FEEDING PRACTICES AND NUTRITION STATUS OF HIV-EXPOSED INFANTS 0-5 MONTHS OF AGE ATTENDING TENWEK HOSPITAL IN BOMET COUNTY, KENYA

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DECLARATION

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

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To my husband Bernard, my parents Mr. and Mrs. Stanley Lang’at, my son Warren, my siblings, Ketty, Daisy and Collins, and all my friends for their genuine support.
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ABBREVIATIONS AND ACRONYMS

AIDS  Acquired Immunodeficiency Syndrome

ANC  Antenatal Clinics

ART  Antiretroviral Therapy

ARV  Antiretroviral

BMI  Body Mass Index

DHIS  Demographic Health Information System

EBF  Exclusive Breast Feeding

eMTCT  Elimination of Mother-to-Child Transmission

ERF  Exclusive Replacement Feeding

FGD  Focus Group Discussion

HIV  Human Immunodeficiency Virus

HTC  HIV Testing and Counselling

IYCF  Infant and Young Child Feeding

KAIS  Kenya Aids Indicator Survey

KDHS  Kenya Demographic and Health Survey

KII  Key Informant Interview

LAZ  Length-for-Age Z-scores

MCH  Maternal and Child Health
MDG  Millennium Development Goals

MOH  Ministry of Health

MTCT  Mother-to-Child-Transmission

NACC  National AIDS Control Council

NASCOP  National AIDS and STI Control Programme

NGO  Non-Governmental Organization

PITC  Provider Initiated Testing and Counselling

PMTCT  Prevention of Mother-to-Child-Transmission

SD  Standard Deviation

SDGs  Sustainable Development Goals

SMART  Standardized Monitoring and Assessment of Relief and Transition

SPSS  Statistical Package for Social Sciences

STI  Sexually Transmitted Infection

UNAIDS  Joint United Nations Programme on HIV/AIDS

UNICEF  United Nations’ International Children’s Emergency Fund

WAZ  Weight-for-Age Z-scores

WHO  World Health Organization

WLHIV  Women Living With HIV

WLZ  Weight-for-Length Z-scores
DEFINITION OF TERMS

**Exclusive breastfeeding:** Infant receives only breast milk and no other liquids or solids except drops or syrups consisting of vitamins, minerals, or medicines. Breast milk can include mother’s expressed milk or milk from a wet nurse for the first 6 months after birth (WHO, 2009).

**Exclusive replacement feeding:** Infant receives no breast milk and is being fed suitable breast milk substitutes in the form of commercial infant formula for the first 6 months after birth (WHO, 2009).

**Growth failure:** Refers to a growth rate in children that is below the appropriate growth velocity for age. The child can be classified as stunted, underweight or wasting due to chronic malnutrition or disease infection (Arpadi, 2009).

**Health interventions:** Efforts that promote behaviour that optimizes mental and physical health, or discourages or re-frames behaviours considered to be potentially health-threatening including immunization and prophylaxis (McLaren, 2007).

**Health status:** Presence or absence of life-threatening illness, risk factors for premature death, severity of disease, and overall health (Becquet et al., 2009).

**Length-for-age z-score:** It indicates the attained growth in length of the child’s age. This indicator is used to assess whether a child has normal length (≥1 to <2 SD), is moderately stunted (>3 to ≤2 SD) or severely stunted (≤-3 SD). It can help identify children who are stunted (short for their age) due to prolonged under nutrition or repeated illness (WHO, 2008).
Mixed feeding: Infant receives breast milk and any other food or liquid including water, non-human milk and formula before 6 months of age (UNICEF, 2011).

Vertical transmission: Occurs when HIV is spread from an HIV positive woman to her baby during pregnancy, labour and delivery or breastfeeding. It is also known as mother to child transmission of HIV (WHO, 2009).

Weight-for-age z-score: It indicates the body weight relative to the child’s age. This indicator is used to assess whether a child has normal weight (≥1 to <2 SD), is moderately underweight (> -3 to ≤ -2 SD) or severely underweight (≤ -3), but it is not used to classify a child as overweight or obese (WHO, 2008).

Weight-for-length z-score: It indicates the body weight in proportion to attained growth in length. This indicator is used to assess whether a child has normal weight and length (≥1 to <2 SD), is moderately wasted (> -3 to ≤ -2 SD) or severely wasted (≤ -3). It is useful in situations where children’s ages are unknown (WHO, 2008).

Z-scores: The deviation of an individual’s value from the median value of a reference population, divided by the standard deviation of the reference population (WHO, 2006).
OPERATIONAL DEFINITION OF TERMS

Feeding practices: These are the options that a mother chooses to feed her infant. These practices can be exclusive breastfeeding, exclusive replacement feeding or mixed feeding.

HIV-exposed: Infants of 0-5 months of age with known/unknown HIV status born to mothers infected with the HIV.

Nutrition status: It is the physiological condition of the body of an infant resulting from intake, absorption and utilization of food. It is determined by length for age (indicator for stunting), weight for age (indicator for underweight) and weight for length (indicator for wasting) z-scores.

Optimal infant feeding practices: Feeding HIV-exposed infants according to the World Health Organization (WHO) and Kenyan Ministry of Health (MoH) recommendations and this can be exclusive breastfeeding (feeding infants only on breast milk with exception of drops or syrups of vitamins and mineral supplements or medicine) or exclusive replacement feeding (feeding infant who is not breast fed with commercial formula with composition close to breast milk).
Out of an annual 15 million pregnancies globally, an estimated overall Human Immunodeficiency Virus prevalence of 0.34% is reported in antenatal women in Kenya. In 2013, there were 13,000 new HIV infections among children. Appropriate feeding practices and good nutrition status are important for the survival, growth, development, health and nutrition of HIV-exposed infants as well as the well-being of their mothers. The recommended infant feeding practice is exclusive breastfeeding (EBF) or exclusive replacement feeding (ERF) for the first 6 months of life. There is limited literature in Kenya and Bomet County on feeding practices and nutrition status of HIV-exposed infants 0-5 months of age, particularly after the changes in Infant and Young Child Feeding recommendations for HIV-exposed infants in the year 2010. The purpose of this study was to determine the feeding practices and nutrition status of HIV-exposed infants who are 0-5 months of age attending the Tenwek Hospital’s paediatric clinic in Bomet County. The study adopted a cross-sectional analytical study design with quantitative and qualitative approaches in data collection, analysis and presentation. A comprehensive sample of 118 mothers/caregivers with HIV-exposed infants 0-5 months of age participated in the study. A researcher-administered questionnaire, focus group discussion guide and key informant interview guide were used to collect data. The data was analysed using SPSS version 22. Nutrition status was analysed using ENA for SMART based the WHO 2006 growth standards’ Z-scores and then exported to SPSS. Infant feeding was based on the mode of feeding in the previous 24 hours. Statistical significance was set at p values less than 0.05. Exclusive breastfeeding was practiced by the majority of the participants (73.7%), 14.4% practiced exclusive replacement feeding and 11.9% mixed fed their infants. More than half the infants had normal length for age (57.6%), weight for age (60.2%) and weight for length (76.3%). About a third (38.1%) of the infants were moderately and severely stunted, 39% were moderately and severely underweight and 19.5% were moderately wasted. No severe wasting was recorded. Infants on EBF were less likely to be stunted (OR=2.401; p=0.001; 95% CI 0.906-5.806) or underweight (OR=2.001; p=0.001; 95% CI 0.328-6.124) compared to those on mixed feeding. There was however, no significant difference in the likelihood for wasting among infants on EBF, ERF or mixed feeding (OR=1.528; 95% CI 0.294-7.954; p=0.614). Challenges to optimal infant feeding were lack of adequate financial resources, cultural beliefs, HIV-related stigma and conflicting knowledge on current guidelines and recommendations on infant and young child feeding. Based on the findings, it is recommended that the Ministry of Health, National AIDS and STI Control Programme, County Government of Bomet and Tenwek Hospital develop a policy to support infants who qualify for exclusive replacement feeding but mothers/caregivers face financial constraints. In addition, they should organize training for non-nutritionist health workers on the current guidelines for infant and young child feeding in the context of HIV.
CHAPTER ONE: INTRODUCTION

1.1 Background to the study
Globally, about 35.3 million people are now living with Human Immunodeficiency Virus (HIV) (Joint United Nation Programme on HIV/AIDS [UNAIDS], 2014) with an estimated 2.3 million new infections in 2012. Women comprise more than half of the global population living with HIV. A third of the total population living with HIV is in the sub-Saharan Africa (Gangar, 2009). This includes over 90% of the world’s children living with HIV (Villamor, Fataki, Bosch, & Fawzi, 2004). According to estimates and projections for 2013 in Kenya, there were approximately 1.6 million people living with HIV, of whom 191,840 were children with an estimated 12,940 new HIV infections among children (National AIDS and STI Control Programme [NASCOP], 2014b).

