

**INFANT FEEDING OPTIONS AND THEIR IMPLICATIONS ON  
NUTRITIONAL STATUS OF CHILDREN 0- 6 MONTHS BORN  
TO HIV POSITIVE MOTHERS IN NAIROBI SLUMS.**

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**(BED. FOOD SCIENCE & NUTRITION)**

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN  
APPLIED HUMAN NUTRITION OF THE UNIVERSITY OF NAIROBI**

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## DECLARATION

I, Beatrice W. Mungai, hereby declare that this Dissertation is my original work and has not been presented for a degree in any other University.

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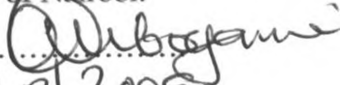
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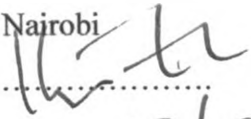
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## **DEDICATION**

Dedicated to my loving and supportive family whose encouragement and moral support has enabled me to accomplish my goal.

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## **ABBREVIATIONS AND ACRONYMS**

<b>AFASS:</b>	Affordable, Feasible, Available, Safe, and Sustainable
<b>AIDS</b>	Acquired Immunodeficiency Syndrome
<b>ART</b>	Antiretroviral Treatment
<b>FANTA</b>	Food And Nutrition Technical Assistance
<b>GIT</b>	Gastro Intestinal Tract
<b>HIV</b>	Human Immunodeficiency Virus
<b>JAMA</b>	Journal of American Medical Association
<b>KDHS</b>	Kenya Demographic and Health Survey
<b>MOH</b>	Ministry of Health
<b>MTCT</b>	Mother to Child Transmission
<b>NASCOP</b>	National AIDS and STI Control Programme
<b>NCHS</b>	National Centre of Health Statistics
<b>PMTCT</b>	Prevention of Mother to Child Transmission
<b>RDA</b>	Recommended Daily allowance
<b>SD</b>	Standard Deviation
<b>SPSS</b>	Statistical Package for Social Sciences
<b>TBA</b>	Traditional Birth Attendant
<b>UNAIDS</b>	United Nations Programme for HIV and AIDS
<b>UNICEF</b>	United Nation Children's Fund
<b>WHO</b>	World Health Organization
<b>MPND</b>	Ministry of Planning and National Development

## **OPERATIONAL DEFINITION OF TERMS**

**AFASS:** Affordable, Feasible, Accessible, Sustainable, and safe (terms referring to the conditions that should be in place for replacement feeding as recommended by WHO).

**CD4 cell count:** Number of CD4 cells in the blood and reflects state of the immune system, normal count is between 600 and 1200 cells/mm<sup>3</sup>, count less than 200 cells/mm<sup>3</sup> indicate that the risk of opportunistic infection is very high.

**Cessation of breastfeeding:** Completely stopping of breastfeeding.

**Commercial infant formula:** a breast milk substitute formulated industrially to satisfy the nutritional requirements for the infant first months of life.

**Exclusive breastfeeding:** Feeding of infant with only breast milk and no other fluids not even water, with exception to medicine and vitamins or mineral supplements

**Exclusive replacement:** Exclusive replacement feeding refers to feeding an infant who is receiving no breast milk with a diet that provides all the nutrients the infant needs during the first six months of life.

**Focus Group Discussion:** Discussion among a group of participants (8-12), guided by a moderator and focuses on a specified topic. It was used in research methodology as a tool for qualitative data collection.

**Home modified animal milk:** A breast milk substitute prepared at home from fresh or processed animal milk suitably diluted with water and with addition of sugar and micro-nutrients.

**Human Immunodeficiency Virus (HIV):** The virus that causes AIDS.

**Iatrogenic transmission of HIV:** Transmission of HIV, which has resulted from some medical, or nursing interventions like: blood transfusion/ blood component therapy, organ, or tissue transplantation, contamination through equipment used during invasive procedures and by HIV-infected workers.

**Infant:** A child who is 0-6 months old (for purpose of this study).

**Mixed feeding:** Feeding an infant with both breast milk and other foods, solid or liquid.

**MTCT:** Transmission of HIV to a child from an HIV infected-woman during pregnancy, delivery or breast-feeding.

**Puree:** Blended semi-solid food prepared from ripe fruits or cooked vegetables used as a replacement food for an infant.

**Recommended Dietary Allowance:** These are levels of intake of essential nutrients considered to be adequate to meet the known nutritional needs of practically all healthy persons.

**Slum:** A very densely populated part of a city normally characterized by lack of basic amenities including sanitary facilities and infrastructure

**Surrogate Breastfeeding:** Breast feeding of an infant by somebody else other than the infant's mother.

**Viral Load:** the amount of HIV in the blood of a HIV positive person

## **ABSTRACT**

Children born to HIV positive mothers are at risk of infection by the virus during pregnancy, delivery and/ or breastfeeding. Without any intervention, the risk of infection to the infants is about 15% through breastfeeding. In addition, infants born without the virus might have compromised nutritional status due to inadequate maternal energy intake resulting from increased needs from HIV. Therefore, such children require proper feeding to improve their health. The recommended feeding practices for infants born to HIV positive mothers is exclusive breastfeeding for the first six months of life, or exclusive replacement feeding with a diet that provides all the nutrients an infant needs during the first six months of life. The objective of this study was to determine the implications of feeding options used by HIV positive mothers in Nairobi slums on nutritional status of their infants (0-6 months old).

A cross sectional study was carried out in Mathare and Korogocho slums in Nairobi during the months of July to October 2007. This was a Health facility/ HIV support centre based study involving 175 HIV positive mothers and their infants aged 0-6 months. Using a pre-tested structured questionnaire and focus group discussions, data were collected on socio-economic and demographic characteristics of the mothers, feeding practices and feeding options, immunization and morbidity status of the infants. Anthropometric measurements of all the infants were taken for nutritional status assessment, while a 24-hr dietary intake recall method was employed on a randomly selected sub-sample of thirty two infants. Data management, entry and analysis was done using SPSS version 12, Microsoft Excel and Epi-info Version 6.

The study identified three feeding options, exclusive breastfeeding, and replacement feeding and mixed feeding employed by the HIV positive mothers. Those practising exclusive replacement feeding, used infant formula (60%), cow milk (11%), and porridge (7.2%), puree (mashed ripe fruits or cooked vegetables) (3.3%) and combination of two or more of the above foods (18.5%). The high percentage of mothers using infant formula was due to availability of the formula through donations. The mothers practising exclusive breastfeeding were mainly those who had no access to donated infant formula and could not afford replacement foods. Others practised exclusive breastfeeding feeding to avoid stigma. Those practising mixed feeding did it due to social pressure to breastfeed or to avoid stigma.

Majority of the infants (64.6%) had normal weight for age, 24.6% were between mild and moderate underweight while 10.8% were between mild and moderate over weight. Most of the infants who were moderately underweight were on mixed feeding, while infants on exclusive breastfeeding had higher cases of mild underweight compared to those on replacement feeding. All cases of overweight were associated with exclusive replacement feeding. The type of feeding option employed by the mothers contributed significantly ( $P= 0.003$ ) to the nutritional status of the infants.

Majority of infants on replacement feeding had adequate daily intake of protein (84.4%), vitamin (81.3 %), iron (65.6%) and energy (62.5%). The energy intake among underweight infants was significantly lower ( $p=0.009$ ) than that of infants with normal weight.



The study concludes that exclusive replacement feeding is the most commonly used feeding option among HIV positive mothers in Nairobi slums due to convenience and accessibility through donated infant formula .Infants on replacement feeding have better nutritional status compared to those on exclusive breastfeeding and mixed feeding. However, there is tendency for infants on replacement feeding option to be obese. Therefore, choice of feeding option determines the nutritional status of the infants. However, reliance on donated infant formula among mothers choosing exclusive replacement feeding is not sustainable hence the study recommends a national wide inclusion measures to improve social economic status of the mothers from resource limited settings and access to low cost replacement infant feed. These should also include stepping up of efforts by the government and Non-government bodies to improve sanitation and access to clean water for safe replacement feeding.

## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background of the study**

Recognized in 1981, HIV/AIDS has become today a global pandemic of concern. The latest update shows that the number of people living with HIV /AID globally by the year 2007 was between 30.6 million and 36.1 million (UNAIDS 2008). Sub Sahara Africa is the most affected by the HIV pandemic and two thirds of all people living with HIV are found in the region. In Kenya, it is estimated that between 100,000 and 160,000 people died of HIV in 2007. On average, HIV/AIDS prevalence is higher in Urban than in rural areas with young women being more vulnerable than their male counterparts (UNAIDS, 2008). This implies a higher risk of Mother-To-Child-Transmission (MTCT) of the virus since those mostly affected are women of reproductive age.

The number of children living with HIV/ AIDS globally by 2007 was estimated to be between 1.9 million and 2.4 million and those who died from HIV/AIDS infection in the same year were between 270,000 and 320,000 ( UNAIDS 2008). The fact that HIV can be transmitted from mother to child through breastfeeding has been a challenge especially in developing countries where breastfeeding is the norm. MTCT can occur during pregnancy, delivery and breastfeeding. Mother-To- Child-Transmission of the virus is responsible for more than 90% of infection in children. Of those infants who are infected through Mother to Child Transmission, it is believed that about two-thirds are infected during pregnancy and around the time of delivery, and about one third are infected through breastfeeding. Transmission during delivery and breastfeeding up to two years is

responsible of one third to one half of HIV infection in infants and young children, and therefore early cessation of breastfeeding is recommended (WHO/UNICEF 2003).

In situations where breastfeeding is likely to be a channel for HIV transmission from a mother to the child, replacement feeding is usually recommended. However, replacement feeding is not considered appropriate when affordability, feasibility, accessibility, sustainability and safety (AFASS) criteria of infant feeding options are not met. It is in this perspective that the WHO has recommended different options of infant feeding for mothers who are HIV positive but still promote and support breastfeeding as the best and most suitable feeding option for HIV negative mothers and those who do not know their HIV status ( WHO, 2003a).

In Kenya, efforts to prevent MTCT of the virus are made through training and provision of resources to health workers to equip them with knowledge and skills to effectively carry out HIV counselling and testing, and infant-feeding counselling. Several Health service providers have been trained in PMTC and have more access to counselling guide manuals and tools. Voluntary HIV counselling and testing is accessible to the mothers and there is improved access to antiretroviral drugs in government hospitals. The choice of infant feeding option depends on the HIV positive mothers after getting appropriate information from Prevention of Mother –Child- Transmission efforts (MOH, 2007)

In resource limited settings, choice of an appropriate infant feeding option can be a challenge to mothers. This study therefore aimed at identifying infant feeding options among HIV positive mothers, factors associated with the choice of the options and the implications on their infants nutritional status.

## **1.2 Statement of the problem**

It is estimated that 30% to 40% of babies born to HIV positive mothers in Kenya could be infected with the HIV virus if there is no intervention. Children born of HIV infected mothers are more at risk of malnutrition and reduced birth weight due to intrauterine growth retardation as a result of mother's lower energy intake compared to increased needs from HIV. Those infants who are infected with HIV need even greater care because their immune system is weak and those with compromised nutritional status require for proper feeding practices (CBS, 2003).

In an ideal situation it would be prudent to advocate for exclusive replacement feeding for the HIV positive mothers but appropriate replacement feeding is a challenge to resource poor communities. Infant formula and modified animal milk which are the recommended replacement feeds are expensive and might be out of reach for low income families. Lack of safe clean water to mix with commercial or home- prepared milk formula, limited supplies of fuel for boiling water and generally poor environmental sanitation may be a problem for safe replacement feeding.

The decision not to breastfeed has its own social risks, including stigma which at times carries grave social, emotional and physical consequences. In an attempt to minimize risks to their infants, yet hide their HIV status, infected mothers may combine breastfeeding with replacement feeding which expose the infants to higher risk of infection (Piwoz and Preble, 2001).

Based on this background, there is need to identify the type of feeding options among HIV positive mothers in limited resource settings, the challenges they face in choice of the option and the implications of these choices on the nutritional status of their infants.

### **1.3 Aim of the study**

To contribute towards improvement of infant feeding, reduction of risk of mother to child transmission and lower morbidity and mortality rate among infants born of HIV positive mothers.

