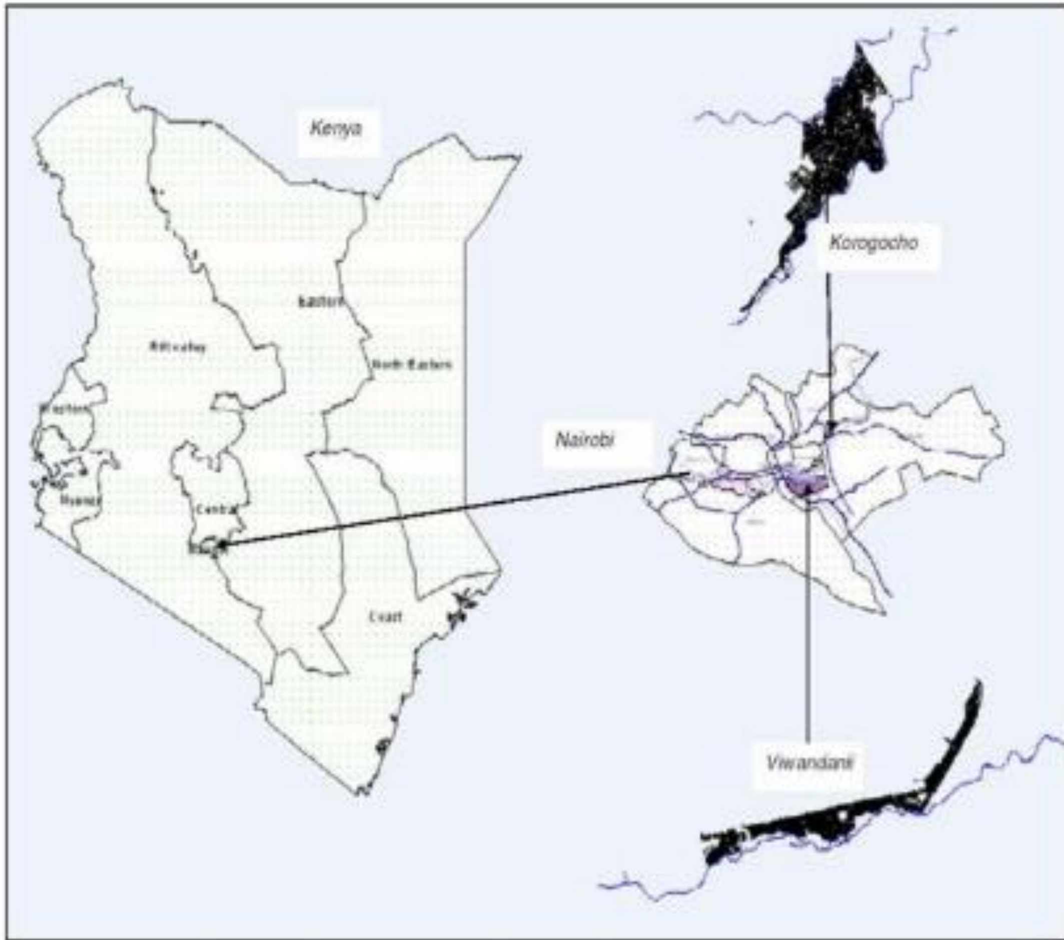
[CIRCLE THE APPROPRIATE RESPONSE]

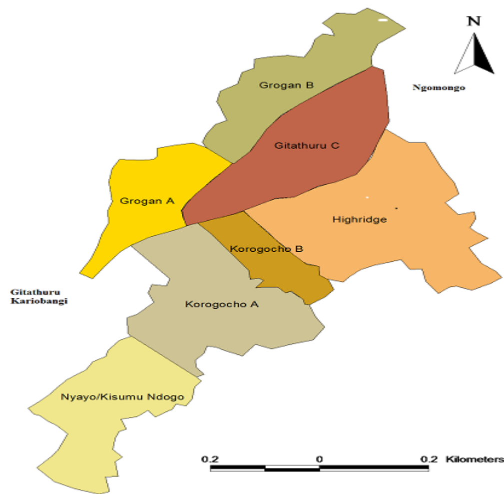
5.11 In the past 4 weeks, did you or any household member have to eat fewer numbers of meals in a day because there was NOT enough food?