Thirty to forty five percent of infants born to mothers living with HIV in developing countries become infected during pregnancy, delivery and breastfeeding, when there is no intervention put in place (de Cock et al., 2000). Becquet et al., (2009) reported that 91% of the children living with HIV were infected through mother-to-child-transmission (MTCT). In Kenya, the total number of deliveries by HIV positive mothers was about 79,000 in the year 2013 (UNAIDS, 2014). There were about 13,000 new child infections in the same year. This translated to a 16% mother to child transmission rate (UNAIDS, 2014). In this regard, HIV infection among children less than 14 years was estimated at 0.9% which translates to about 101,000 children infected nationally (NASCOP, 2014a). In Bomet County, children comprised of 13% of those living with HIV by end of 2011 translating to 2,524 children, of whom 126 were from the Tenwek region (NASCOP, 2014b). The
prevalence of HIV amongst infants 0-5 months of age has not been documented in Kenya AIDS Indicator Survey (KAIS).

Promotion of appropriate infant feeding practices is a key strategy in prevention of mother-to-child transmission (PMTCT) of HIV. The WHO in collaboration with UNICEF have developed the Global strategy for infant and young child feeding, that recognizes appropriate infant feeding practices to be crucial for improving the nutrition status and decreasing infant mortality in all countries (WHO, UNICEF, UNAIDS, & UNFPA, 2010). The WHO recommends that for HIV-exposed infants, the national health authorities should promote a single infant feeding practice as the standard of care and information about other practices should be made available to mothers, although health services would mainly support one approach for the prevention of mother-to-child transmission of HIV (PMTCT) (WHO et al., 2010). Kenya has adopted exclusive breast feeding for the first 6 months of life, introduction of appropriate complementary foods thereafter, and continue breastfeeding for the first 12 months of life (Government of Kenya et al., 2011). Breastfeeding should then only stop once a nutritionally adequate and safe diet can be provided without breast milk.

In circumstances where a mother living with HIV is not able to breastfeed her infant, exclusive replacement feeding (ERF) is recommended. This ERF should be acceptable, feasible, affordable, sustainable and safe (AFASS) (WHO et al., 2010). In addition, mothers known to be living with HIV are provided with lifelong antiretroviral therapy or antiretroviral prophylaxis interventions to reduce HIV transmission through breastfeeding.
The infant also receives antiretroviral prophylaxis during the period they are breastfeeding in order to reduce MTCT. The current rate of exclusive breastfeeding in Kenya is 61% (KNBS, MOH, NACC, KEMRI, & NCPD, 2015).

Sub-optimal infant feeding practices has been associated with malnutrition/poor growth among infants. For the HIV-exposed infants, HIV is another contributing factor to poor nutrition status. A review of several studies by Isanaka, Duggan, and Fawzi, (2009) found that children living with HIV had low weight for age, weight for height/length and height/length for age compared to those not living with HIV especially within 3 to 4 months of birth. The impairment was higher in developing countries compared to developed countries. The same nutrition indices however, were normal for infants 0-5 months of age who were HIV-exposed but not infected in most studies, except one conducted in Nairobi, Kenya by Sherry, Embree and Mei, (2000). Sherry et al., (2000) found that height for age was significantly lower at 1.5 months after birth and weight for height z-scores were greater at 6 months and 18 month after birth among HIV-exposed.

The increased risks among HIV-exposed infants, makes it important to provide comprehensive care to these infants with a particular emphasis on nutrition in order to reduce the risk of MTCT as well as improve their quality of life. It is against this background that this study was conducted.

1.2 Statement of the problem

In Kenya, the risk of HIV transmission from an infected mother to her child has been found to range from 9% to 20% (Neumann, 2012). In Bomet County, there were about 1,019
HIV positive pregnant women by the end of 2011 (NASCOP, 2013). These women potentially placed their children at risk for mother to child transmission of HIV during pregnancy, at birth or when breastfeeding (NASCOP, 2013). In the same year, 2,524 children were reported to be infected with HIV through Mother-to-Child-Transmission (MTCT) in Bomet County (NACC, 2014).

To avoid the MTCT, WHO and MoH in Kenya recommend either exclusive breastfeeding or exclusive replacement feeding for HIV-exposed infants. Evidence shows that sub-optimal infant and young child feeding practices among HIV-exposed children result in malnutrition presenting as growth faltering (Bii et al., 2008; Kimani-Murage et al., 2011; Neri et al., 2013; Oleske, 2008). As a result, growth failure as seen in stunting and underweight is considered as an early marker of HIV infection (Neri et al., 2013). High levels of stunting, wasting and underweight have been reported in the postnatal period in children from areas with increased burden of HIV infection. Under-nutrition occurs more frequently in HIV infected children but it has also been noted to occur in HIV-exposed but uninfected children (McGrath et al., 2012).

Studies have shown that in resource limited settings, there is early occurrence of under-nutrition before age three months in both HIV infected and HIV exposed uninfected children and they also have high mortality rates (Homsy et al., 2010; Kafulafula et al., 2010; Kuhn et al., 2010; Ram et al., 2012). In low socio-economic communities under-nutrition results from multiple factors including sub-optimal infant feeding practices, opportunistic infections and immune deficiencies micronutrient deficiencies (Landes et al.,
In Kenya, the rate of stunting among the general population is 26%, underweight is 4.3% and wasting is 3.7%, while in Bomet County, the rate of stunting is 35.5%, underweight is 12% and wasting is 1.8% (KNBS et al., 2015). These high rates in the general population could indicate that the prevalence could be higher among HIV-exposed infants.

Nutrition status is related to infant feeding practices. Exclusive breastfeeding rates among all infants 0-5 months of age in Kenya is 61% (KNBS et al., 2015), while the rates for Bomet County are not documented. Sub-optimal infant feeding practices as well as poor nutrition status poses a challenge to meeting Kenya vision 2030 and the sustainable development goals (SDGs) both in the County and in Kenya since they impact negatively on the economy. There is generally limited literature in Kenya and Bomet County on the infant feeding practices and nutrition status among HIV-exposed infants 0-5 months of age, particularly after the changes in the IYCF recommendations for HIV-exposed infants by WHO in 2010.

1.3 Purpose of the study

The purpose of the study was to determine the infant feeding practices and nutrition status of HIV-exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital in Bomet County.
1.4 Objectives of the study

The objectives of the study were to:

1. Determine the infant feeding practices among HIV-exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital.

2. Determine the nutrition status of HIV-exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital.

3. Establish the relationship between infant feeding practices and nutrition status among HIV-exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital.

4. Identify the challenges to optimal infant feeding practices among HIV-exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital.

1.5 Research hypotheses

H₀₁: There is no significant relationship between infant feeding practices and stunting among HIV-exposed infants 0-5 months of age.

H₀₂: There is no significant relationship between infant feeding practices and underweight among HIV-exposed infants 0-5 months of age.

H₀₃: There is no significant relationship between infant feeding practices and wasting among HIV-exposed infants 0-5 months of age.

1.6 Significance of the study

The information generated by this study may be significant to several stakeholders. At County level, it may be useful to the health facilities, communities and County government of Bomet, while at national level, it may be useful to the Ministry of Health, National Aids
Control Council (NACC), and National AIDS and STIs Control Programme (NASCOP), among others. This study highlights the gaps in feeding practices and nutrition status of HIV-exposed infants 0-5 months of age and can therefore inform policy makers and implementers of areas to focus on when designing interventions for this category of children.

1.7 Delimitation of the study
This study only focused on the feeding practices and nutrition status of HIV-exposed infants who are 0-5 months of age attending paediatric clinic at Tenwek Hospital. Generalization of the findings can therefore, only be done to populations and health facilities of similar characteristics.

1.8 Limitation of the study
The study did not reveal the influence that time or different seasons in the year may have on infant feeding practices, as well as the changes in feeding practices that may occur with infant age, as this information was only collected at one point in time.
1.9 Conceptual framework

The study adopted the conceptual framework by Steven and Jeniffer, (2006) on the relationships between nutrition status and feeding patterns among HIV-exposed children (Figure 1.1).

![Conceptual Framework Diagram]

Figure 1.1 Conceptual framework on the relationships among HIV exposure, feeding practices and nutrition status in children.

Source: Adopted and modified from Steven and Jennifer (2006).

The nutrition status of a HIV-exposed infant is affected by the HIV exposure, feeding practices and challenges the mother/caregiver faces. HIV-exposure influences the nutrition status by the fact that the infant may be born small for gestational age due to intrauterine growth retardation. The infants may also be infected with HIV which leads to increased
needs thus influencing the nutrition status of the infant. A mother/caregiver can choose to exclusively breastfeed, give replacement feeds or practice mixed feeding. The challenges that the mother experience determines the feeding mode she chooses for her infant as well as the risk of HIV transmission. These challenges faced by mothers related to infant feeding may include inadequate knowledge on the recommended infant feeding practices, traditional and cultural beliefs as well as limited financial resources. This can influence the nutrition status by determining the feeding choices and practices for instance; financial constraints can limit the choice of exclusive replacement feeding due to the inability to afford formula milk. This study focused on the nutrition status, feeding practices and challenges to optimal infant feeding practices among HIV-exposed infants 0-5 months of age.
2.1 Nutrition related risks and HIV-exposure in infants

The risk of HIV transmission from mother to child ranges from 9% to 20% in Kenya (Neumann, 2012). According to the UNAIDS global AIDS report released in 2014, the total number of deliveries by mothers living with HIV was about 79,000. Further, about 13,000 new child infections were recorded. This translated into a 16% mother to child transmission rate. A study by Gewa, Oguttu and Savaglio, (2011) in Kisumu, found that most of the children may be infected peri-natally from their mother during the time of pregnancy, birth or breastfeeding. The MTCT accounts for more than 10% of all new HIV infections globally. In the absence of interventions, the risk of MTCT is 20-45%, with the highest rates in populations with prolonged breastfeeding (WHO et al., 2010). The WHO guidelines for HIV and infant feeding of 2010, recommended exclusive breastfeeding (EBF) coupled with anti-retroviral viral (ARV) prophylaxis for the first 6 months of life for HIV-exposed infants.