### **1.4 Purpose of the study**

The purpose of this study was to highlight the infant feeding challenges faced by HIV positive mothers living in limited resource urban settings.

### **1.5 Justification of the study**

The HIV/AIDS epidemic is resulting in an increasing number of infants becoming infected each year, and in many developing countries HIV/AIDS has become a major cause of infant mortality. It is estimated that the number of people living with HIV in Kenya by 2004 were 1.4 million and the number of children was 100,000. Majority of the children got infected through MTCT. The HIV epidemic in Kenya has resulted in 30%

increase in mortality among infants and young children. Thus the AIDS epidemic is rapidly reversing the gains in child survival accrued through child survival programmes (MOH, 2005 a).

HIV and AIDS programme contributed to decline of HIV prevalence from 5.9% in 2005 to 5.1% in 2006 but the prevalence increased in 2007 to 7.8% (NASCO, 2008).

By 2007, the estimated number of adults and children living with HIV/AIDS in Kenya had increased to between 1.5 and 2.0 million (UNAIDS 2008)

While some research has been carried out on infant feeding practices among HIV positive mothers, there has been less focus on resource limited settings like the slums where the mothers are facing bigger challenges on choice of appropriate feeding option due to their meagre resources.

Although recommendations on feeding options of infants born to HIV positive mothers have been given all over the world, MTCT of HIV is still rampant among HIV positive mothers in the developing countries in addition to high morbidity and mortality rates among infants (FANTA 2001). It is against this background that this study was undertaken with the aim of contributing to PMTCT and improved nutritional status as well as reduced morbidity and mortality among infants born to HIV positive mothers.

## **1.6 Objectives of the study**

### **1.6.1 Main objective**

The general objective of the study was to identify the infant feeding options, factors associated with their choice and the implications on the nutritional status of infants born of HIV positive mothers living in urban slums.

### **1.6.2 Specific objectives**

- a) To determine the household social- economic and demographic characteristics of the HIV positive mothers.
- b) To identify the infant feeding options practiced by HIV positive mothers for their infant aged 0 to 6 months.
- c) To establish the factors associated with the choice of infant feeding options by HIV positive mothers.
- d) To assess dietary intake of infants who may be on replacement feeding option.
- e) To determine the nutritional status of the infants born of HIV positive mothers.

## **1.7 Hypotheses**

There is significant association between the type of infant feeding option and the nutritional status of the infants.

### **1.7.1 Research questions**

- a) What are the household characteristics of the selected HIV positive mothers?
- b) What are the infant feeding options adopted by HIV positive mothers?
- c) What are the factors associated with the choice of infant feeding options by HIV positive mothers?
- d) What is the relationship between the mothers' socio-economic status and infants' nutritional status?
- e) Is there a relationship between infants' nutritional status and the feeding option?
- f) Do the foods used in replacement feeding option provide adequate nutrients (Energy, Protein, Vitamin A, and Iron)?

### **1.8 limitations**

Due to difficulties in identifying HIV positive mothers at community level, only HIV positive mothers receiving services from a public health facility and HIV support centre were included in the study as they had accepted their HIV status. Therefore, those not visiting these facilities at that time were not included.



## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

Human Immune Deficiency (HIV) is a retrovirus which attacks and impairs the body's natural defence system against disease and other infection. The immune system weakens and CD4 cell (T-lymphocyte cells which fight infection in the body) count decreases leading to opportunistic infection from other viruses, bacteria and parasites. The CD4 cell count is the number of CD4 cells in the blood and reflects the state of the immune system. The normal count of a healthy person is between 600 and 1,200 cells/ mm<sup>3</sup>. When the CD4 cell count of an adult falls below 200 cells/mm<sup>3</sup>, the risk of opportunistic infection is high. This disease condition caused by advanced stage of HIV is referred to as Acquired Immune Deficiency syndrome (AIDS) (MOH, 2005a).

HIV is transmitted through three primary routes: Having unprotected sex with a HIV infected person, transfusion of HIV contaminated blood and its by-products, use of HIV contaminated instruments like needles, razors and other instrument for surgical procedure. Infected mother can also transmit the virus (MTCT) during pregnancy, child birth or breastfeeding, (FANTA 2001).

The most common mode of HIV transmission is through sexual contact with an infected person. Women are more at risk of infection than men, though no research has given concrete explanation for this gender disparity. Children are not exempt from direct and indirect effects of AIDS and the high birth rate and high rates of HIV infection among women contribute to large numbers of infants infected with HIV (Piwoz et al, 2001).

## **2.2 Mother to child transmission of HIV**

Mother to Child Transmission also known as Vertical or Prenatal Transmission can occur during pregnancy (in Uterus), during birth when the newborn infant comes into contact with infected maternal fluids, shortly after birth (postnatal) or during the early months of life while breastfed. Most children become infected during the prenatal period; i.e. during or shortly after delivery (Michael *et al.*, 2004).

HIV transmission during labour and delivery occurs when the baby comes in contact with or ingests / inhales maternal blood and /or vaginal secretions containing HIV virus. HIV transmission may also occur with maternal-foetal transfusion during contractions in labour. Maternal factors which may increase the risk of HIV transmission during labour and delivery include; high maternal viral load, rupture of membranes more than 4 hours before delivery, invasion delivery procedures that increase contact with mothers infected blood or body fluids and other viral or bacterial infections, Premature delivery and low birth weight weaken the infant's immune system increasing the risk of infection, (MOH, 2005a). Maternal nutritional status also plays a role, especially Vitamin A deficiency, foliate and maternal anaemia which are associated with increased transmission of HIV. Vitamin A deficiency leads to weakening of epithelial surfaces such as virginal and foetal uterine surfaces that allow for easy rapture (Semba et al, 2001).

HIV transmitted through breastfeeding is assumed to be present in cell-free components of breast milk of infected mothers. Infants become infected with HIV when the virus

enters the intestinal mucosa. Recent maternal infection with HIV due to unprotected sex during lactation also increases the risk of the infant being infected.

Other factors increasing the risk of HIV transmission through breastfeeding include: Low CD4 cell count in the mother, high maternal erythrocyte sedimentation rate, and breast lesions, such as mastitis, cracked and bleeding nipples and oral lesions in the infant. Type of breastfeeding practiced also determines the risk of HIV transmission where infants who are exclusively breastfed with only breast milk and no other solid foods or liquids having lower risk of infection than those who are mixed fed ,(Piwoz et al, 2001).

Report of studies carried out on breast-feeding and MTCT in East and South Africa indicated that breast-feeding by women with established infection may increase the rate of transmission by an additional 15% and the risk of transmission for the mother with a newly acquired infection in the breast-feeding period was estimated as 29%. Breastfeeding for about two years carries a risk of transmission of about 15%. It is therefore desirable that women should breastfeed for shorter periods to reduce the risk of MTCT (Pratt, 2003).

### **2.3 Infant feeding and HIV**

Breast-feeding has always been acknowledged as the optimal way to feed infants particularly during the first six months of life. Breastfeeding soon after birth provides colostrums that contain infection fighting substances which boost the infant's immune

system and provides concentrated nutrients for the infant. Exclusive breastfeeding is hygienic and prevents diarrhoea and acute respiratory infection caused by bacteria infection. Frequent un-supplemented breastfeeding for six months provides protection against pregnancy and is an effective method of family planning when practiced appropriately. The bond developed between the infant and the mother provides both emotional and physical growth to the infant. (MOH 2005a)

The fact that HIV can be transmitted through breast milk has been a major public health concern especially in developing countries where breastfeeding is a cultural norm and resources are limited for effective replacement feeding. In these countries, sanitation is poor, clean water is not readily accessible, and fuel for boiling water is limited.

Replacement feeding (i.e. feeding an infant on diet other than breast milk that provides all the nutrients the infant needs during the first six months of life) is recommended when replacement feeding meets the following conditions commonly summarised with the acronym “AFASS”:

**Acceptable:** There is no cultural or social barrier to replacement feeding and there is support by family and community, or the mother will be able to cope with pressure from family and friends to breastfeed.

**Feasible:** The mother (or family) has adequate resources to prepare replacement food and feed the infant adequately

**Affordable:** The mother and family, with community or health system support if necessary, can meet the cost of purchasing/ producing, preparing and using replacement feed.

**Sustainable:** There is continuous and uninterrupted supply for the feed needed for replacement feeding as long as the infant need it.

**Safe:** Replacement foods are correctly and hygienically prepared and stored and fed in nutritionally adequate quantities with clean hands and utensils, (WHO and UNICEF, 2004).

Ideally, mothers should be counselled about infant feeding options during antenatal care, but it is possible that some will not learn about their HIV status until they give birth or until their babies are a few months old (MOH, 2005 a). This shows that there is need for proper counselling of pregnant women to be tested to help them select and practice the safest infant feeding options in their individual situation in case they are found to be HIV positive.

## **2.4 Prevention of mother to child transmission of HIV/AIDS**

The immediate response to the discovery that breast-feeding is a cause of HIV transmission in infants born of HIV-infected mothers was for those mothers not to breastfeed. This might not be a problem in developed countries which have enough resources to provide suitable replacement feeding. The replacement feeding option could be the best in the case where PMTCT is the only factor considered, but in situations where AFASS criteria is not met, it is associated with increased morbidity and mortality of infants who are not breastfed particularly in resource limited settings, (Powe et al, 2001).

In developing countries, resources are limited and if the mothers are not well informed on the benefits and disadvantages of each and every infant feeding option, their infants could run a higher risk of dying from infectious diseases than from HIV transmitted by the mother during breastfeeding. This emphasizes the necessity and relevance of PMTCT counselling before and after the mother takes a decision on infant feeding option, (Pratt, 2003).

When the HIV positive mother chooses breastfeeding as an option, the following recommendations are given to prevent HIV transmission, (UNICEF 1998):

- ✚ The mother should initiate breastfeeding immediately after birth to stimulate flow of milk and the infant should be fed frequently day and night and on demand. The infant should breastfeed exclusively for about six months (with no other liquids, milks or solid food introduced).
- ✚ Mothers whose breasts have inflamed or cracked nipples, and other nipple or infant mouth sores during breastfeeding period, should seek immediate medical attention due to the increased risk of transmitting the virus through breastfeeding. If inflammation is on one breast, the mother should express and discard the milk from this breast until treatment is received.
- ✚ When the mother makes a decision to stop breast-feeding and have identified appropriate replacement feed which is affordable, feasible, accessible, and sustainable and safe, then breastfeeding should stop the earliest time possible.

- ↓ HIV positive Mother should not use mixed feeding because it irritate the infant gastro-intestinal tract (GIT) exposing the infant to HIV infection.

## **2.5 Infant feeding options**

According to WHO/ UNICEF/ (2004) recommendations on infant feeding in the context of HIV, mothers are to be informed of the benefits and disadvantages of different options possible for feeding their infants from birth up to six months with appropriate complementary feeding up to two years. The following are the options recommended:

### **Breast-milk substitutes**

#### **(a) Commercial infant formula**

This is based on modified cows milk or soy protein and is closest in nutritional composition to breast milk. However it lacks long chain essential fatty acids present in breast milk, and also has no immune factor. It can be considered as an option only when the mother has reliable access to sufficient formula for at least six months and has resources (water, fuel, utensils, skills and time) to prepare it accurately and hygienically

#### **(b) Homemade- prepared formula**

This can be made from fresh animal milks, with dried milk powder or evaporated milk. Adding of micronutrient is recommended since animal milk may not provide sufficient Iron, Zinc, Vitamin A and C and folic acid. They include;

##### **(i) Modified animal milk**

Modification involves dilution with boiled water to reduce the concentration of protein, sodium, phosphorous and other salts which are in higher quantity than breast milk. To

dilute cow's milk, 100ml of the milk is diluted with 50ml of boiled water and added 10g of sugar.

(ii) Unmodified animal milk

This is normally fresh cows milk although other suitable animal milk can be used depending on the community. The milk is concentrated and may cause dehydration, so the mother should give boiled clean water after the feed.

(iii) Dried milk powder and evaporated milk

The milk is reconstituted by adding a volume of water to a measure of milk to make up a milk formula that is suitable for infants.