0=Never | 0
1=Rarely (once or twice in the last 4 weeks) | 1
2=Sometimes (Once or twice every week... or 3 to 10 times in the last 4 weeks,) | 2
3=Often (more than twice a week in the last 4 weeks... or more than 10 times in the last 4 weeks) | 3

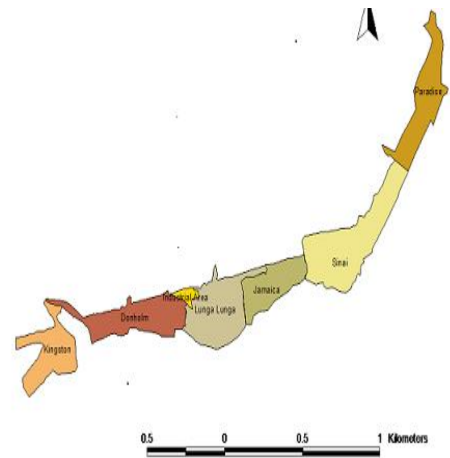
	[CIRCLE THE APPROPRIATE RESPONSE]	
5.12	In the past 4 weeks, was there ever NO food of any kind to eat in your household because of lack of resources to get food? How Often?	
	0=Never	0
	1=Rarely (once or twice in the last 4 weeks)	1
	2=Sometimes (Once or twice every week... or 3 to 10 times in the last 4 weeks,)	2
	3=Often (more than twice a week in the last 4 weeks... or more than 10 times in the last 4 weeks)	3
	[CIRCLE THE APPROPRIATE RESPONSE]	
5.13	In the past 4 weeks, did you or any household member go to sleep at night hungry because there was NOT enough food? How often?	
	0=Never	0
	1=Rarely (once or twice in the last 4 weeks)	1
	2=Sometimes (Once or twice every week... or 3 to 10 times in the last 4 weeks,)	2
	3=Often (more than twice a week in the last 4 weeks... or more than 10 times in the last 4 weeks)	3
	[CIRCLE THE APPROPRIATE RESPONSE]	
5.14	In the past 4 weeks, did you or any household member go a whole day and night without eating anything because there was NOT enough food?	
	0=Never	0
	1=Rarely (once or twice in the last 4 weeks)	1
	2=Sometimes (Once or twice every week... or 3 to 10 times in the last 4 weeks,)	2
	3=Often (more than twice a week in the last 4 weeks... or more than 10 times in the last 4 weeks)	3
	[CIRCLE THE APPROPRIATE RESPONSE]	
6.0	ENDINGS	
	END TIME (24 HRS)	
3.1	RECORD ANY GENERAL COMMENTS ………………………………………………………………………………………………. ……………………………………………………………………………………………….	

Appendix III: Study sites





Korogocho



Viwandani

Appendix IV: Kemri ethical approval

KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org info@kemri.org Website:www.kemri.org

KEMRI/RES/7/3/1 **11th June, 2015**

TO: **DR. ELIZABETH KIMANI (PRINCIPAL INVESTIGATOR)**
APHRC,
P.O. BOX 10787-00100,
NAIROBI, KENYA

Dear Madam,

RE: **NON-SSC PROTOCOL NO. 327 (*REQUEST FOR ANNUAL RENEWAL AND PROTOCOL DEVIATION)* EFFECTIVENESS OF COMMUNITY BASED NUTRITIONAL COUNSELING ON INFANT FEEDING PRACTICES.**

Thank you for the continuing review report for the period **18th March 2014** to **17th March 2015** and a protocol deviation on late submission of the application.

This is to inform that during the 240th A meeting of the KEMRI Scientific and Ethics Review Committee held on 9th June 2015, the Committee **conducted the annual review and approved** the above referenced application for another year.

The Committee also noted that a protocol deviation form has been submitted, as the request for annual renewal was done after the expiration date of the last approval. The measures taken to prevent this from recurring in the future are satisfactory.