Poor nutrition status places children at increased risk of morbidity and mortality and is also shown to be related to impaired mental development (KNBS et al., 2015). Almost half (45%) of all deaths among children under five are due to one or more forms of undernutrition leading to fetal growth restriction, stunting, underweight, wasting, vitamin A and zinc deficiencies, HIV infection and sub-optimal breastfeeding (Black et al., 2011).

2.2 Feeding practices among HIV-exposed infants

A number of studies have been conducted on HIV-exposed infants’ feeding practices with varied findings. A study conducted in Lagos in two university teaching hospitals showed
that 73.5% of the infants were on ERF, 18.5% were on EBF while 8% of the infants were on mixed feeds (Olatona, Ginigeme, Roberts, & Amu, 2013). These study had participants drawn from urban settings with 43.5% of the participants counselled on ERF, 17.5% were counselled on EBF and 34.5% were counselled on both ERF and EBF. The ages of the infants under study ranged from 2 weeks to 72 weeks and this posed a risk of recall bias among mothers as the duration of recall was longer than in the current study where the recall is for the previous 24 hours. In an intervention study conducted in Ile-Ife in south-west Nigeria, it was reported that mothers should choose infant formula in order to reduce the risks of HIV transmission to their infants (Abiona et al., 2006). There were concerns however, about affordability of infant formula in this study. Another study conducted in University College Hospital, Ibadan by Oladokun, Brown and Osinusi, (2010) found that 92.5% of mothers living with HIV chose ERF. The main reason stated by the mothers for their choice of infant feeding was to reduce the risk of transmission of HIV.

A study in Lusaka, Zambia by Omari, Luo, Kankasa, Bhat and Bunn, (2003) found that all mothers breastfed their children but only 35% of infants less than 4 months of age were exclusively breastfed. This was a longitudinal study conducted in an urban area in which the HIV-exposed infants were followed up from birth up to 12 months. Another study conducted in Delhi, India reported that exclusive breastfeeding was practiced by 57% of HIV-exposed infants up to 6 months of age. The sample size was however not large especially when it came to finding the proportions for children of various age groups. The study was also conducted in an urban setting, and included children from health-conscious mothers, coming to the centre for immunization and thus it was not representative of the
general population who may not go to hospital (Khan, Kayina, Agrawal, Gupta, & Kannan, 2012).

The rate of exclusive breastfeeding among HIV-exposed infants was higher in a study conducted in Northwest Ethiopia (89.5%) (Muluye, Woldeyohannes, Gizachew, & Tiruneh, 2012). In Kenya, Bii et al., (2008) found that 50% of the HIV-exposed infants were on ERF, 35% on EBF and 14% on mixed feeds at Kitale District Hospital. Both studies were cross sectional in nature and were institution based. A clinical trial conducted in Kisumu by Okanda, Borkowf, Girde, Thomas and Lecher, (2014) found that 80.4% of the mothers living with HIV breastfed their infants. The current rate of exclusive breastfeeding among the general population in Kenya is 61% (KNBS et al., 2015) while the rate of EBF in Bomet county has not been documented. There were varied findings generally in Africa on infant feeding practices of HIV-exposed. Further, there is limited literature on feeding practices among HIV-exposed infants 0-5 months in Kenya, particularly in Bomet County.

2.3 Nutrition status among HIV-exposed infants

Nutrition status among infants has been shown to be poor in less developed countries. In 2014, about 16% or 95 million children under five years of age in less developed regions were underweight (WHO, 2015). According to the recent KDHS (2015), the nutrition status for infants 0–6 months of age in the Kenya general population is 10% stunting, 3.7% underweight, and 3.7% wasting(KNBS et al., 2015). A study conducted on 737 HIV-exposed infants in India by Ram et al., (2012) reported stunting and underweight to be high in both the HIV infected and uninfected infants. The nutrition status of infants in the same
age group in some of the African countries was worse than those in Kenya, with 9%-19% stunted, 4%-14% underweight, and 3%-16% wasted (WHO Global Database on Child Growth and Malnutrition). In a randomized control trial conducted in India by Ram et al., (2012), there was an overall high prevalence of malnutrition at birth with HIV-exposed infants having approximately 47% stunting, 10% wasting and 26% underweight.

In the study conducted by Ram et al., (2012) HIV-exposed but uninfected infants were monitored for stunting, underweight and wasting as nutrition indicators. HIV-infected infants had poorer nutrition outcomes over a period of time. The study found that with onset of HIV infection, the divergence in growth profile of the infants occurred within 4–6 weeks of life and persisted through one year of life. In a retrospective study of 162 HIV-exposed infants at a Regional Paediatric Centre for HIV in Delhi, prevalence of wasting and stunting was 50.5% and 48.8%, respectively (Seth et al., 2012). In another study conducted in Dar es Salaam, Tanzania, stunting was found to occur at 29% and wasting at 8% (Villamor et al., 2004). In a review of infant growth studies examining HIV-exposure and postnatal growth, only one study in Kenya by Sherry, Embree, & Mei, (2000) found significantly higher stunting among HIV-exposed uninfected compared to infants unexposed to HIV. The other studies found a lack of association suggesting that viral exposure without infection is not detrimental to postnatal growth (Isanaka et al., 2009).

A research in the urban slums of Korogocho and Viwandani carried out by Kimani-Murage et al., (2011) found that HIV infected children less than 18 months of age had significantly poorer nutrition outcomes compared to their HIV uninfected counterparts. This study was conducted in urban slums and therefore, may not be comparable to other population with
different characteristics. This study also targeted children 0-18 months that have varied feeding recommendations by WHO and MoH. This age group is also very diverse. There is limited literature on nutrition status of the 0-5 months age group in Kenya, particularly Bomet County.

2.4 Associations among HIV-exposure, infant feeding practices and nutrition status

There was limited literature on the association between feeding practices and nutrition status among HIV-exposed infants 0-5 months of age and therefore the literature has been reviewed in relation to various age groups on the available literature and different indices.

In a prospective cohort study conducted in Lagos, Nigeria on anthropometric indices of infants born to mothers living with HIV, categorization of the infants by birth weight showed that there were three times more LBW infants in the HIV-positive cases than in the HIV-negative controls (Ezeaka, Temiye, Iroha, Akinsulie, & Adetifa, 2009). In a cross sectional study conducted in a University college Hospital, Ibadan by Oladokun et al., (2010) there was no significant association between the feeding practice and HIV exposure at six weeks. A study conducted in Nairobi by Muchina & Waithaka, (2010) found that children who were not on EBF for six months were more than twice as likely to be underweight than those who were on EBF. In addition, children who continued breastfeeding were one and half times likely not to suffer from wasting compared to those who had discontinued breastfeeding. Another study conducted in Bangladesh found that exclusively breast fed infants were nutritionally better off than those on mixed feeding (Giashuddin, Kabir, Rahman, & Hannan, 2003).
In contrast, a study conducted in Malawi by Kamudoni, Maleta and Shi, (2014) found that EBF was not associated with LAZ, WAZ or WLZ among infants 0-6 months. Further, in a collaborative study conducted in Europe by Newell, Borja, & Peckham, (2003), neither stunting nor underweight was associated significantly with HIV-exposure at birth (p =0.57 and 0.06, respectively), but differences between infected and uninfected children increased with age. In a randomized controlled trial conducted in Dar es Salaam, Tanzania, the HIV status of the infants was independently associated with deficits in LAZ and WLZ scores, while infant morbidities such as diarrhoea or respiratory illnesses independently reduced subsequent WLZ but not LAZ scores (Webb, Manji, Fawzi, & Villamor, 2009). There is limited literature on the association between nutrition status and feeding practices among the HIV-exposed infants in Kenya.

1.5 Challenges to optimal feeding of HIV-exposed infants

There are well documented benefits of breastfeeding that include improved infant immunity and thus decreased morbidity and mortality from disease, improved paediatric development, and health benefits for mothers including natural birth spacing, improved maternal-child bonding and economic and environmental benefits (Pediatrics, 2012). Infants who are fed on foods or liquids in addition to breast milk (mixed feeding) instead of breast milk (replacement feeding) during the first 6 months of life are at increased risk of morbidity and mortality from unsafe water, inadequate formula preparation or storage, unsanitary conditions and infant formula shortages, particularly in low-resource settings. Reports on nutrition programmes implemented in Sub-Saharan region have indicated that stigma is associated with exclusive replacement feeding. Women living with HIV often
breastfeed in public while also privately feeding formula or other foods and liquids to infants younger than 6 months (UNFPA et al., 2001). This increases the risk of vertical transmission.