Home-made formula should be considered as an option when: commercial formula is not available or is too expensive for the mother to buy, animal milk and other milk are reliable and the mother can afford for at least six months and has resources to prepare it hygienically and micronutrient supplementation is possible.

### **Modified Breastfeeding**

(i) Early cessation of breastfeeding

This is reducing the length of time the child is breastfed to minimize the length of exposure to HIV infection through breast milk. It is advisable for the mother to stop breastfeeding as soon as she is able to provide adequate and hygienic replacement feeding. This is considered as an option where the mother finds it difficult to avoid Breastfeeding completely due to social or cultural reasons or develop AIDS during breastfeeding period.



(ii) Expressed and heat- treated breast milk

Heat treatment of expressed breast milk from an HIV positive mother kills the virus in the breast milk. The milk is superior to other milks but the heat treatment reduces the level of immune factors. It is a suitable option for sick and low birth weight babies in a hospital setting. Most mothers may not find it a practical long term option at home because expressing and heat-treatment of breast milk is time consuming.

(iii) Breast milk banks

They are generally used as a source of breast milk from donors. This is a short time option for sick and low- birth weight new babies, but it may not meet the nutritional needs of an infant for a long period. Due to the risk of HIV transmission through unpasteurised pooled breast milk from unscreened donors, the option is only recommended when: the milk banks are operating under standard procedures and safety precautions, donors are screened for HIV and donated milk is correctly pasteurized.

(iv) Wet -nursing

In some communities there is traditional wet-nursing in the family setup and is acceptable for a relative to breast feed the infant. However, there is the risk of transmission to the infant if the wet nurse is HIV- infected or from an infected infant to the wet- nurse.

This option should be considered only when: the wet nurse is aware of the risk of HIV transmission and is ready to take all the precautions; she is willing and available to breastfeed the infant as frequently and as long as needed and the wet nurse has access to counselling and breastfeeding support.

### **2.5.1 Challenges on choice of options**

Transmission of HIV/AIDS from mother to child through breastfeeding has been a pre-occupant problem all over the world especially in the developing countries where breastfeeding is a cultural norm and economic resources are limited (Piwoz et al, 2001). Though exclusive breastfeeding is advisable for HIV positive mothers who do not meet the AFASS conditions, it is still a problem in timing of proper breastfeeding cessation which can lead to mixed feeding. This is thought to be one of the great risks of MTCT by irritating the infant's stomach lining and allowing easier access of the virus through the infant gut, (FANTA, 2001). The other problem with exclusive breastfeeding can be lack of enough food in quantity and quality for lactating mothers, opportunistic infections which can occur at any time during the breastfeeding period as well as breast conditions (cracked nipples, mastitis, abscess or Candida) causing the mother to shift to another option leading to mixed feeding.

Wet nursing in an urban setup is a big challenge, unlike the rural dwellings where the family is a close knit unit. Issues of beliefs and tradition are also a hurdle to deal with in communities where surrogate breastfeeding is a taboo. HIV stigma has not been completely eradicated hence disclosing ones HIV status to facilitate wet nursing is a problem.

HIV positive mothers in resource limited urban settings (slums) are faced with problems of meeting their nutritional needs which make exclusive breastfeeding for six months a big challenge. Breast milk replacement would be an option in such cases but due to resource constraints the mothers are faced with a problem of paying for the feeding

option (Piwoz et al, 2001). Replacement feeding options (infant formula and modified animal milk) have another problem different from MTCT, of morbidity and mortality due to the mode of preparation and their composition compared to breast milk:

- ⬇ The Commercial Infant Formula lacks protective immune factors as found in breast milk; it is less easily digested and lacks some substances such as long-chain essential fatty acids present in breast milk.
- ⬇ The Modified Animal Milk is difficult for infants to digest and does not contain all their nutrients the infants need Proteins and fats are inferior compared to breast milk as well as micronutrients (iron, zinc, vitamins A, C and folic acid) and also lacks protective immune factors.
- ⬇ Commercial formula and modified animal milk may not be affordable to most mothers in resource limited settings, and the mothers may also lack resources and skills to prepare a suitable replacement feed. (Sanghvi, 1999)

## **2.6 Gaps in literature**

Although various studies have been conducted on infant feeding and MTCT of HIV in developing countries, the number of infants who are infected with HIV every year is still high warranting the investigation to highlight the factors contributing to this problem.

Documentation of adherence to the WHO recommended infant feeding practices by HIV positive mothers in limited resource urban settings, factors associated with choice of infant feeding options and implications on the nutritional status of the infant is lacking.

This study has therefore attempted to address these gaps

## **CHAPTER THREE: STUDY SETTING AND METHODOLOGY**

### **3.1 Study area**

The study was carried out in Mathare and Korogocho slums which are located at Kasarani Division in the Eastern part of Nairobi Province. Most of this area is occupied by people of low income status in Nairobi. The population in Mathare and Korogocho is estimated to be about 1.5 million and with very poor socio- economic status. The people living in the slums are faced with problems of prostitution, unemployment, drug addiction, alcoholism, crime and domestic violence and as the population continues to grow, illegal settlements have increased in number. HIV is the biggest problem in the two slums and it is estimated that, between 20% and 40% of the adults are HIV positive and the disease is spreading (Nairobi Wikipedia, 2007).

Mathare and Korogocho slums consist of several simple semi-permanent structures crammed within a very small area. There is little or no access to water, electricity, sanitation, basic infrastructure or services, and with unsecured tenure. Open sewage drains are a breeding ground for parasites, bacteria and mosquitoes, causing diseases such as cholera, typhoid and malaria. There are very few government health centres and schools to cater for the large population which is estimated to be over 1.5 million, and the private owned facilities are poorly equipped and managed. Education and health care are not guaranteed and the ever-rising population is putting more and more strain on the little services that are available (Nairobi Wikipedia, 2007)

The public health facilities in the area are under the administration of Nairobi City Council. There are about four public and five NGOs health facilities providing health services in the study area. The public clinics provide maternal and child health services and also caters for HIV positive patients although their services are minimal due to limited resources. The charitable organizations based in the area supplement the government services in Education, health and other social support. Some of the NGOs provide HIV counselling, testing, ARV drugs and food rations to HIV patients and infant formula to HIV positive mothers.

### **3.2 Study population**

The study population included HIV positive mothers living in the two slums and also attended HIV support clinics or centres. The inclusion criteria was HIV positive mothers with infants aged 0-6 months and attending the City council clinics or HIV support centres in Mathare and Korogocho. The exclusion criteria was mothers who were not HIV positive, HIV positive mothers with infants above six months, and HIV positive mothers not attending the clinic or support centre.

### 3.3 Methodology

#### 3.3.1 Study design

This was a health facility based cross-sectional study, descriptive and analytical in nature. It was conducted between July and October 2007.

#### 3.3.2 Sample size determination

Based on research in Kenya (CBS, 2003) it is estimated that exclusive breast feeding of infants 0-6 months is practiced by about (13%) of the women. It is assumed that (87%) of the women use other feeding options. Assuming that a similar proportion of HIV positive mothers were exclusively breastfeeding, this proportion was used in determination of the study sample by incorporation into the Fishers statistical formula, (Fisher et al, 1991).

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

Where;

n = desired sample size

z = standard normal deviation, 1.96 for 95% confidence interval

p = the prevalence for Exclusive Breastfeeding

For this study p is estimated to be 13% (KDHS, 2003)

$$q = 1.0 - p = 1.0 - 0.13 = 0.87$$

d= degree of accuracy desired, set at 0.05

$$\text{Sample size } n = \frac{1.96(1.96) * 0.13 * 0.87}{0.05 * 0.05} = 173.79$$

Sample size was rounded to 175.

### **3.3.3 Sampling procedure**

To get the required sample size of 175 mothers and their infants, purposive and exhaustive sampling was employed. In the first stage, Nairobi province was purposively selected because it was the province with the highest number of slums in the country. Kasarani division was purposively selected because it has the highest number of slums in Nairobi. Mathare and Korogocho are neighbouring slums in Kasarani with the highest population and similar living conditions and they were purposively selected to get the study sample.

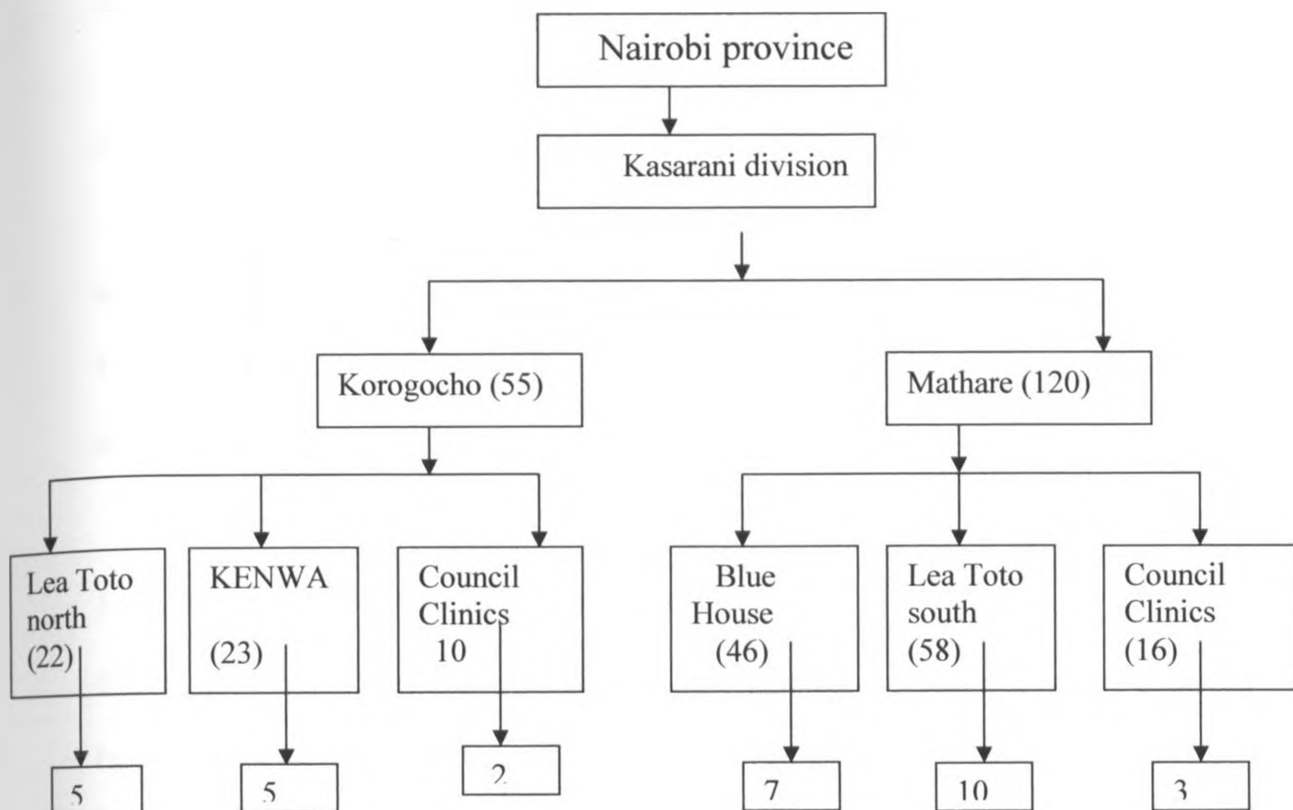
Second stage, purposive selection of Health clinics providing health services and other support to HIV positive mothers was done. The selection was based on the willingness to participate in the study by the facility administration. Council clinics included in the study were Mathare North clinic, Baba Ndogo clinic which provide services to Mathare population. In Korogocho slum, Lion club clinic and Kariobangi North clinic were included. The NGOs support centres included, Blue House and Lea Toto South catering for Mathare population. Korogocho was catered for by KENWA and Lea Toto North centre. The clinics were selected based on the consent of the administration to participate in the study.

Stage three involved exhaustive sampling to select the mothers based on their willingness to participate. The health clinics and support centres were visited at specific days of the week when mothers had appointment for child clinic or collecting the infant

formula. The number of mothers and the infants selected per clinic depended on the attendance during the visit. From the health facility records, Mathare had double the population of Korogocho and therefore it was allocated more visiting days. One hundred and twenty (120) respondents were selected from Mathare and Fifty five (55) from Korogocho.