This approval is valid from **June 9, 2015** through to **June 8, 2016**. Please note that authorization to conduct this study will automatically expire on **June 8, 2016.** If you plan to continue with data collection or analysis beyond this date please submit an application for continuing approval to the **SERU** by **27th April 2016.**

You are required to submit any amendments to this protocol and other information pertinent to human participation in this study to the SERU for review prior to initiation.

You may continue with the study.

Yours faithfully,

PROF. ELIZABETH BUKUSI,
ACTING HEAD,
KEMRI/SCIENTIFIC AND ETHICS REVIEW UNIT

In Search of Better Health

Appendix V: Kenyatta university ethical approval

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Email: chairman.kuerc@ku.ac.ke
secretary.kuerc@ku.ac.ke
ercku2008@gmail.com
Website: www.ku.ac.ke

P. O. Box 43844 - 00100 Nairobi
Tel: 8710901/12
Fax: 8711242/8711575

Our Ref: KU/R/COMM/51/793

Date: 30th August, 2016

Macharia Teresia Njoki
Kenyatta University
P.O. Box 43844 – 00100
NAIROBI

Dear Teresia

APPLICATION NUMBER PKU/542/I635 – "ASSOCIATION BETWEEN HOUSEHOLD FOOD SECURITY AND INFANT FEEDING PRACTICES IN URBAN INFORMAL SETTLEMENTS IN NAIROBI COUNTY, KENYA"

1. IDENTIFICATION OF PROTOCOL
The application before the committee is with a research topic, "ASSOCIATION BETWEEN HOUSEHOLD FOOD SECURITY AND INFANT FEEDING PRACTICES IN URBAN INFORMAL SETTLEMENTS IN NAIROBI COUNTY, KENYA" received on 21ST June, 2016.

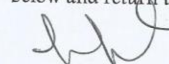
2. APPLICANT
Macharia Teresia Njoki

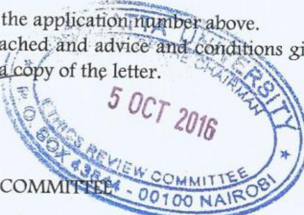
3. SITE
Nairobi County, Kenya

4. DECISION
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 APPROVED that the research may proceed for a period of ONE year from 30th August, 2016.

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 an electronic copy of the protocol to KUERC.

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.





DR. TITUS KAHIGA
CHAIRMAN ETHICS REVIEW COMMITTEE

I ..TERESIA..N..MACHARIA.accept the advice given and will fulfill the conditions therein.

Signature.......................... Dated this day of.........05/10............... 2016.

cc. Vice-Chancellor
DVC-Research Innovation and Outreach

Appendix VI: NACOSTI authorisation

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471, 2241349,3310571,2219420
Fax:+254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

NACOSTI/P/17/50179/11953

Date:

6th March, 2017

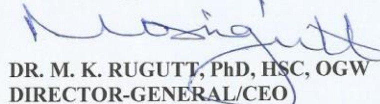
Teresia Njoki Macharia
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Association between household food security and infant feeding practices in urban informal settlements in Nairobi County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **6th March, 2018.**

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** 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, OGW
DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

The County Director of Education
Nairobi County.

National Commission for Science, Technology and Innovation is ISO 9001:2008 Certified

Appendix VII: Approval to use APHRC data

A global center of excellence, consistently generating and delivering relevant scientific evidence for policy and action in Africa

Elizabeth Kimani-Murage (PhD)
Research Scientist
African Population & Health Research Center (APHRC)
P.O. Box 10787, 00100,
Nairobi Kenya
Tel: +254 (020) 4001000
Cell: +254-724-322193
Email: ekimani@aphrc.org

04.12.2015

Teresia Njoki Macharia,
Kenyatta University

Dear Teresia,

Re: Data Request Approval

As the Principal Investigator and Project Manager for APHRC's Maternal Infant and Young Child Nutrition (MIYCN) project in Viwandani and Korogocho slums, I write to confirm that APHRC has approved your request to use the data from the project for your Maters thesis focusing on food security and infant feeding practices under Kenyatta University. Please see attached the signed data request form.

If you need any further assistance, please do not hesitate to let me know.

Yours Faithfully,

Kimani

Dr. Elizabeth Kimani-Murage
Research Scientist
African Population & Health Research Center (APHRC)