Infant and young child feeding (IYCF) guidance for HIV-exposed children has continued to evolve since WHO issued its first infant feeding technical consultation consensus statement in 2000 (WHO, 2000). The risk of HIV transmission from breastfeeding up to 18–24 months is 15–20%, but studies in low-resource environments have concluded that not breastfeeding or stopping breastfeeding early increased mortality and reduced HIV-free survival (Siegfried, Van der Merwe, Brocklehurst, & Sint, 2011; Thior et al., 2006).

The infant feeding recommendations have kept changing based on the emerging evidence. In 2006, WHO recommended that mothers living with HIV choose between exclusive breastfeeding for 6 months or exclusive replacement feeding for 6 months if acceptable, feasible, affordable, sustainable and safe (AFASS) (WHO, 2007). By 2010, data on the impact of antiretroviral drugs (ARVs) on reducing the risk of mother-to-child transmission of HIV and increased all-cause mortality among infants who were not exclusively breastfed led to WHO updating its recommendations again: this time urging countries to endorse one nation-wide infant feeding recommendation for women with HIV – either avoid all breastfeeding, or breastfeed while taking ARVs. In countries that adopted breastfeeding as the policy according to the WHO review report 2010, women with HIV are encouraged to continue breastfeeding for at least 1 year and until a nutritionally adequate and safe diet without breast milk can be provided. Even where ARVs are not available, WHO (2010) guidelines still recommended mothers to exclusive breastfeed their HIV-exposed infants.
The rapid change in global recommendations for infant feeding in the context of HIV caused confusion among health care providers and mothers living with HIV (Sint et al., 2013). Countries are often slow to adopt new global guidelines, and they are faced with challenges in retraining healthcare providers (Sint et al., 2013).

Most hospitals in Kenya, face challenges in providing appropriate care for HIV exposed infants (Bii et al., 2008). These challenges include lack of adequate awareness on exclusive breastfeeding among mothers and healthcare workers, inadequate funding from the national and county government, and inadequate trained personnel (Bii et al., 2008). In other studies in Africa women cited employment as a barrier to breastfeeding (Agbo et al., 2013; Ogada, 2014). Women who resume their duties before their infants are six months of age were reported to face challenges in adhering to the practice of exclusive breastfeeding (Agunbiade & Ogunleye, 2012; Ogada, 2014). The challenges associated with exclusive replacement feeding included lack of safe water to prepare formula milk and financial resources to buy the infant formula (Kumar et al., 2007). There is limited literature on challenges to optimal feeding and nutrition status on HIV-exposed infants in Kenya, particularly in Bomet County.

2.6 Summary of literature review

The literature reviewed indicates that feeding practices are sub-optimal among HIV-exposed infants with mixed feeding still being practiced by some women. Nutrition status has also been found to be poorer among the HIV-exposed. The HIV-exposed infants are more likely to be stunted, underweight and/or wasted especially when the feeding practices
are sub-optimal. Some of the challenges to adequate nutrition status identified in literature include lack of information on proper feeding practices, inadequate health staff and inadequate funding and facilities in the hospitals. There is limited literature on the feeding practices and nutrition status of HIV-exposed infants in developing countries. This study will contribute to knowledge on the feeding practices and nutrition status of HIV-exposed infants 0-5 months of age in a country in sub-Saharan Africa, Kenya.
CHAPTER THREE: METHODOLOGY

3.1 Research design

The study adopted a cross-sectional analytical design as data was collected at only one point in time. Mixed methods (quantitative and qualitative) approaches were used in data collection, analysis and presentation. Cross-sectional analytical studies enables the interrelationships between variables to be analysed (Mugenda & Mugenda, 2003). Qualitative data was used to complement and triangulate the quantitative data.

3.2 Measurement of variables

3.2.1 Dependent variable

The dependent variable in this study was nutrition status as determined by weight for length (wasting), weight for age (underweight) and length for age (stunting) z-scores.

3.2.2 Independent variable

The independent variables in this study were:

1. Infant feeding practices as determined by exclusive breastfeeding, exclusive replacement feeding or mixed feeding in the previous 24 hours.

3.3 Study area

The study was conducted at the Tenwek Hospital in Bomet County. This is a referral mission hospital and consequently serve a large number of people (Hospital, 2013). It is also one of the main health facilities that provide HIV services in Bomet County. In the Maternal and Child Health (MCH) clinic, services offered include growth monitoring,
immunization and treatment of various illnesses including upper respiratory infections, diarrhoea, vomiting and HIV-related care for women and children. For HIV, services include HIV testing and counselling, nutrition assessment, counselling and provision of nutrition supplements, care and treatment of people living with HIV (Hospital, 2013). Other services offered at the hospital include internal medicine, general and orthopaedic surgery, ophthalmology, emergency medicine, obstetrics and gynaecology, diagnostic radiology, laboratory, cancer screening, cancer treatment, maternity services and family health services including paediatrics (Hospital, 2013).

### 3.4 Target population

The target population was mother/caregivers and infants pairs between 0-5 months of age born by mothers living with HIV (HIV-exposed). In Tenwek Hospital, there are approximately 2,200 deliveries per year, with about 76 deliveries by women living with HIV (Ministry of Health, 2014). The cumulative number of HIV-exposed infants enrolled in Bomet County is 543 (Ministry of Health, 2014).

#### 3.4.1 Inclusion criteria

1. Mothers/caregivers with infants exposed to HIV (born by mothers living with HIV).
2. The infants should be 0-5 months of age.
3. Mothers/caregivers with HIV-exposed infants attending Tenwek paediatric clinic.
4. Mothers/caregivers who consented to participate in the study.

#### 3.4.2 Exclusion criteria

1. Those born with very low birth weight (less than 1500 grams) as recorded in the MCH booklet.
2. Infants born to mothers who have alcohol/drug addiction problems which was determined from the mothers’ health records.

3.5 Sample size determination

Fisher’s formula cited in Mugenda and Mugenda, (1999) was used to establish the appropriate sample size suggest the formula:

\[ n = \frac{Z^2 \times p \times q}{d^2} \]

Where:

- \( n \) = the desired sample size, if the target population is greater than 10,000
- \( z \) = the standard normal deviate at the required confidence level
- \( p \) = the proportion in the target population estimated to have characteristics being measured (Proportion of deliveries by mothers living with HIV was 0.04%, proportion of mothers who exclusively breastfed their infants for 6 months was 0.1% in Kenya) (Ministry of Health, 2014).
- \( q \) = 1 - \( p \)
- \( d \) = the level of statistical significance set (95% for this study)

\[ n = \frac{(1.96)^2 \times 0.1 \times (1-0.1)}{(0.05)^2} = 138.3 = 138 \]

Since the target population in this study was less than 10,000, the final sample estimate was calculated using the following formula:

\[ nf = \frac{n}{1 + (n/N)} \]

Where:
nf= the desired sample size when the population is less than 10,000

n= the desired sample size when the population is more than 10,000

N= the estimate of the population size (543 HIV-exposed enrolled in Bomet county)

\[
\frac{138}{543} = 1 + \left( \frac{138}{543} \right) = 110
\]

To cater for non-response, 10% of 110 was added = 110+11= 121

Thus, the calculated sample size was 121 mother/caregiver infant pairs.

3.6 Sampling techniques

Comprehensive sampling was used as data was collected from every mother/caregiver with a HIV-exposed infant 0-5 months of age who consented to participate in the study. This is because the sampling frame of HIV-exposed infants was close to the calculated sample size (127 infants). Every Tuesday and Thursday, the researcher reported to the clinic and every eligible mother who consented to participate was sampled for the study. Paediatric clinic for HIV-exposed and infected infants and children is usually held on Tuesdays and Thursdays at Tenwek MCH. About 56 HIV-exposed infants were seen in the clinic every month (Hospital, 2013). The mother/infant and caregiver/infant pairs were enrolled once to avoid duplication of data collected.

3.7 Recruitment and training of research assistants

The researcher recruited two research assistants based on the criteria that they had a minimum of a Diploma in nutrition, had previous experience in nutrition surveys, preferably on IYCF and were fluent in both English and Kipsigis languages. The researcher
conducted training for the research assistants was conducted for four days. The training focused on: objectives of the study, interview techniques, filling of the questionnaires, taking anthropometric measurements for weight and length, calibration of equipment, research ethics and storage and tracking of questionnaires. The training was conducted through lectures, demonstrations and role plays.

3.8 Research instruments

3.8.1 Researcher-administered questionnaire

The researcher assisted by the research assistants administered a researcher-administered questionnaire (Appendix I) to mothers/caregivers. The questionnaire had three sections:

Section A: This was for recording the anthropometric data of the infant.

Section B: This section elicited information on socio-economic characteristics of the mothers/caregivers (education, occupation and income), demographic characteristics of the mothers/caregivers (age, marital status, religion, ethnicity, parity) and infant characteristics (age and sex).

Section C: This section comprised of the standard WHO questionnaire for Infant and Young Child Feeding (IYCF) (WHO, 2009). It elicited information on the feeding practices of the infants (exclusive breastfeeding, exclusive replacement feeding and mixed feeding) based on a 24 hour recall. The questionnaire was translated to Kipsigis, the native language in Bomet County, to cater for mothers/caregivers who did not understand English (Appendix J).
3.8.2 Focus Group Discussion (FGD) guide

A FGD guide (Appendix K) was used to collect information from the mothers/caregivers during FGDs. The guide elicited information on the experiences the mothers/caregivers had on the feeding practice chosen, challenges, support and suggestions for feeding practices and nutrition status of infants 0-5 months of age.