In stage four, random sampling was then carried out in the centres to select respondents for 24hr- dietary intake recall .The sample size was based on the lowest acceptable number for a social study i.e. thirty. Due to time constrain, the lowest sample size was considered and not the highest.This was carried out through random selection of admission numbers in the attendance register. The two council clinics from each area were combined to make one centre as shown in Figure 3.1. This was done to get a substantial number of respondents for data analysis. The number of respondents selected per clinic or centre was calculated in proportion to the total attendance from the six centres.





**Figure 3.1: Sampling frame**

### 3.3.4 Study tools

Data was collected using a pre-tested structured questionnaire and a focus group discussion (Appendix I and III). The structured questionnaire was used to collect information on:

- ✦ Social –demographic characteristics of the mothers
- ✦ Child morbidity and immunization status
- ✦ Environmental sanitation and household hygiene

- ↳ Child feeding practices and feeding options
- ↳ Foods used in replacement feeding and quantities using the 24hr-dietary recall method.
- ↳ Mothers' knowledge on MTCT of HIV and acceptability of recommended feeding option.
- ↳ Anthropometric measurements of the infants.

The focus group discussions (FGD) were used to cross check information given in the questionnaire and also enrich data in areas not covered in the scheduled interviews.

### **3.3.5 Recruiting and training field assistants**

Four field assistants, two males and two females were recruited through recommendation by the organizations working in the study area. Approval was obtained from the area chief. The following selection criteria were used:

- ↳ Be a resident of the study area
- ↳ Preferably a social worker in the area or experience in other similar field surveys
- ↳ Completion of secondary school education.

Three day training was carried out by the chief investigator according to the training programme (Appendix II). The training covered the following; objectives of the study, interviewing techniques, taking of anthropometric measurements, recording of 24-hr recall information and administering the questionnaire. The participants rehearsed the procedures through role play to internalize the process before going to the field.

### **3.3.6 Data collection procedures**

#### **3.3.6.1 Pre-testing of study instrument**

Pre-testing of the questionnaire was carried out among HIV positive mothers and their infants who were not respondents in the study. It was carried out in Korogocho at Redeemed Gospel support centre and Provide international health clinic. Thirty mothers were involved in the pre-testing. This was done to determine the appropriateness of the study instrument and also to give the field assistants hands on experience. Appropriate adjustments were made before the actual data collection.

#### **3.3.6.2 Questionnaire administration**

The respondents were first informed of the study purpose and the contents of the survey were explained by the enumerators. Assurance of confidentiality of the information was given and maintained. Oral informed consent was obtained from the mothers before administering the questionnaire or undertaking any measurement. The questionnaire was administered by the field assistants under the supervision of chief investigator.

#### **3.3.6.3 Anthropometric measurements**

The anthropometric measurements were mainly based on weight for age because it is a more reliable measure of infants' nutritional status for infants 0-6 months old. Measurements were taken using the paediatric weighing scales. The scales were first calibrated and during the weighing, every scale was adjusted by bringing the pointer to zero mark before taking the weight of each child. The weight was recorded to the nearest 0.1kg.

Weight measurements of the infants were obtained using techniques as described by United Nations (UN, 1986). Corresponding Standard deviation scores (z scores) was calculated with reference to National Centre for Health Statistic (NCHS)/WHO, 1986).

#### **3.3.6.4 Immunization status**

This information was obtained from the child health cards and recorded in the questionnaire. In cases where the card was not available the mother was asked to recall the vaccination given and the age when the child received it. The children who had received all the required immunization for their age were considered fully immunized, while the rest were considered either partially immunized or not immunized accordingly.

#### **3.3.6.5 24-hour recall dietary intake**

The method was employed to determine the dietary intake of the foods used in exclusive replacement feeding. Several mothers were interviewed on the type of food and quantities fed to the infant within 24-hours period preceding the day of the interview. Thirtymothers and their infants were then randomly selected from those interviewed based on the attendance in each health centre as shown in figure 3.1.

A sample of 30 respondents is used as the lowest acceptable sample in social survey; hence it was used in determining the number of infants to be included in the 24-hr dietary recall test. The dietary adequacy in relation to Vitamin A, Iron, Protein and Energy were calculated from Kenya Food Composition Value Tables (Sehmi, 1993) and analyzed using SPSS computer package.

### **3.3.6.6 Focus Group Discussion**

Three focus group discussions (FGD) comprising of 15 participants were held, one took place at Mathare and two at Korogocho. Members of the group included HIV positive mothers, health service providers and social workers. The members were recruited from the existing HIV support groups in the study area which catered for both residents of Mathare and Korogocho ; two were based in Korogocho and one in Mathare. The discussion was directed by the chief investigator using FGD guideline (Appendix III). The FGD was used to verify information collected through the questionnaires and also to gather some social- demographic and infant feeding practices information that could not be obtained through the scheduled interviews. Most mothers practising mixed feeding were not ready to talk about it, and this information could only be obtained from focus group discussions.

### **3.3.7 Ethical consideration**

To undertake the research, a permit was obtained from the Ministry of Science and Technology. Written permission was given by Nairobi City Council Medical Health Officer and the Administrators of the HIV support centres. The chiefs in both Korogocho and Mathare were informed and gave their approval. The study was approved by the Board of Postgraduate Studies at the University of Nairobi.

### 3.3.8 Data processing and analysis

Data from completed questionnaires and anthropometric results were first coded for ease of analysis and then entered into the computer. The Statistical Package for Social Sciences analysis (SPSS) version 12 was used for data entry, cleaning and analysis.

Epi-info software was used to convert anthropometric measurements (weight) into nutritional status indices. Standard references based on the National Centre for Health Statistics data (NCHS/WHO 1986) was used for comparison. The cut off points indicated in table 3.1 below were used to categorize the infants' nutritional status.

**Table 3.1:** Infants' nutritional status categories

<b>Nutritional status</b>	<b>WAZ-scores</b>
Normal	$\geq -1$
Mild	-2 to < -1
Moderate	-3 to < -2
Severe	< -3

Both descriptive and analytical methods were used to produce the study results. This involved various statistical tests to establish measures of central tendency and spread, relationships and differences in variables. Levels of significance were determined using Chi square test for categorized variables and Spearman's regression test for continuous variables, P-value less than 5% ( $p < 0.05$ ) was considered as statistically significant.

## **CHAPTER FOUR: RESULTS**

### **4.1 General introduction**

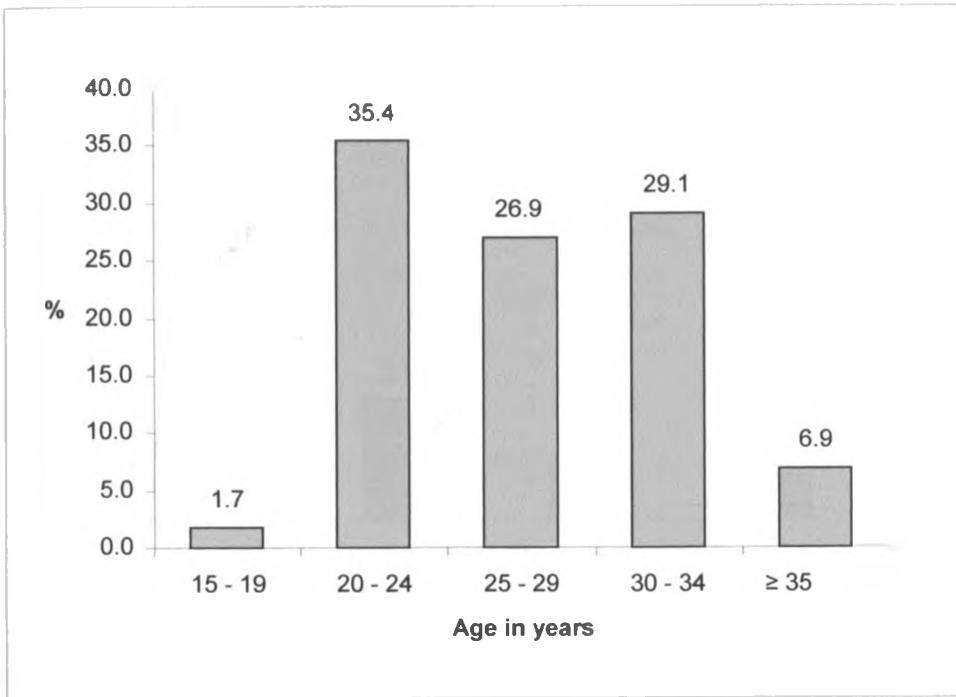
This chapter presents the results of the study. The first part presents the results on the socio-economic and the demographic characteristics of mothers, infant feeding options and associated factors. It also provide information and analysis of mothers knowledge of HIV in relation to MTCT and PMTCT and their acceptability of infant feeding alternatives as recommended by WHO/ UNICEF(2004).

The second part gives information on the characteristics of the infants, immunization and morbidity status, common illness affecting the infants in the study area, types of food used for replacement feeding and their nutritional adequacy. It also includes the analysis of the nutritional status of the infants in relation to their feeding options.

### **4.2 Socio-demographic and economic characteristics of the mothers**

#### **4.2.1 Age distribution and marital status**

The respondents of this study were 175 HIV positive mothers with infants aged 0-6 months of which 31% were from Korogocho and 69% from Mathare. Majority of the mothers as shown in Figure 4.1, were between the age of 24 and 35 years. The number of teenage mothers and those over thirty five years old was very small.

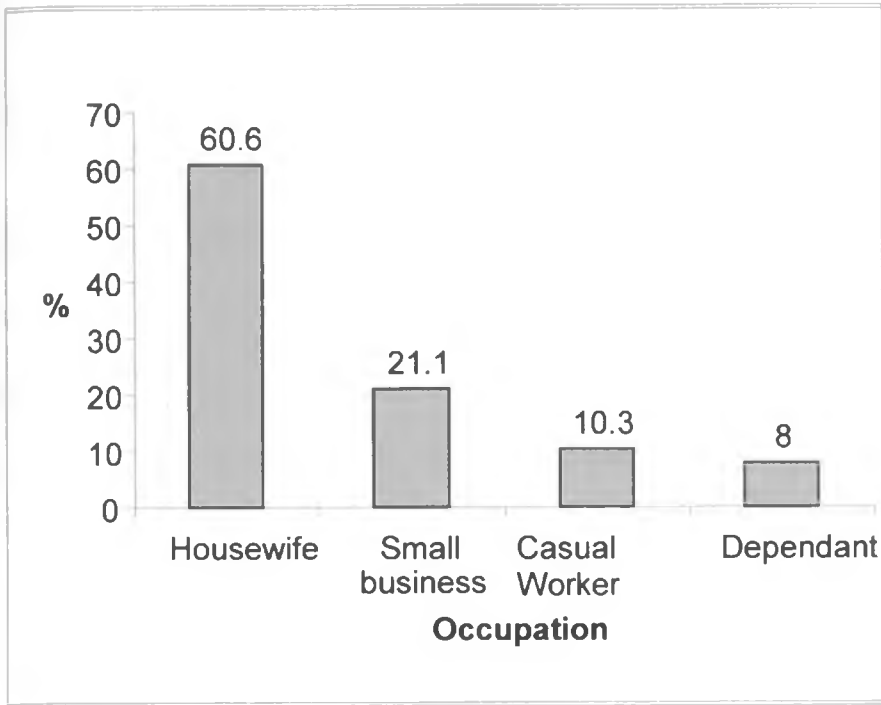


**Figure 4.1: Distribution of study mothers by age**

#### **4.2.2 Mothers' occupation**

More than half of the mothers in the study were housewives and were not involved in any income generating activities .Figure 4.2 shows that 34.4% of the mothers was involved in small business and casual employment while the rest depended on relatives and well wishers.





**Figure 4.2: Distribution of mothers by occupation**

#### **4.2.3 Mothers' level of education**

Most mothers had attained basic education with the majority having gone through lower or upper primary level. Table 4.1 shows that about one quarter of the mothers had secondary level of education while a small portion had attained college education. Only four of the mothers in the study group had no formal education, an indication that the illiteracy level among the group is low.