3.8.3 Key Informant Interview (KII) guide

A KII guide (Appendix M) was used to collect information from the healthcare workers. The guide elicited information on the current recommendations of IYCF used by the nutritionists, nurses, clinical officers and adherence counsellors when counselling their clients on IYCF. The other information collected was on: trends in feeding practices, nutrition status among HIV-exposed infants, the challenges experienced by healthcare workers when counselling mothers/caregivers living with HIV who are attending paediatric clinic at Tenwek Hospital as well as challenges experienced by the mothers/caregivers.

3.8.4 Anthropometric tools

The weight of the infants was measured using a salter scale while the length was measured using a length board. These anthropometric tools have been recommended by WHO (de Onis, Garza, Victoria, Onyango, & Martines, 2004).

3.9 Pre-testing of research instruments

Pre-testing was conducted with 13 pairs of infant-mother/caregiver at Longisa District Hospital whose patients have similar characteristics as Tenwek Hospital. Pre-testing
provided the research assistants the opportunity to have practical experience and to identify context specific challenges that would have risen from using the instruments.

3.10 Data collection procedures and techniques

Data was collected for a period of two months as the required sample size was achieved during this period. Mother/caregiver and infant pairs visited the clinic once a month for HIV-related services. A formal self-introduction by the researcher was done, followed by informed consent and then data collection. The data collection techniques that were adopted were face to face interviews, FGDs and KII. Further, anthropometric measurements were taken.

3.10.1 Face-to-face interviews

One time face to face interviews were conducted with the mothers/caregivers by the researcher assisted by research assistants. Interviews were conducted at the examination room in the Maternal and Child Health (MCH) block, each lasting 20-30 minutes. The interviews elicited information on the socioeconomic characteristics, demographic characteristics and feeding practices.

3.10.2 Focus Group Discussions

The FGDs were facilitated by the researcher assisted by a research assistant as an observer. The participants were selected using simple random sampling based on their reported mode of feeding. Two groups of 10 and 9 mothers/caregivers each were selected from those who had exclusively breastfed, 8 were selected among those who had practiced exclusive replacement feeding and 8 among those who had mixed fed.
The venue was the Maternal and Child Health (MCH) classroom at Tenwek MCH block because it was spacious and had minimal interruptions from other clients and healthcare workers. The sessions begun with an introduction of participants and the purpose of the discussion. The rules and regulations governing the discussion were then agreed upon before the FGD begun. The areas that were covered in the discussions included the mothers/caregivers infant feeding experiences, health services provided and challenges faced in their choice of infant feeding. The discussions were audio tape recorded. Audio taping was done using two different devices concurrently.

The mothers/caregivers were encouraged to give their views freely and every participant was given equal chances of participation. The discussions ended with a summary of main points and thanking of the participants. The observer (research assistant) ensured that the tape recorder was working and observed and recorded the non-verbal cues among the FGD participants. Each session lasted between 60-90 minutes.

3.10.3 Key Informant Interviews

Key Informant Interviews (KIIs) were conducted with 3 nutritionists, 4 nurses, 2 clinical officers and 2 adherence counsellors (people living with HIV who give counselling and moral support to the people living with HIV at the clinic). Key informants, who provided services to the mothers living with HIV at Tenwek hospital’s paediatric clinic were purposively selected because they were knowledgeable of the context specific information for mothers living with HIV registered at the health facility. They were facilitated by the researcher and guided by the KII guides. The key informants were interviewed on the recommendations of IYCF implemented at Tenwek Hospital, nutrition status, feeding
practices among infants 0-5 months of age and challenges faced by healthcare workers and mothers/caregivers in Tenwek. The interviews were conducted in the examination rooms at Tenwek MCH block and they were audio tape recorded. Audio taping was done using two different devices concurrently and each session lasted between 20-30 minutes.

### 3.10.4 Anthropometric measurements

Anthropometric measurements weight and length were taken. Weight was measured in kilograms using a Salter scale with an accuracy of 0.1 kilograms. The infants were weighed twice in minimal clothing in a warm room and measurement recorded immediately. The measurement was taken at eye level. The mean of the two weights was then computed. If any pair of the readings exceeded the maximum allowable difference (100 grams), the prior measurements were discarded and the weighing was repeated (de Onis et al., 2004). The scale was calibrated with a known weight before taking the measurements.

The length of the infants was measured in centimetres using a length board with a headstand to the nearest 0.1 centimetres accuracy. The mother/caregiver placed the child on the length board and held the infant’s head in place as they laid down on the length board while the person taking the measurement held the legs. Before taking the reading, the child was barefoot with the heels, buttocks, shoulders and the back of the head touching the board. The length readings were taken twice and a mean of the two was computed to get the infants length, which were then recorded in the questionnaire. If any pair of the readings exceeded the maximum allowable difference (0.7 centimetres), the prior measurements were discarded and the length measurement was repeated (de Onis et al., 2004).
3.11 Validity and reliability

3.11.1 Validity

The standard WHO IYCF questionnaire was used to collect data on IYCF. This questionnaire has already been validated by the WHO (WHO, 2008a). Standard WHO recommended anthropometric tools (salter scale and length board) were also used for measuring weights and lengths of the infants. The KII and FGD guides were validated by a team of researchers from the hospital and university supervisors.

3.11.2 Reliability

The test-retest method was conducted to test for the reliability of the instruments. Data was collected twice at an interval of three days from the same participants. There was a correlation coefficient of 0.89 (0.79 – 0.98; 95% CI) between the two sets of data. This was considered adequate as it was above 0.7, as recommended by Fisher’s et al in Mugenda and Mugenda, (2003).

3.12 Data quality control

Several measures were taken to ensure high data quality. These included: careful evaluation, selection and training of research assistants; taking the weight and length measurements twice; cross checking of all questionnaires to ensure that all questions had been answered before terminating the interviews; safe keeping of questionnaires in a locked safe by the researcher; daily submission and cleaning of questionnaires used and cleaning of data after entry. Audio taping was also done using two different recorders to ensure no loss of data and clarity of the records.
3.13 Data analyses

Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 22. Infant’s nutrition status was analysed using ENA for Smart software version 2011 and then exported to SPSS. Descriptive statistics (mean, standard deviation, frequencies and percentages) analysis was conducted for socio-economic characteristics, demographic characteristics and nutrition status (Table 3.1). Odds ratio (OR) was used to test associations between categorical variables such as feeding practices and nutrition status. The ANOVA was used to test the differences in mean z-scores (nutrition status) by mode of feeding (exclusive breastfeeding, exclusive replacement feeding or mixed feeding). Infant feeding practices were analysed based on the WHO and Ministry of Health recommendations for HIV-exposed infants 0-5 months of age. Nutrition status was assessed based on the WHO (2006) child growth standards and Z-score cut offs were applied; below-3SD were categorized as severe malnutrition, above-3SD and below -2SD as moderate malnutrition, above-2SD and below-1SD as mild malnutrition and above-1SD as normal growth and nutrition status. Statistical significance was set at p<0.05.

For qualitative data, content analysis was conducted for the Focus Group Discussions (FGD) and Key Informant Interviews (KII). The FGDs and the KIIIs were transcribed verbatim and translated into English by the researcher assisted by the research assistant. They were then read through several times by the researcher and the information from the FGDs categorized into themes: experiences the mothers/caregivers had on feeding practice chosen, challenges, support and suggestions for feeding practices of HIV-exposed infants from the FGD guides. The information categories obtained in the FGD analysis were used
to organize the information in each KII according to the informant category: nutritionist, nurses, adherence counsellors and clinical officers. Illustrative quotations were also selected.

Table 3.1 Data analysis matrix

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Variable</th>
<th>Nature of the variable</th>
<th>Methods instruments of data collection</th>
<th>Statistical tests and data presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>To determine the infant feeding practices among HIV-exposed infants 0-5 months of age</td>
<td>Infant feeding in the previous 24 hours, defined as:</td>
<td>Categorical</td>
<td>● Researcher-administered questionnaire</td>
<td>● Percentages</td>
</tr>
<tr>
<td></td>
<td>• Exclusive breastfeeding (EBF)</td>
<td>Qualitative</td>
<td>● FGD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Exclusive replacement feeding (ERF)</td>
<td></td>
<td>● KII</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mixed Feeding (MF)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To determine the nutrition status of HIV-exposed infants 0-5 months of age</td>
<td></td>
<td>Categorical Continuous</td>
<td>● Researcher-administered questionnaire</td>
<td>● Percentages</td>
</tr>
<tr>
<td></td>
<td>• Length for age z-scores</td>
<td></td>
<td>● Means</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Weight for age z-scores</td>
<td></td>
<td>● Standard Deviations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Weight for length z-scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To establish the relationships between infant feeding practices and nutrition status of HIV-exposed infants 0-5 months of age</td>
<td>Likelihood of Stunting, Underweight and Wasting among those on EBF, ERF, and MF</td>
<td>Continuous Categorical</td>
<td>● Researcher-administered questionnaire</td>
<td>● Percentages</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● FGD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● KII</td>
<td></td>
</tr>
<tr>
<td>To identify the challenges to optimal infant feeding practices among HIV-exposed infants 0-5 months of age</td>
<td>Emerging themes from KIIs and FGDs</td>
<td>Qualitative</td>
<td>● FGD</td>
<td>● Content analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● KII</td>
<td></td>
</tr>
</tbody>
</table>
3.14 Logistical and ethical considerations