**Table 4.1: Distribution of study mothers by education level**

<b>Level of education</b>	<b>count</b>	<b>percentage (%)</b>
No formal education	4	2.3
Primary	127	72.6
Secondary	44	25.1
Total	175	100

#### **4.2.4 Family monthly income**

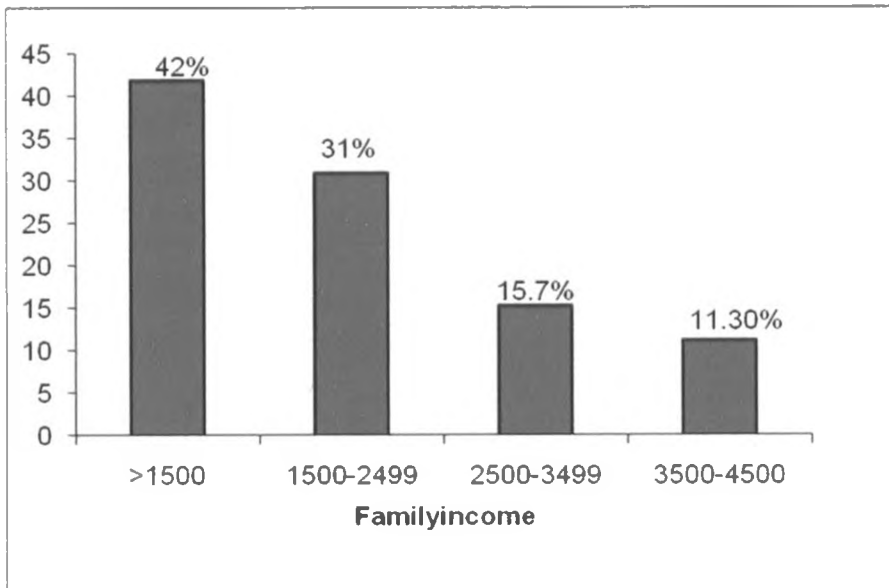
Table 4.2 shows the distribution of the mothers by main source of family income.

Most of the families earned their income through casual work, while half of the households relied on salaried menial work or small businesses (e.g. hawking, selling foodstuff, house wares and clothes). A small number mainly widows relied on donations from well wishers and charitable organizations.

**Table 4.2: Main source of family income**

<b>Source of income</b>	<b>n</b>	<b>%</b>
Casual employment	81	46.3
Salaried employment	49	28.0
Business	41	23.4
Donations	4	2.3
Total	175	100

Figure 4.3 shows the distribution of mothers by their household total monthly income. The lowest income was less than KES.1500 while the highest was KES. 4500. The World Bank defines extreme poverty as living on less than 1.25 US \$ and moderate poverty as living on less than 2 US \$ per person per day (Wikipedia, 2001). Based on this definition, three quarters of the mothers are living in extreme poverty



**Figure 4.3: Distribution of mothers by family monthly income**

#### **4.2.5 Environmental sanitation and hygiene**

Although more than half of the households obtained their water for household use from a household tap as shown in Table 4.3, a substantial number of the mothers were buying water from vendors. Majority of the mothers were not treating drinking water for the household use but only boiled for the Index child.

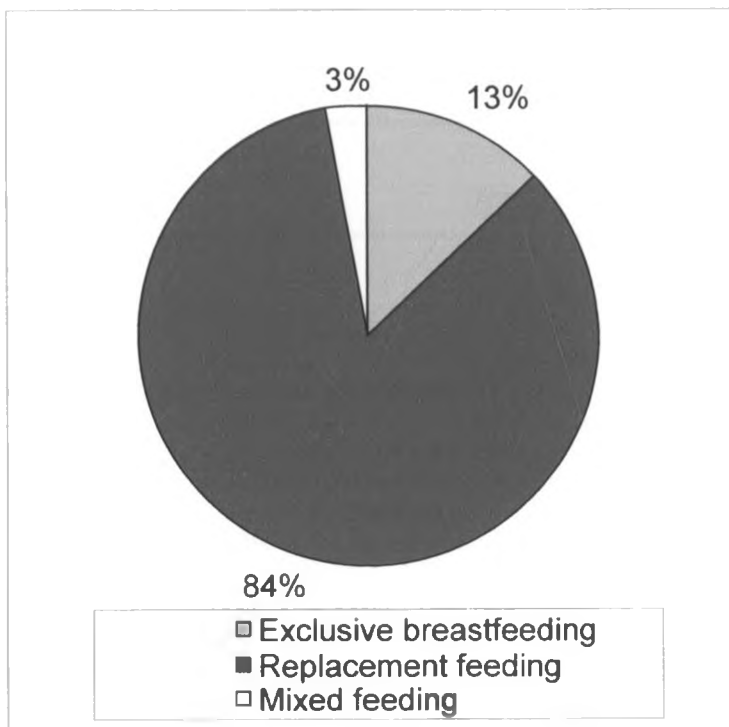
The main method of waste disposal was indiscriminate dumping and even for the households which paid for garbage collection, most of this waste was being dumped in the nearby river, water drainage channels and open spaces in the area. Toilet facilities were few and several households had to share one pit latrine. Some households had to pay for communal pit latrine to use the facility.

**Table 4.3: Distribution of mothers by Environmental sanitation and hygiene practice.**

<b>Sanitation &amp; hygiene practice</b>	<b>Households</b>	
	<b>Number</b>	<b>Percent</b>
<b><u>Source of water</u></b>		
Household tap	99	56.6
Buying	76	43.4
<b><u>Water treatment</u></b>		
Boil for Index child only	162	92.6
Treat for whole household	13	7.4
<b><u>Waste disposal</u></b>		
Dustbin/ Garbage collectors	74	42.3
Dumping	101	57.7
<b><u>Type of toilet</u></b>		
Communal household pit latrine	127	72.6
Paying communal pit latrine	48	27.4

### 4.3 Infant feeding options and associated factors

The study identified three Infant feeding options practised by the mothers in the study area. The vast majority of women (84%) were using replacement feeding, 13 % were practising exclusive breastfeeding and 3% employed mixed feeding. Figure 4.4 shows the distribution of the mothers by infant feeding option practise.



**Figure 4.4: Distribution of mothers by infant feeding option**

#### 4.3.1 Reasons for choice of specific option

Reasons for choice of a specific feeding option varied among the mothers as shown in Table 4.4. Out of those using replacement feeding, 55% chose the option to protect the child from being infected by HIV or because they were advised at the health clinic not to

breastfeed. The others chose the option because of availability through donation or for convenience especially the mothers in employment and business and not able to exclusively breastfeed. Those practising exclusive breastfeeding and mixed feeding chose the option due to affordability, stigma and social pressure to breastfeed. The study found a significant ( $P= 0.001$ ) association between choice of feeding options and reasons given by the mothers for their choice.

**Table 4.4: Distribution of study mothers by feeding options and reasons for choice**

Feeding options and reasons for choice	N=175	
	Number	Percent
<b>Replacement feeding</b>		
Protect child from HIV infection	52	29.7
Advice at the Health clinic not to breastfeed	54	30.9
Convenience/ to be able to work	11	6.3
Accessibility through donation	30	17.1
<b>Exclusive breastfeeding</b>		
Affordability	13	7.3
Stigma and social pressure to breastfeed	6	3.4
Advice by health officer	4	2.4
<b>Mixed feeding</b>		
Stigma and social pressure to breastfeed	3	1.7
Affordability	2	1.2

### 4.3.2 Types of food used for replacement feeding

Table 4.5 shows the types of food used by the mothers for replacement feeding. About 60% of the mothers used only infant formula obtained from the support centres and 11% used cow's milk only. The rest of the mothers combined the foods as shown in Table 4.5. Porridge made from ground cereals flour and puree from blended fruit or cooked vegetables was mostly common among mothers practicing mixed feeding.

**Table 4.5: Distribution of mothers by types of food for replacement feeding**

N=147		
Types of food	Number using	Percent (%)
Infant formula only	88	60
Cow's milk only	17	11
Infant formula / Porridge	18	11.8
Cow's milk/ Infant formula	6	3.4
Porridge	13	7.2
Milk/porridge/ Puree	5	3.3
Puree	5	3.3

### 4.3.3 HIV positive mothers challenges in infant feeding option

Table 4.6 shows that, mothers practicing replacement feeding faced financial constraints making it difficult to buy fuel for preparation of donated infant formula. Inconsistent supply of the donated infant formula and the need to frequently prepare the feed due to

lack of proper storage facility was a problem. The mothers had to wake up at night to prepare the feed for the infant.

Exclusive breast feeding as shown in Table 4.6 was considered a hindrance to engagement in income generating activities since the mother had to be with the child most of the time and expressing breast milk for the baby was considered as impractical by majority of the mothers. Due to poor feeding, a few of the mothers were unable to produce sufficient milk to feed their babies.

As shown in Table 4.6, stigma and social pressure to breastfeed was cited as a challenge by mothers practicing mixed feeding. Most of these mothers had not disclosed their HIV status and had to practise mixed feeding to avoid speculation. In some cases the husband was aware but still pressurized the wife to practice mixed feeding to avoid stigma.

The chi-square test indicated a significant ( $P= 0.001$ ) association between the choice of feeding options and the challenges encountered by the mothers.



**Table 4.6: Distribution of mothers by challenges in practising infant feeding options**

N=175		
Feeding option/ Challenges	n	%
<b>Exclusive replacement feeding</b>		
Inconsistent supply of donated infant formula	60	34.3
Financial-lack money for option and fuel	69	39.4
Time constraint due to frequent preparation of feed	18	10.3
<b>Exclusive breastfeeding</b>		
Difficult in engaging in income generating activities	17	9.7
Social pressure to introduce complementary food early	4	2.3
Not producing sufficient milk	2	1.1
<b>Mixed Feeding</b>		
Stigma- fear of their HIV status being known	5	2.9

#### **4.3.4 Mothers' coping strategies when faced with infant feeding challenges**

Table 4.7 shows that, those mothers faced with the problem of accessing the replacement feed, especially the formula, coped by reducing the quantity per feed or by reducing the frequency of feeding the infant. Some mothers combined the formula with other feeds like cow milk, porridge or puree.

In some cases where the donated formula was available but no fuel for boiling preparation water, the mothers used unboiled water. For those using cow's milk for

replacement feeding they would dilute the milk with excess water when the quantity was less than what the infant required. Table 4.7 shows that, mothers facing stigma relied on their family for moral support and those pressurized to introduce complementary food early, fed the child with light foods e.g. milk, porridge and fruit or vegetable puree.

**Table 4.7: Distribution of study Mothers by coping strategies**

<b>N=175</b>	
<b>Challenges and Coping strategy</b>	<b>Percent (%)</b>
<b>Inconsistent infant formula supply and financial constrains</b>	
Using less formula when available	37.2
Use unboiled water when there is no fuel	10.3
Dilute cow milk with water	10.3
Reduce frequency of feeding	17.1
<b>Not producing enough breast milk</b>	
Give the child water in- between the feeds	1.1
Reduce the frequency of feeding	2.3
<b>Stigma and pressure to introduce complementary food</b>	
Depend on family for moral support	12.0
Give the child light food e.g. porridge, milk or puree	9.7

#### **4.3.5 Factors determining the choice of feeding options**

Affordability as shown in Table 4.8 was a major factor in choice of exclusive breastfeeding and to some extent also mixed feeding. Some mothers chose exclusive breastfeeding because they could not afford the food for replacement feeding. A few of those who could not afford exclusive replacement feeding combined both breast feeding and replacement feeding.

As shown in Table 4.8, stigma and social pressure was associated with choice of exclusive breastfeeding and mixed feeding. Some mothers chose to breastfeed to conceal their HIV status. Others were pressurized by their spouses and relatives.

Table 4.8 shows that, advice from a health officer contributed mostly in choice of either exclusive breastfeeding or replacement feeding but not in mixed feeding.

Convenience and the opportunity to go to work or carry out business as shown in Table 4.8, was a contributing factor to the choice of replacement feeding by the mothers. Most mothers in employment or carrying out small business were practising this option.

Mothers knowledge on prevention of mother to child transmission of HIV (PMTCT) and belief as shown in Table 4.8, contributed to the choice of replacement feeding. The mothers believed that if they did not breastfeed their Infant will be free from HIV infection. This notion only held if the child had not been infected earlier either during pregnancy or delivery.

Table 4.8 shows that, availability of infant formula through donation was associated with the high percentage of mothers practicing replacement feeding. 60% of the mothers practicing replacement feeding were using donated infant formula and only 24% were using other types of food.

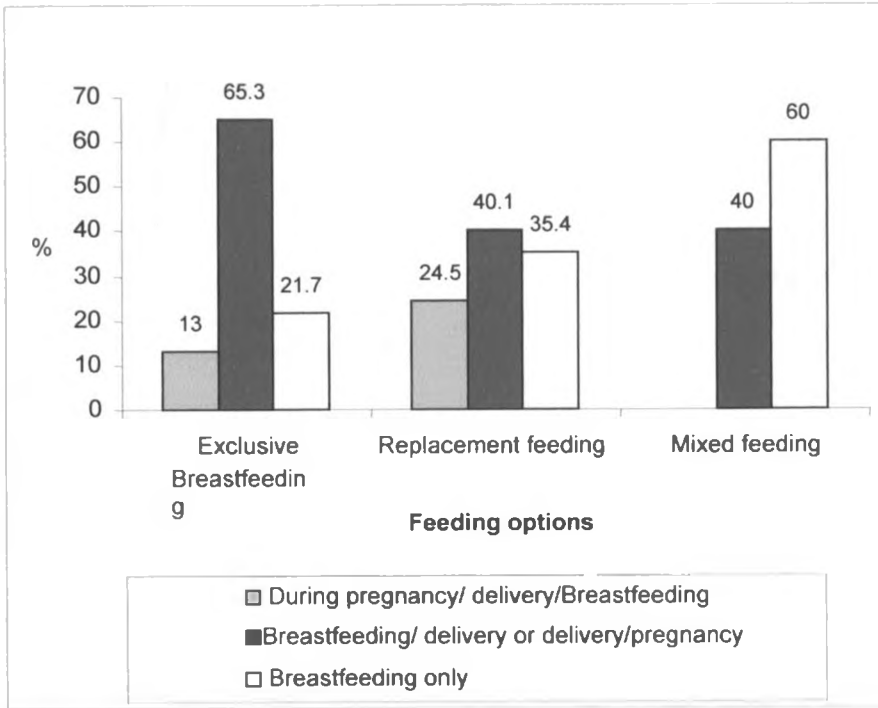
**Table 4.8: Distribution of mothers by factors determining the choice of feeding option**

Factors	FEEDING OPTION		
	N=23 (%)	N=84 (%)	N=3 (%)
	Exclusive breastfeeding	Replacement feeding	Mixed feeding
Affordability	56.5	0.0	40
Stigma and social pressure to breastfeed	39.1	0.0	60
Advice by health officer	3.2	28.6	0.0
Convenience/- to be able to work	0.0	15.6	0.0
Belief and knowledge in PMTCT	1.2	35.4	0.0
Accessibility through donation	0.0	20.4	0.0

#### 4.3.6 Mothers' knowledge of MTCT of HIV and choice of feeding options.

Figure 4.5 shows that, one third of the mothers knew all the three ways of HIV transmission and two thirds knew two or one way of transmission. All the mothers had

knowledge of breastfeeding as one way of HIV transmission from mother to child. However, there was no significant ( $P > 0.05$ ) association between mothers' knowledge on way of transmission and their choice of feeding option.



**Figure 4.5: Distribution of study mothers by Choice of feeding option and Knowledge of MTCT of HIV.**

#### 4.3.7 Mothers' acceptance of recommended infant feeding alternatives.

Table 4.9 shows that most mothers accepted infant formula and animal milk as suitable infant feeding alternative. One quarter of the mothers were not ready to use milk powder as they considered it to be of low nutritional value. Majority of the mothers were sceptical of the heating process destroying HIV virus and only 7.4% indicated they would use heated breast milk as an alternative feed.

Very few mothers as shown in Table 4.9 accepted wet nursing or breast milk from milk bank as an alternative for feeding their infants. Wet nursing was considered impractical in an urban setup and breast milk from milk bank raised concern of stigma and HIV status of the donor.

**Table 4.9: Mothers accepting WHO recommendations as suitable infant feeding alternative**

<b>WHO recommended feeding alternative</b>	<b>Mothers accepting</b>	
	<b>(N=175)</b> <b>n</b>	<b>%</b>
Commercial infant formula	167	95.4
Animal milk (cow/goat/camel)	164	93.7
Dried milk powder	125	71.4
Expressed heat treated breast mil	13	7.4
Breast milk from milk bank	7	4.0
Wet nursing	6	3.4

## 4.4 Infants' morbidity and associated factors

### 4.4.1 Distribution of the study infants by sex and age

. The children were categorized into age groups, < 3 months and 3- 6 months similar to WHO age categories for calculating RDA for children 0-6 months (WHO, 2003).

The group consisted of 51% males and 49% females who were almost equally distributed within the two age category. Majority of the infants were in the less than 3 months age group. Figure 4.6 shows the age and sex distribution of the infants.

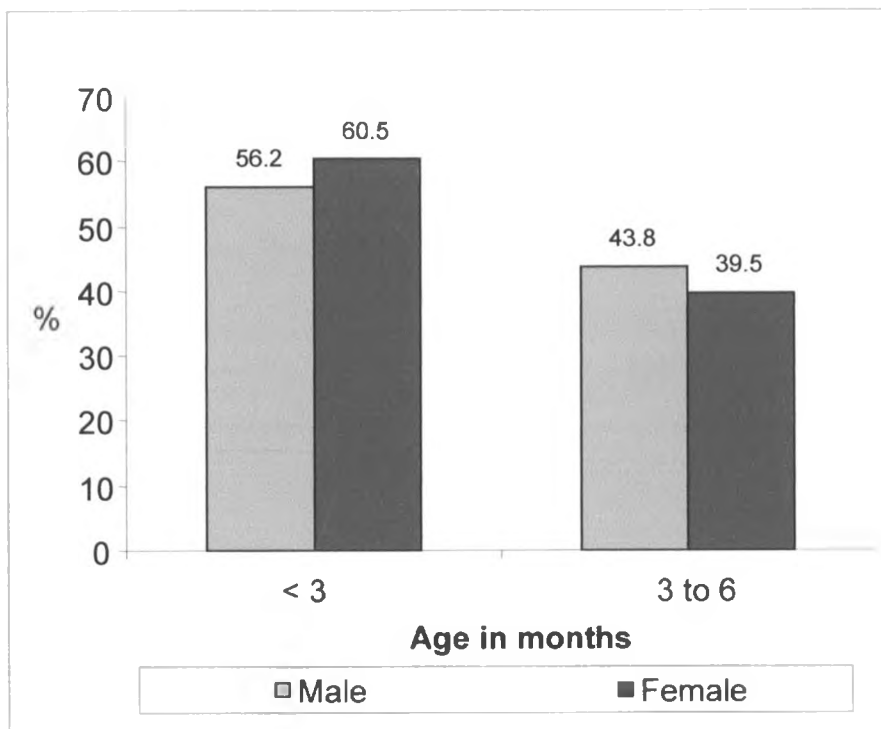


Figure 4.6: Distribution of study Infants by age and sex

#### 4.4.2 Morbidity experience of the study Infants

As shown in Table 4.10, 73% of the study infants had been sick during the two weeks period preceding the interview date. The most common ailment was respiratory tract infection, followed by diarrhoea and malaria in that order.

**Table 4.10: Distribution of study infants by morbidity experience**

N= 175		
Morbidity experience	Frequency	Percent
Respiratory tract infection	70	54.7
Diarrhoea	42	32.8
Malaria	16	12.5
Total	128	100

#### 4.4.3 Immunization status of the study infants

The study results showed that 61% of the infants were fully immunized for age, 33% were partially immunized for age and 6% had not been immunized at all. Table 4.11 shows that morbidity affected the infants equally whether immunized or not.

Chi-square test showed no significant association ( $p=0.156$ ) between immunization status and morbidity.



**Table 4.11 Distribution of study infant's by morbidity and immunization status**

<b>Morbidity</b>	<b>Fully immunized</b>		<b>Partially Immunized</b>		<b>Not immunized</b>		<b>Total</b>	
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Diarrhoea	22	20.6	16	27.6	4	40.0	42	24.0
Respiratory tract infection	43	40.2	25	43.1	2	20.0	70	40.0
Malaria	9	8.4	6	10.3	1	10.0	16	9.1
No sickness	33	30.8	11	19.0	3	30.0	47	26.9
<b>Total</b>	<b>107</b>	<b>100</b>	<b>58</b>	<b>100</b>	<b>10</b>	<b>100</b>	<b>175</b>	<b>100</b>

#### **4.4.4 Infants morbidity in relation to feeding option**

Table 4.11 shows that morbidity experience was equally distributed especially in exclusive breastfeeding and replacement feeding. This is contrary to the expectation that, infants on exclusive breastfeeding should experience less cases of respiratory tract since exclusive breastfeeding is associated with better hygiene while more cases of diarrhoea would be associated with replacement feeding because replacement feeding in poor hygienic environment has high risks of contamination.

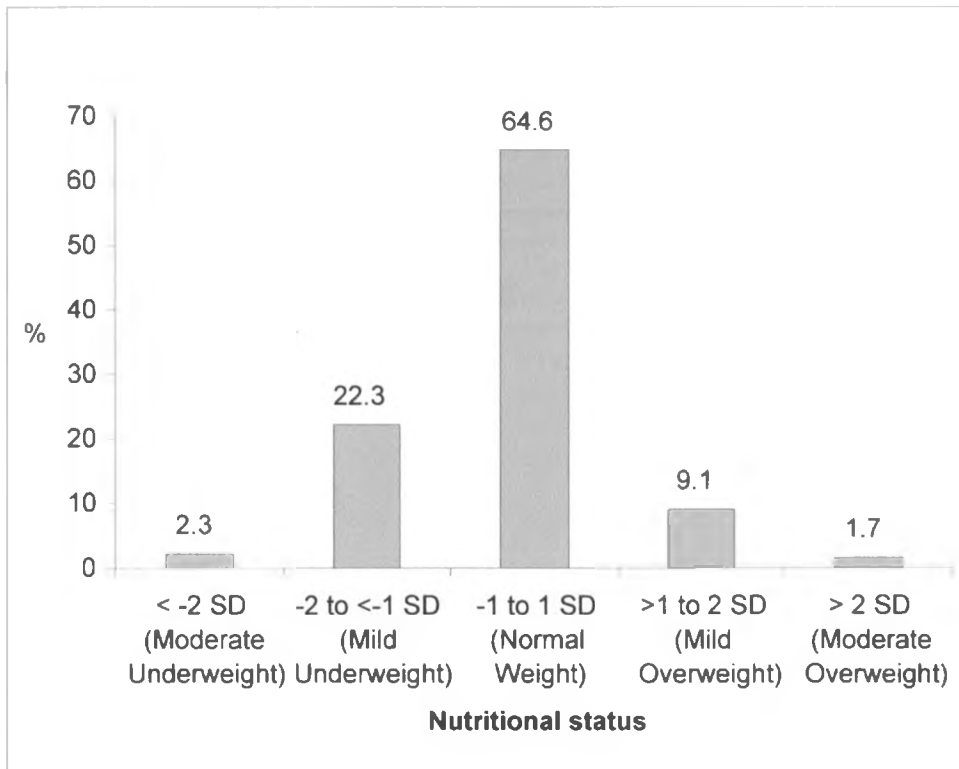
The chi- square test, at 95% level of significance showed no significant association (P= 0.181) between infants morbidity experience and the feeding option.