Clearance and approval to conduct the study was obtained from the graduate school of Kenyatta University (Appendix A). Ethical clearance was sought from Kenyatta University Ethical Review Committee (Appendix B) and Tenwek Institution Research Committee (IREC) (Appendix C). A research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI) (Appendix D). Informed voluntary consent (Appendix E-H) was sought from the mothers/caregivers and healthcare workers in form of signatures or thumb-print. The participants were assured of privacy and confidentiality of the information collected. Potential benefits of the study to the community were articulated clearly and unambiguously. No risks or harmful effects were recorded during the study since no substances were ingested or administered to the participants. Research participants were considered partners, not research subjects and the community members will be informed of study results. Free counselling was conducted for mothers/caregivers who were not following the recommended feeding practices and/ or whose infants have faltering growth, after data collection.
CHAPTER FOUR: FINDINGS

The purpose of the study was to determine the feeding practices and nutrition status of HIV-exposed infants 0-5 months of age. The relationship between the nutrition status and feeding practices as well as the challenges faced by these women during infant and young child feeding were explored. One hundred and twenty seven mothers/caregivers were eligible for the study, 121 consented while 6 declined and therefore, 121 mothers/caregivers were recruited to participate in the study resulting into a response rate of 97.5% considered adequate by Fincham, (2008). Out of the 121 questionnaires, 118 were analysed as 3 infants had very low birth weight and thus their questionnaires were not included in the analysis. Additionally, 11 key informants were interviewed.

4.1 Demographic characteristics of infants and their mothers/caregivers

4.1.1 Demographic characteristics of infants
There were more female infants (54.2%), than males (45.8%) (Table 4.1). The majority (45.8%) were 2-3 months of age, while those of 0-1 month of age comprised 10.2% of the total study population (Table 4.1).
Table 4.1: Demographic characteristics of infants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N=118</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>54</td>
<td>(45.8)</td>
</tr>
<tr>
<td>Female</td>
<td>64</td>
<td>(54.2)</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>(100.0)</td>
</tr>
<tr>
<td>Age in completed months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 1</td>
<td>12</td>
<td>(10.2)</td>
</tr>
<tr>
<td>2 to 3</td>
<td>54</td>
<td>(45.8)</td>
</tr>
<tr>
<td>4 to 5</td>
<td>52</td>
<td>(44.0)</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>(100.0)</td>
</tr>
<tr>
<td>Place of Delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health facility</td>
<td>115</td>
<td>(97.5)</td>
</tr>
<tr>
<td>Non health facility</td>
<td>3</td>
<td>(2.5)</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

4.1.2 Demographic characteristics of the mothers/caregivers

The mothers/caregivers age in completed years was between 16-36 years with a mean age of 25.2 ±3.6 years (Table 4.2). Most mothers/caregivers (69.4%) were married, 22% were never married and 7.7% were either divorced or separated. More than half of the participants (58.5%) had only one child, 35.6% had 2 to 3 children while 5.9% had more than 3 children. Most of the participants (96.6%) were the infant’s mothers while 3.4% were caregivers.
Table 4.2: Demographic characteristics of the mothers/caregivers

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N=118</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in completed years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-20</td>
<td>9</td>
<td>(7.6)</td>
</tr>
<tr>
<td>21-29</td>
<td>98</td>
<td>(83.1)</td>
</tr>
<tr>
<td>30-36</td>
<td>11</td>
<td>(9.3)</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>(100.0)</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>25.2 ±3.6</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>26</td>
<td>(22.0)</td>
</tr>
<tr>
<td>Married</td>
<td>82</td>
<td>(69.4)</td>
</tr>
<tr>
<td>Widowed</td>
<td>1</td>
<td>(0.9)</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>9</td>
<td>(7.7)</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>(100.0)</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 child</td>
<td>69</td>
<td>(58.5)</td>
</tr>
<tr>
<td>2-3 children</td>
<td>42</td>
<td>(35.6)</td>
</tr>
<tr>
<td>4-5 children</td>
<td>7</td>
<td>(5.9)</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>(100.0)</td>
</tr>
<tr>
<td>Relationship to the infant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers</td>
<td>114</td>
<td>(96.6)</td>
</tr>
<tr>
<td>Caregivers</td>
<td>4</td>
<td>(3.4)</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

**4.2 Socio-economic characteristics of the mothers/caregivers**

More than half of the mothers/caregivers had completed primary education (55.9%) while 9.3% had no formal education (Table 4.3). More than a third of the participants (39%) were housewives. Most of the mothers/caregivers (69.5%) were earning a monthly income of between 0-5,000 Kenyan shillings (KSh.).
Table 4.3: Socioeconomic characteristics of the mothers/caregivers

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N=118</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mothers/caregivers education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>11 (9.3)</td>
<td></td>
</tr>
<tr>
<td>Primary incomplete</td>
<td>26 (22.0)</td>
<td></td>
</tr>
<tr>
<td>Primary complete</td>
<td>66 (55.9)</td>
<td></td>
</tr>
<tr>
<td>Secondary and above</td>
<td>15 (12.7)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>118 (100.0)</td>
<td></td>
</tr>
<tr>
<td>Main Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual labour</td>
<td>6 (5.1)</td>
<td></td>
</tr>
<tr>
<td>Farmer</td>
<td>27 (22.9)</td>
<td></td>
</tr>
<tr>
<td>Salaried employment</td>
<td>18 (15.3)</td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td>17 (14.4)</td>
<td></td>
</tr>
<tr>
<td>Housewife</td>
<td>46 (39.0)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4 (3.4)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>118 (100.0)</td>
<td></td>
</tr>
<tr>
<td>Monthly Income (KSh.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-5,000</td>
<td>82 (69.5)</td>
<td></td>
</tr>
<tr>
<td>5,001-10,000</td>
<td>14 (11.9)</td>
<td></td>
</tr>
<tr>
<td>10,001-20,000</td>
<td>16 (13.6)</td>
<td></td>
</tr>
<tr>
<td>20,001-40,000</td>
<td>6 (5.0)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>118 (100.0)</td>
<td></td>
</tr>
<tr>
<td>Other income sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From domestic animals</td>
<td>43 (36.4)</td>
<td></td>
</tr>
<tr>
<td>From cash crops</td>
<td>21 (17.8)</td>
<td></td>
</tr>
<tr>
<td>From both domestic animals and cash crops</td>
<td>44 (37.3)</td>
<td></td>
</tr>
<tr>
<td>Other asset you own like machinery and equipment</td>
<td>10 (8.5)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>118 (100.0)</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Feeding practices among the infants

4.3.1 Breastfeeding practices from delivery

In this study, most mothers/caregivers (95.3%) who breastfed their infants met the WHO recommendation of initiating breastfeeding within the first one hour of birth (Table 4.4). Another positive finding was that most mothers/caregivers (92.4%) did not give pre-
lacteals upon delivery as only 7.6% reported having given pre-lacteals. The majority of the
mothers (90.7%) had ever breastfed their infants since birth, with 89.7% having breastfed
their infants in the last 24 hours. (Table 4.4).

Table 4.4: Breastfeeding practices since delivery

<table>
<thead>
<tr>
<th>Practice</th>
<th>N=118 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation of breastfeeding after delivery (N=107)</td>
<td></td>
</tr>
<tr>
<td>Less than 30 minutes</td>
<td>66 (61.7)</td>
</tr>
<tr>
<td>From 30 minutes to one hour</td>
<td>36 (33.6)</td>
</tr>
<tr>
<td>More than 1 hour</td>
<td>5 (4.7)</td>
</tr>
<tr>
<td>Total</td>
<td>107 (100.0)</td>
</tr>
<tr>
<td>Gave pre-lacteals (N=118)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9 (7.6)</td>
</tr>
<tr>
<td>No</td>
<td>109 (92.4)</td>
</tr>
<tr>
<td>Total</td>
<td>118 (100.0)</td>
</tr>
<tr>
<td>Has ever been breastfed since birth (N=118)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>107 (90.7)</td>
</tr>
<tr>
<td>No</td>
<td>11 (9.3)</td>
</tr>
<tr>
<td>Total</td>
<td>118 (100.0)</td>
</tr>
<tr>
<td>Was breastfed in the last 24 hours (N=107)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>96 (89.7)</td>
</tr>
<tr>
<td>No</td>
<td>11 (10.3)</td>
</tr>
<tr>
<td>Total</td>
<td>107 (100.0)</td>
</tr>
</tbody>
</table>

The findings from the FGDs and KIIIs were in agreement with the quantitative findings as
most participants felt that all mothers should breastfeed their infants and that breastfeeding
should start immediately after birth. Most mothers nodded to an assertion by one mother
(M3FGD3, 2015): ‘You breastfeed your child immediately you finish giving birth.’

The majority of the participants in the focus groups did not support giving other foods to
the baby before initiating breastfeeding. A few felt that they needed to give a little water, ‘I
normally give water as it makes the throat wet and because the milk may not have started
coming out yet.’ (M₁FGD₁, 2015). The mothers/caregivers gave two main reasons for giving pre-lacteals; that the infant was crying a lot which mothers/caregivers interpreted as hunger; and the perceived delayed lactation among mothers after delivery. One of the mothers (M₄FGD₂, 2015) in the FGD emphasized, “The baby was crying a lot and since I did not have enough milk, I gave him water and he stopped crying.”

4.3.2 Mode of feeding in the previous 24 hours

The mode of feeding was determined based on a 24 hour recall. The findings show that most mothers/caregivers followed the WHO recommendations of infant feeding, as 73.7% of them exclusively breast fed their infants, while 14.4% practiced exclusive replacement feeding. Only 11.9% mixed fed their infants (Figure 4.1).

![Current Mode of Feeding](image)

Figure 4.1: Mode of feeding among infants based on 24 hour recall

The mode of feeding in the previous 24 hours was further analysed by the age of the infants. Majority of the infants across all the age groups were on exclusive breastfeeding (Table 4.5).
Table: 4.5: Mode of feeding by age in months

<table>
<thead>
<tr>
<th></th>
<th>Exclusive breastfeeding</th>
<th>Exclusive replacement feeding</th>
<th>Mixed feeding</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=87</td>
<td>N=17</td>
<td>N=14</td>
<td>N=118</td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>0-1</td>
<td>7(58.0)</td>
<td>3(25.0)</td>
<td>2(17.0)</td>
<td>12(100.0)</td>
</tr>
<tr>
<td>2-3</td>
<td>39(72.0)</td>
<td>7(13.0)</td>
<td>8(15.0)</td>
<td>54(100.0)</td>
</tr>
<tr>
<td>4-5</td>
<td>41(79.0)</td>
<td>7(14.0)</td>
<td>4(17.0)</td>
<td>52(100.0)</td>
</tr>
</tbody>
</table>

Similarly, from the FGD findings, exclusive breastfeeding (EBF) was reported to be practiced by most of the mothers and most of them had a positive attitude towards it. Exclusive replacement feeding on the other hand was perceived to be practiced by the mothers/caregivers with high income or by infants whose mothers’ die during birth or are sick. ‘When the nurse told me I can still breastfeed my child, I was happy because I could not have afforded the milk that is in tins. They are for the rich,’ explained one of the mothers (M3FGD2, 2015).

Those mothers/caregivers practising EBF and ERF reported that they received information from the healthcare practitioners during their antenatal clinic visits. Those who breastfed said they chose to breastfeed because of its availability, requires no preparation and is nutritionally balanced. Those who chose to practice ERF however, had mixed opinion. Some chose to practice ERF because they feared transmitting the virus to the child, one of the caregivers reported choosing ERF because the mother of the infant died after delivery while another chose ERF because she was advised by a healthcare worker. Most mothers/caregivers agreed that mixed feeding was an inappropriate choice of feeding. One
of the mothers/caregivers (M2FGD4, 2015) said, “Attendance of clinic is important, you would know why you shouldn’t give your child any food other than breast milk before 6 months.”

From the findings of the KII with healthcare workers, EBF and ERF were part of the health education at the MCH clinic. The nutritionists and some non-nutrition staff had updated knowledge on the subject. The benefits mentioned were that the child would grow well and be healthy, and the mother would benefit from natural child spacing. The risk of HIV transmission was also discussed and the protective effect of EBF as compared to mixed feeding. According to the nurses, EBF was practiced by most mothers, while others gave water and started giving porridge before six months.

### 4.3.3 Foods given to infants on mixed feeding

The 14 mothers/caregivers (11.9%) who practiced mixed feeding were asked which liquids or solids they gave to their HIV-exposed infants. Cow’s milk was given to the babies by the majority (87.5%) of the mothers/caregivers (Table 4.6). The rest of the mothers/caregivers who practised mixed feeding (12.5%) gave fruit juice to their infants. Traditional herbs were given by almost a third (31.3%) of the participants who mixed fed their infants. Only 1 infant was fed sour milk (6.3%) with 12.5% being fed on thick, grain-based porridge (Table 4.6).
Table 4.6: Foods given to infants on mixed feeding based on a 24 hour recall

<table>
<thead>
<tr>
<th>Foods given</th>
<th>N=14</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquids*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow’s milk</td>
<td>12</td>
<td>(87.5)</td>
</tr>
<tr>
<td>Fruit juice</td>
<td>2</td>
<td>(12.5)</td>
</tr>
<tr>
<td>Traditional herbs</td>
<td>5</td>
<td>(31.3)</td>
</tr>
<tr>
<td>Sour milk/yoghurt</td>
<td>1</td>
<td>(6.3)</td>
</tr>
<tr>
<td>Thin porridge</td>
<td>5</td>
<td>(31.3)</td>
</tr>
<tr>
<td>Solids*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread, or thick grain- based porridge</td>
<td>2</td>
<td>(12.5)</td>
</tr>
<tr>
<td>Cassava</td>
<td>1</td>
<td>(6.3)</td>
</tr>
</tbody>
</table>

*multiple responses

From the FGD findings, mixed feeding was generally viewed as an inappropriate choice of feeding as it was associated increased risk of HIV infection. ‘The nurse always insists on not giving any other foods to the baby except breast feeding because if you give other foods, the baby will get HIV,’ explained one mother/caregiver (M6 FGD3, 2015). The mothers/caregivers who were breastfeeding while giving other foods gave several reasons for mixed feeding.

‘In our culture, herbs are given to the babies to clean the stomach, and then they are bathed with the herbs to protect them from people with bad eyes,’ explained a mother/caregiver (M7 FGD1, 2015). ‘My child took after his father, he cries a lot because he is hungry and breast milk alone is not adequate. I also need to go to the farm and do not have time to break every now and then to breastfeed my child,’ explained another
mother/caregiver (M8FGD4, 2015). Other reasons included delayed lactation and perceived hunger.

4.4 Prevalence of morbidity in the previous 2 weeks among HIV-exposed infants

Majority of the infants (90.7%) were not sick in 2 weeks before the survey whereas 9.3% of the infants had diarrhoea.

Table 4.7: Prevalence of morbidity in the past 2 weeks

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N=118</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illness in the previous 2 weeks (N=118)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11</td>
<td>9.3</td>
</tr>
<tr>
<td>No</td>
<td>107</td>
<td>90.7</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of illness (N=118)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhoea</td>
</tr>
<tr>
<td>Respiratory tract infection</td>
</tr>
<tr>
<td>Fever</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

4.5 Nutrition status of the infants

The weight and length measurements were obtained for infants 0-5 months of age. The data obtained was used to compute 3 summary indices of nutrition status as recommended by WHO; the length-for-age, weight-for-age, and weight-for-length z-scores.

4.5.1 Length for age z-scores (LAZ)

Length for age z-scores indicates attained growth in length at the infant’s age. It is an indicator for stunting (short for age) due to prolonged under nutrition or repeated illness. More than half (57.7%) of the infants were well nourished (normal), 34.7% were
moderately stunted, while 3.4% were severely stunted (Table 4.8). The mean length for age z-score was -0.47 ± 1.5.

Table 4.8: Length for age z-scores (LAZ)

<table>
<thead>
<tr>
<th>Length for age z-scores</th>
<th>N=12 (0-1month)</th>
<th>N=54 (2-3 months)</th>
<th>N=52 (4-5 months)</th>
<th>N=118 (0-5 months)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n(%)</td>
<td>n(%)</td>
<td>n(%)</td>
<td>n(%)</td>
<td></td>
</tr>
<tr>
<td>&gt;2 SD</td>
<td>0(0.0)</td>
<td>1(20.0)</td>
<td>4(80.0)</td>
<td>5(4.2)</td>
<td>0.8 – 8.5</td>
</tr>
<tr>
<td>≥1 to &lt;2 SD (Normal)</td>
<td>6(8.8)</td>
<td>30(44.1)</td>
<td>32(47.1)</td>
<td>68(57.7)</td>
<td>48.3 – 66.9</td>
</tr>
<tr>
<td>&gt;3 to ≤2 SD (Moderately stunted)</td>
<td>6(14.6)</td>
<td>20(48.8)</td>
<td>15(36.6)</td>
<td>41(34.7)</td>
<td>25.4 – 44.1</td>
</tr>
<tr>
<td>≤3 SD (Severely stunted)</td>
<td>0(0.0)</td>
<td>3(75.0)</td>
<td>1(25.0)</td>
<td>4(3.4)</td>
<td>0.8 – 6.8</td>
</tr>
<tr>
<td>Total</td>
<td>12(10.2)</td>
<td>54(45.8)</td>
<td>52(44.1)</td>
<td>118(100.0)</td>
<td>-</td>
</tr>
<tr>
<td>LAZ Mean±SD</td>
<td>-1.05±1.26</td>
<td>-0.64±1.49</td>
<td>-0.47±1.53</td>
<td>-0.47 ± 1.54</td>
<td>-0.73–0.19</td>
</tr>
</tbody>
</table>

* Nutrition status based on WHO 2006 Child Growth Standards Z-scores

The likelihood of illness was analysed by length for age z-scores. There was no significant association between recent illness and stunting (OR=2.65; p=0.150; 95% CI 0.64-9.71) (Table 4.9).