**Table 4.12: Distribution of study infants morbidity experience and feeding option**

Morbidity experience	Feeding options (%)					
	N=128					
	Exclusive Breastfeeding		Replacement feeding		Mixed feeding	
	n	%	n	%	n	%
Respiratory tract infection	12	60	57	54.8	1	25
Diarrhoea	7	35	34	32.7	2	50
Malaria	1	5	13	12.5	1	25
Total Number	20	100	104	100	4	100

#### 4.5 Infants nutritional status and associated factors

The results indicate that 24.6% of the infants were below normal weight for age while 75.4 % had normal weight for their age. Only a very small number was moderate underweight or overweight, and there were no cases of severe underweight or overweight. Figure 4.8 shows the distribution of the infants by their nutritional status.



**Figure 4.7 Distribution of study Infants by nutritional status**

#### **4.5.1 Infants' nutritional status and feeding options**

Table 4.13 Shows that 75% of the infants nutritional status was in normal and above category, and 25% were malnourished. Majority of the infants in the normal and above category were on replacement feeding, 8.3% on exclusive breastfeeding and 2.4% on mixed feeding.

The Chi square test identified a significant ( $P= 0.003$ ) association between the infants' nutritional status and feeding options. Replacement feeding showed better nutritional status.

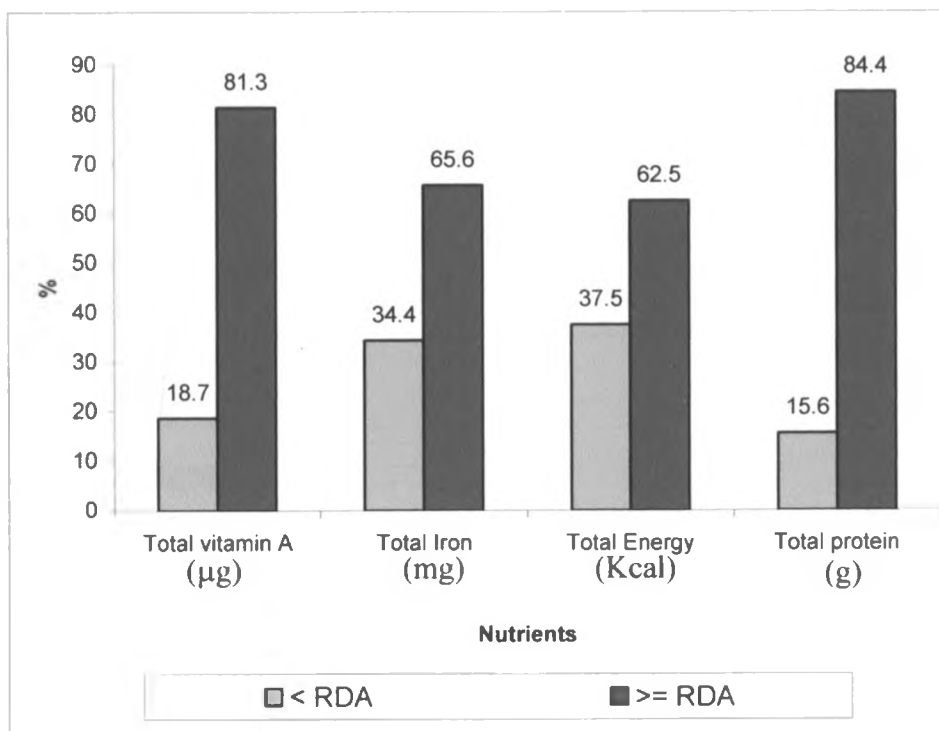
**Table 4.13: Distribution of study infants by nutritional status and feeding option**

Nutrition status	Exclusive breastfeeding		Replacement feeding		Mixed feeding		Total	
	n	%	n	%	n	%	n	%
< -1SD	12	52.2	29	19.7	2	40	43	24.6
>= -1SD	11	47.8	118	80.3	3	60	132	75.4
Total	23	100	147	100	5	100	175	100

#### 4.5.2 Dietary intake of energy, protein, vitamin A, and iron among infants on

##### Replacement feeding

Figure 4.8 shows that, majority of the infants on replacement feeding option were meeting the Required Daily Allowance (RDA) for vitamin A and protein and only less than 20% had inadequate intake. Iron and energy intake was adequate for two thirds of the infants while it was inadequate for one third.



**Figure 4.8: Distribution of study infants by nutrients (energy, vitaminA, iron and protein) adequacy**

#### **4.5.3 Infants nutritional status and mothers' socio-demographic characteristics**

There was no significant association between infant nutritional status on the one hand and mothers' age, education level and occupation on the other hand. However, there was a statistically significant association ( $p= 0.009$ ) between infant nutritional status and family income. Table 4.14 shows a higher percentage of infants in "Normal and above" category with increase in family income.

**Table 4.14: Distribution of study Infants' by nutritional status and mothers' demographic and socio- economic characteristics.**

	Below Normal ( < -1SD ) N=43	Normal and above ( ≥-1SD) N=132	
Economic and Social-demographic characteristics	%	%	X <sup>2</sup> (level of significance)
<b>Mothers age(yrs.)</b>			
15-24	46.3	34.1	P=0.345 NS*
25-29	19.5	29.5	
30-35	24.4	30.2	
Above 35	9.8	6.2	
<b>Education level</b>			
Below secondary	86	71.2	P= 0.068 NS*
Secondary and above	14	28.8	
<b>Occupation</b>			
Housewife	65.1	59.2	P= 0.163 NS*
Small business	16.3	22.7	
Casual worker	16.3	8.3	
Dependant	2.3	9.8	
<b>Family income</b>			
< 1500	16.3	3.0	P= 0.019 S**
1500- 2499	20.9	20.5	
2500- 3499	32.6	37.1	
3500- 4500	30.2	39.4	
X <sup>2</sup> (chi-square test)	NS*- Not Significant at 5%		S**- Significant at 5%

#### 4.5.4 Social Economic and Demographic factors determining choice of feeding option.

Binary logistic regression was performed on multiple factors to establish true predictors of infant feeding options. In this analysis, exclusive breastfeeding and replacement feeding were considered as the feeding options. Mixed feeding was excluded due to the small number of mothers practising, hence limiting statistical analysis. Five factors were considered together into the model, namely;

- ↓ Mothers age in years
- ↓ Mothers level of education
- ↓ Mothers occupation
- ↓ Family monthly income
- ↓ Mothers knowledge on Mother-To-Child-Transmission of HIV

Table 4.15: Shows the final outcome of the analysis with family income as the only determinant in choice of infant feeding options. The analysis was also carried out on the various categories of family income and the outcome showed that; a mother is 5.25 times more likely to opt for exclusive breastfeeding than replacement feeding if the family income is less than 1500 KES. Compared to one whose family income is 3500-4500 KES. ( $P=0.043$ ). This implies that family income is a significant factor that influences the choice of feeding option.

**Table 4.15: Logistic regression predicting feeding option from family monthly income.**

Variables	Odds ratio	95.0% C.I. for odds ratio		P value
		Lower	Upper	
Monthly income				
< 1500	5.25	1.054	26.112	0.043**
1500 - 2499	3.32	1.187	9.311	0.022
2500 - 3499	1.27	0.225	7.159	0.786
*Reference category used was 3500 – 4500				
**Significant at 0.05 level.				



## **CHAPTER FIVE: DISCUSSION**

### **5.1 Choice of feeding options**

Infant feeding represents a great challenge in the prevention of mother-to-child transmission of HIV. WHO guidelines on infant feeding counselling suggests methods that reduce the risk of HIV transmission and discourage mixed feeding. It recommends HIV mothers to be advised on feeding options according to their local circumstances. However, information by which to assess the risks or benefits of breastfeeding or replacement feeding is rarely available and recommendations may be based on studies which may not necessary is applicable to the mothers' situation. Feasibility and social acceptance of the recommended feeding methods is an issue and mostly depend on the mothers prevailing circumstances (Aika A.O, 2006)

Breastfeeding which would be the most feasible option in limited resource settings where mothers cannot afford replacement feeding due to financial constrains and poor sanitation carries the risk of infant infection. Although replacement feeding will avoid possibility of MTCT of HIV through breast milk, absence of breastfeeding raises the issue of stigma and financial constrain in providing replacement feed. Heated breast milk, wet nursing and breast milk from milk banks which are the other recommended feeding alternatives (WHO /UNICEF, 2004) are not common in the Kenyan slum communities and most mothers are not familiar with them. This indicates a need for the mothers to be informed on all available infant feeding alternatives; their advantages and disadvantages; to help them chose what is suitable in their individual circumstances. A similar study done in Botswana, Malawi and Uganda, reported that 70% of mothers are not sure of the best

option to take. Majority believe that an HIV positive mother who breastfeed always infect the child and intentional avoidance of breastfeeding will raise suspicion that she is HIV positive (Chopra et al, 2006).

Three feeding options which include exclusive breastfeeding, replacement feeding and mixed feeding are practised by mothers in the study area of Nairobi. Majority of the mothers use replacement feeding mainly due to accessibility through donation of infant formula. This is expected as it relieves the mothers of the burden of buying infant feeds, but it also poses a problem when the donated formula is not sustainable. Inconsistent supply causes mothers to device coping strategies such as using excess water to mix the formula or reducing the frequency of feeding which is detrimental to the infants' health. The nutrients quantity in the feed is reduced and when this practice is continued for long, nutritional deficiency occurs and may expose the infant to nutritional deficiency diseases, (Mahan, 2000). However, the problem is not widely spread among the mothers in the study since most children have normal weight for age but it might have contributed to the few cases of underweight.

The small proportion (3%) of mothers practising mixed feeding is encouraging due to the dangers posed by this feeding practise. Mixed feeding irritates the infant's gastrointestinal tract (GIT) exposing the infant to HIV infection. The proteins found in solid foods cause damage to the infant's stomach lining making it easy for the virus to penetrate. However, the results may not give a true picture of the actual practice due to the possibility of under reporting of mixed feeding by the mothers. Furthermore, the study concentrated mainly on mothers attending health facilities and HIV support centres

and did not consider those not attending those facilities. Based on the information obtained from focus group discussions, the number is likely to be higher than what was reported by the respondents. Poor reporting arise from the mothers' knowledge of the dangers they are exposing their infants but stigma and social pressure cause them to practice the feeding option. Some earlier trial studies on infant feeding ( Nduati. et al, 2005) indicated that HIV positive mothers perceived replacement feeding as best option in reduction of MTCT risk but 31% end up breast feeding after initially initiating replacement feeding due to social pressure to breastfeed and concern for reputation as good mothers.

Exclusive breastfeeding would be ideal under the mothers' circumstances but the option has its challenges. Some mothers using this option are not able to meet their nutritional requirements hence breast milk production is not sufficient for effective breastfeeding. Such mothers opt for replacement feeding or mixed feeding. In some cases there is pressure to introduce complementary food too early since breast milk alone is considered not sufficient. The option is nonetheless ideal in situations where the mother is facing stigma and social pressure to breast feed. A similar study done in Tanzania, (Leshabari, 2007) revealed that fear of disclosure of HIV and social pressure to breastfeed are among the main reasons for choice of exclusive breastfeeding by HIV positive mothers. In Zambia a study on infant feeding indicated that the tendency to choose breastfeeding as a feeding option was due to fear of disclosure of HIV status, stigmatisation of non breastfeeding mothers and high cost of replacement feeding. (Aika, 2006).

## **5.2 Factors associated with choice of feeding options**

Advice by a health officer is attributed to choice of feeding options, especially, exclusive breastfeeding and replacement feeding. This also tallies with the outcome of where the infant is delivered, whereby delivery in a health centre results into 87% of the mothers opting for the two options. This may be associated with the intensified PMTCT counselling carried out at the health facilities where this study was conducted. If similar effort is made with PMTC programme running in most health facilities in the country (MOH, 2007), HIV positive mothers will be better informed on choice of appropriate feeding option. This tally with a study in Cameroon (Njom, 2005) which showed infant feeding counselling as the main factor influencing infant feeding choice and option.

Affordability contributes significantly to the choice of feeding option with most mothers facing financial constrains opting for exclusive breastfeeding and mixed feeding. The reason for this is that infant formula and animal milk which are the recommended option for replacement feed are too expensive. Apart from those mothers who had access to donated infant formula, only a few mothers could afford to use animal milk. The rest of the mothers used porridge , fruit and vegetable puree implying that use of recommended foods for replacement feeding, (WHO / UNICEF, 2004) was not adhered to.

Availability of the infant formula through donation, contributes to the high number of the mothers practising replacement feeding as none of the mothers ever buys the formula when not available at the support clinic. A few mothers opt to buy cow milk which they can afford. Considering the income of most mothers' households, commercial formulae

are out of reach. Replacement feeding option is convenient for working mothers and those in business since they can delegate infant feeding responsibility as they work. In such cases, donation of infant formula would have more impact in improving nutritional status of the infants if accompanied by a component of income generating activities for sustainability.

Stigma and social pressure contribute mainly in choice of exclusive breastfeeding and mixed feeding. This is attributed to community, family or spousal pressure on the mother to breastfeed. The mothers also opt for the two options due to the concern of maintaining confidentiality of their HIV status. This problem is still prevalent albeit in a smaller scale, with increasing HIV awareness (MOH, 2005 b)

Belief and knowledge of PMTCT is mainly associated with choice of replacement feeding. Currently there is a comprehensive and well focussed nation HIV program for PMTCT which has strengthened and increased access to antenatal care, provision of counselling and testing services including nutrition and antiretroviral drugs for mother and infant. Majority of the mothers in this program believe on replacement as the best feeding option in preventing transmission of HIV to the infant. This is reflected by the large number of the mothers opting for replacement feeding (MOH, 2007) .The response call for more support of the mothers in resource limited settings to make replacement feeding viable.

Although most of the social economic and demographic factors were not considered significant in regression analysis, there was a significant association of family income

with choice of infant feeding options. It also tallies with affordability which was given as a main factor in choice of exclusive breast feeding and mixed feeding options. The hypothesis that mothers' social economic status is significantly associated with choice of feeding option is therefore partially accepted.

### **5.3 Feeding options and implication on infants' health and nutritional status**

#### **5.3.1 Feeding option and infants' health**

Some studies on infant feeding suggest that diarrhoea and respiratory tract infection occurs less frequently in breastfed infants and the protection can be conferred by both exclusive and partial breastfeeding. The protective effect of breastfeeding is associated with maternal antibodies fighting against rotavirus which are thought to be present in breast milk. (Hillary, 2006) .However, this study did not find any significant association between the feeding options and infants morbidity experience.

Most of the infants had been sick two weeks preceding the day of interview, and cases of illness were equally distributed within the feeding options. This may be due to the fact that the infants are exposed to poor environmental sanitation and hygiene. Hence, it becomes difficult to tell whether the feeding options have any effect on morbidity experienced. However, there is need to improve on sanitation and hygiene to reduce the cases of illness as these may lead to feeding problems and compromise the nutritional status of the children.

Sickness among infants leads to low absorption of food from the gut, poor appetite and low intake which can cause malnutrition (WHO/ UNCEF, 2004) .With the support from the government and NGOs working in the area the community can be assisted to improve on sanitation and hygiene and this would reduce the morbidity level. The health centres can also contribute by educating the mothers on sanitation and good hygiene practices.

### **5.3.2 Feeding options and nutritional status**

The fact that majority of the infants have normal weight for age is an indication of dietary adequacy among the infants. The association of mixed feeding with cases of underweight, though the number is small, is expected since mixed feeding has proved to be a nutrition problem. It is a cause of malnutrition and high rates of morbidity in children and also HIV transmission from mother to the infant. (Piwoz et.al., 2001)

An observation worth noting is the association of mild underweight with exclusive breastfeeding. The underweight cases are likely due to mothers not producing sufficient milk resulting to the infants being underfed. The process of lactation is nutritionally demanding and especially for a mother who is fully nursing. Increased intake of all nutrients is advised for the mother to help her synthesis the amount of milk required for the infant (Mahan, 2000). However, nutritional counselling alone is not adequate in resource poor communities in that as much as the mothers may be willing to consume desirable diets, purchasing power and access is limited. In this case, exclusive breastfeeding would be successive if accompanied by an intervention component aimed at improving the socio-economic status of the mothers.

The few cases of overweight in replacement feeding could be attributed to excess food being given to the infant either by not using the recommended quantities for age or too frequent feeding. This could be an issue in use of infant formula if the mother does not follow the instructions correctly, and also the use of high energy dense foods such as porridge (starch and sugar) and purees (starch).

## **CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS**

### **1.1 Conclusion**

The study concludes that replacement infant feeding using infant formula is the most common option for feeding the infants among HIV positive mothers in Nairobi slums. However, use of infant formula is dependent on unsustainable modes of availability mainly donor distributions. Without this donations and government support therefore, use of appropriate replacement feeds in resource poor communities may not be viable.

Demographic and social economic factors are of less influence in choice of feeding option in poor resources urban areas except family income. Infant feeding counselling by health personnel leading to PMTCT knowledge is also a key factor in choice of exclusive breastfeeding and replacement feeding options.

The foods used for replacement feeding provided adequate amounts of protein, vitamin A, iron and energy. This contributed to the majority of infants having normal nutritional status.

Though most mothers depended on donations of infant formula for replacement feeding, family income showed significant influence on nutritional status of the infant with higher income resulting into higher percentage of infants in normal and above category.



Generally, the area is crowded and the sanitation is poor contributing to high level of morbidity among the infants. Hence it is not possible to associate feeding options with morbidity experience in poor resource settings. However, with proper infant feeding counselling especially on hygiene, the mothers can practise safe replacement feeding.

Replacement feeding is associated with better nutrition status though with overweight cases due to overfeeding and type of food used, while exclusive breastfeeding and mixed feeding are associated with average nutritional status and some cases of underweight. The underweight problem can be attributed to inadequate maternal nutrition interfering with breast milk production. Therefore, the choice of feeding options has a significant implication on the nutritional status of the infants.

The study findings are expected to update the PMTCT counsellors and program managers on factors influencing infant feeding practices among HIV positive mothers in limited resource settings and help policy planners in developing strategic plans in prevention of mother to child transmission of HIV (PMTCT).

## **6.2 Recommendations**

Proper choice of feeding option play a big role in improving the nutritional status of the infants and also in prevention of mother to child transmission (PMTCT) of HIV. Based on these findings, the study arrives at the following recommendations:

- ✚ Replacement feeding resulted into better nutritional status among the infants and therefore emphasis should be put on personal hygiene, access to clean water, physical and environmental sanitation to make the feeding option viable.
- ✚ In limited resource settings, HIV positive mothers should be empowered by providing basic amenities in relation to environmental sanitation and promoting income generating activities to enable replacement feeding and provide good nutrition to the breastfeeding mothers.
- ✚ If infant formula is to be provided to HIV positive mothers in resource poor settings, it should be sustainable up to the recommended age to ensure continuous supply and discourage poor feeding practices which impact negatively on infants' health.

The study findings provide updated information on factors influencing infant feeding practices among HIV positive mothers in limited resources setting and implications of infant feeding options on nutritional status of the infants. PMTCT counsellors, program managers and policy planners should use this information to develop strategic plans in PMTCT while keeping in mind the options for such mothers.

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### **Morbidity and immunization**

10. Has the child been sick in the last two weeks? Yes=1 No=2
11. What was the illness?  
Diarrhoea=1 Common cold=2  
Fever=3 Stomach upsets/ vomiting=4  
Malaria=5 Pneumonia=6
12. Where was the child delivered?  
Health facility=1 Under TBA=2  
At home=3
13. Has the child been immunized?  
Fully immunized=1 Partially immunized=2  
Not immunized=3
14. Confirmed immunization status from Child Health Card? Yes=1 No=2

### **Child feeding practices**

15. What feeding option are you using for your child? Breast milk=1  
Replacement feeding=2  
Mixed feeding=3
- 16 Why have you chosen this option? \_\_\_\_\_
17. How frequently do you feed the child? On demand=1 Intervals of 3 hours=2  
3-4 times a day=3 6-7 times a day=4
18. Do you plan to change the option you are using before the child is six months?  
Yes=1 No=2
- 19 If Yes, to what option? \_\_\_\_\_
20. What challenges do you encounter in practicing the option you have chosen?  
\_\_\_\_\_

## **Mother's beliefs and knowledge of MTCT HIV**

20 Do you know that HIV can be transmitted from mother to child?

Yes=1 No=2

21 If yes how? During pregnancy/ delivery/ breastfeeding =1 Any other two ways of

Transmission=2 Any one way of transmission=3

22. Do you believe that Mother to Child Transmission of HIV can be prevented?

Yes=1 No=2

23. Has any one talked to you about prevention of mother to child transmission of HIV?

Yes=1 No=2

24. If yes, who talked to you? Health officer=1 Social worker= 2 Friends and

Relatives=3

## **Mothers' acceptance of recommended feeding alternatives**

Considering your HIV status would you use the following feeding options and if no why?

25. Expressed heat treated breast milk? Yes=1 No=2

26 Breast milk from milk bank? Yes =1 No=2

27. Wet- nursing? Yes=1 No=2

28. Commercial infant formula? Yes=1 No=2

29. Dried milk powder? Yes=1 No=2

30. Animal milk (cow/ goat/camel)? Yes=1 No=2

**Anthropometric measurements**

31. Name of Child \_\_\_\_\_

32 Age (months) \_\_\_\_\_

33 Sex Male =1 Female=2

34. Measurements First Reading Second Reading Third Reading Average

Weight (kg) \_\_\_\_\_

Height (cm) \_\_\_\_\_

**Nutritional adequacy for replacement feeding:**

35. How many times do you feed the baby in a day? \_\_\_\_\_

36. What did you feed the baby from Yesterday morning to today? \_\_\_\_\_

37. Explain to me what was used to prepare each meal and the quantities \_\_\_\_\_

38. What quantities did the baby eat? \_\_\_\_\_

(Quantities to be equated to weight in grams)

**39 24-h dietary intake Recall Assessment table:**

No. of feeds	Type of meal	Quantities of ingredients	Quantity consumed by the Infant (gms)	Amount of estimated nutrients			
				Iron (mg)	Proteins (mg)	Energy (kcal)	Vitamin A (µg)

## APPENDIX II: Field assistants training program

DAY	TIME	SUBJECT	LEARNING METHOD	LEARNING AIDS
1.	8.30-10.30AM	Introduction	Lecture /Discussion	Handouts/ Board
	11- 1.00PM.	-Techniques of data collection - Handling questionnaire -Interacting with study subject	-Lecture - Discussion - Demonstration	- Handouts - Writing board
	2-4 PM	- Tips in carrying out interviews. - Tips in recording of information from - Respondents.	- Lecture - Discussion - Demonstration	- Handouts -Samples - Questionnaires
2.	8.30-10.30 AM	- Handling of study subjects and tools -Ethical issues, -filling in of questionnaire and use of tools	- Lecture - Discussion - Demonstration	- Handouts - Questionnaires - Measuring tools/equipment
	11-1.00 pm	-Taking measurements -Recording of data	- Discussion, - Demonstration - Role play	-Measuring Equipment and tools -Questionnaire
	2-4 pm	Assessment of dietary intake: - Application of 24-h-Recall method and Review of methods/tools.	- Lecture/ - Discussion - Demonstration	-Handouts - Measuring/ weighing tools
3.	8.30-9 Am	Briefing by Principal Investigator.	- Discussion - Demonstration	-Food samples - Questionnaires - Tools
	9.30-1Pm. 2-4 Pm	-Pretesting in field -Review of tools / measurements	- Role play - Discussion	- Questionnaires -Measuring tools and equipment

### **APPENDIX III: focus group discussion guideline**

The discussion dwelt on the following areas:

- ↓ Level of morbidity and mortality of infants in the community and the causes.
- ↓ Common illness among infants
- ↓ Community attitude towards HIV/AIDS infected individuals.
- ↓ Knowledge of Mother to child transmission of HIV.
- ↓ Knowledge of Prevention of mother to child transmission of HIV.
- ↓ Common sources of income for the households.
- ↓ Knowledge of feeding options available to HIV positive mothers.
- ↓ The most acceptable and accessible feeding option for HIV positive mothers.
- ↓ Common methods of preparing infants food.
- ↓ Frequency of feeding infants and quantities given per feed.
- ↓ Challenges encountered by HIV positive mothers in choice of feeding option.
- ↓ Coping strategies in the face of difficulties in infant feeding.