Table 4.9: Relationship between recent illness and the length for age z-scores

<table>
<thead>
<tr>
<th>Exposure (Recent illness)</th>
<th>Odds Ratio(OR)</th>
<th>Confidence Interval (95%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
</tr>
<tr>
<td>Yes</td>
<td>2.65</td>
<td>0.64</td>
<td>9.71</td>
</tr>
<tr>
<td>No</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
4.5.2 Weight for age z-scores (WAZ)

Weight for age indicates the effects of both acute and chronic nutrition status. It reflects body weight relative to the infant’s age. Majority (60.2%) of the infants had normal nutrition status, 35.6% were moderately underweight, 3.4% were severely underweight while 0.8% had more than the recommended weight for age (overweight) (Table 4.10). The mean weight for age z-score was -0.50 ± -0.01.

Table 4.10: Weight for age z-scores (WAZ)

<table>
<thead>
<tr>
<th>Weight for age z-scores</th>
<th>N=12 0-1month</th>
<th>N=54 2-3 months</th>
<th>N=52 4-5 months</th>
<th>N=118 0-5 months</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2 SD (Overweight)</td>
<td>n(%)</td>
<td>n(%)</td>
<td>n(%)</td>
<td>n(%)</td>
<td></td>
</tr>
<tr>
<td>≥-1 to &lt;2 SD (Normal)</td>
<td>0(0.0)</td>
<td>1(100.0)</td>
<td>0(0.0)</td>
<td>1(0.8)</td>
<td>0.0 – 2.5</td>
</tr>
<tr>
<td>&gt;-3 to ≤-2 SD (Moderately underweight)</td>
<td>4(5.6)</td>
<td>27(38.0)</td>
<td>40(56.3)</td>
<td>71(60.2)</td>
<td>51.7 – 68.6</td>
</tr>
<tr>
<td>≤-3 SD (Severely underweight)</td>
<td>7(16.7)</td>
<td>23(54.8)</td>
<td>12(28.6)</td>
<td>42(35.6)</td>
<td>27.1 – 44.1</td>
</tr>
<tr>
<td>Total</td>
<td>12(10.2)</td>
<td>54(45.8)</td>
<td>52(44.1)</td>
<td>118(100.0)</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean±SD</th>
<th>Mean±SD</th>
<th>Mean±SD</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAZ</td>
<td>-1.24±1.08</td>
<td>-0.62±1.36</td>
<td>-0.20±1.04</td>
</tr>
</tbody>
</table>

* Nutrition status based on WHO 2006 Child Growth Standards z-scores

Analysis of the relationship between illness weight for age Z-scores showed no significant association (OR=8.75; p=0.988; 95% CI 2.91-15.30).
Table 4.11: Relationship between recent illness and the weight for age z-scores

<table>
<thead>
<tr>
<th>Exposure (Recent illness)</th>
<th>Odds Ratio(OR)</th>
<th>Confidence Interval (95%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
</tr>
<tr>
<td>Yes</td>
<td>8.75</td>
<td>2.91</td>
<td>15.30</td>
</tr>
<tr>
<td>No</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**4.5.3 Weight for length z-scores (WLZ)**

Weight for length indicates body weight in proportion to attained growth in length. It is an indicator for wasting which results from a recent illness or food shortage that causes acute and severe weight loss, although chronic under nutrition or illness can also cause wasting. Similar to weight for age and length for age z-scores, most infants (76.3%) had normal weight for length z-score with 19.5% moderately wasted and 4.2% overweight (Table 4.12). The mean weight for length was -0.08 ± 1.04.
Table 4.12: Weight for length z-scores (WLZ)

<table>
<thead>
<tr>
<th>Weight for length z-score</th>
<th>N=12 0-1 month</th>
<th>N=54 2-3 months</th>
<th>N=52 4-5 months</th>
<th>N=118 0-5 months</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2 SD (Overweight)</td>
<td>n(%)</td>
<td>n(%)</td>
<td>n(%)</td>
<td>n(%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0(0.0)</td>
<td>2(40.0)</td>
<td>3(60.0)</td>
<td>5(4.2)</td>
<td>0.8 – 8.5</td>
</tr>
<tr>
<td>≥-1 to &lt;2 SD (Normal)</td>
<td>8(8.9)</td>
<td>41(45.6)</td>
<td>41(45.6)</td>
<td>90(76.3)</td>
<td>68.6 – 83.9</td>
</tr>
<tr>
<td>&gt;-3 to ≤2 SD (Moderately wasted)</td>
<td>4(17.4)</td>
<td>11(47.8)</td>
<td>8(34.8)</td>
<td>23(19.5)</td>
<td>12.7 – 27.1</td>
</tr>
<tr>
<td>≤-3 SD (Severely wasted)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>0.0 – 0.0</td>
</tr>
<tr>
<td>Total</td>
<td>12(10.2)</td>
<td>54(45.8)</td>
<td>52(44.1)</td>
<td>118(100.0)</td>
<td></td>
</tr>
</tbody>
</table>

Mean±SD

WLZ       | -0.50±1.06   | Mean±SD | Mean±SD | Mean±SD | Mean±SD |

<table>
<thead>
<tr>
<th></th>
<th>Lower Limit</th>
<th>Upper Limit</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3.74</td>
<td>385.05</td>
<td>0.0047*</td>
</tr>
<tr>
<td>No</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Significant at p< 0.05

The analysis of the relationship between illness and weight for length Z-scores showed a significant likelihood of wasting among infants who had been ill in the previous 2 weeks (OR=20.57; p=0.0047; 95% CI 3.74-385.05) (Table 4.13). Infants who were ill were 20.57 times more likely to be wasted than those who were not ill.

Table 4.13: Relationship between recent illness and the weight for length z-scores

<table>
<thead>
<tr>
<th>Exposure (Recent illness)</th>
<th>Odds Ratio(OR)</th>
<th>Confidence Interval (95%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
</tr>
<tr>
<td>Yes</td>
<td>20.57</td>
<td>3.74</td>
<td>385.05</td>
</tr>
<tr>
<td>No</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Significant at p< 0.05
4.6 Associations between nutrition status and infant feeding practices

4.6.1 Association between stunting and infant feeding practices

There was no significant difference in the likelihood of stunting among infants on exclusive breastfeeding to those on exclusive replacement feeding (OR=0.86; p=0.110; 95% CI 0.061-2.33) (Table 4.14). In contrast, infants on exclusive breastfeeding were 2.401 times less likely to be stunted than those on mixed (OR=2.40; p=0.001; 95% CI 0.91-5.81). The hypothesis (H01) which stated that there is no significant relationship between infant feeding practices and stunting among HIV-exposed infants 0-5 months of age was therefore, rejected.

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Odds Ratio(OR)</th>
<th>Confidence Interval (95%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
</tr>
<tr>
<td>EBF</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ERF</td>
<td>0.89</td>
<td>0.06</td>
<td>2.33</td>
</tr>
<tr>
<td>MF</td>
<td>2.40</td>
<td>0.91</td>
<td>5.81</td>
</tr>
</tbody>
</table>

*Significant at p< 0.05

4.6.2 Association between underweight and infant feeding practices

Similarly, there was no significant difference in the likelihood of underweight among infants on exclusive breastfeeding compared to those on exclusive replacement feeding (OR=0.86; p=0.243; 95% CI 0.15-4.68). In contrast, infants on exclusive breastfeeding were 2.001 times less likely to be underweight than those on mixed (OR=2.00; p=0.001; 95% CI 0.33-6.12) (Table 4.15). The hypothesis (H02) which stated that there is no
significant relationship between infant feeding practices and underweight among HIV-exposed infants 0-5 months of age was therefore, rejected.

Table 4.15: The likelihood of underweight by mode of feeding

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Odds Ratio(OR)</th>
<th>Confidence Interval (95%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
</tr>
<tr>
<td>EBF</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ERF</td>
<td>0.86</td>
<td>0.15</td>
<td>4.68</td>
</tr>
<tr>
<td>MF</td>
<td>2.00</td>
<td>0.33</td>
<td>6.12</td>
</tr>
</tbody>
</table>

*Significant at p< 0.05

4.6.3 Association between wasting and infant feeding practices

There was no significant difference in the likelihood of wasting among infants on exclusive breastfeeding with those on exclusive replacement feeding (OR=0.19; p=0.996; 95% CI 0.01-3.13) and on mixed feeding (OR=1.53; p=0.61; 95% CI 0.29-7.95) (Table 4.16). The hypothesis (H03) which stated that there is no significant relationship between infant feeding practices and wasting among HIV-exposed infants 0-5 months of age was therefore, not rejected.

Table 4.16: The likelihood of wasting by mode of feeding

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Odds Ratio(OR)</th>
<th>Confidence Interval (95%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
</tr>
<tr>
<td>EBF</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ERF</td>
<td>0.19</td>
<td>0.01</td>
<td>3.13</td>
</tr>
<tr>
<td>MF</td>
<td>1.53</td>
<td>0.29</td>
<td>7.95</td>
</tr>
</tbody>
</table>
4.6.4 Comparison of mean z-scores by mode of infant feeding

The mean z-scores for weight for length, weight for age and length for age were also compared by modes of feeding (Table 4.13). The mean length for age for those on mixed feeding was significantly different from those on EBF and ERF (ANOVA; p<0.001). A post hoc analysis was conducted to test which group was different from the others. Those on EBF and ERF modes of feeding however, had no significant difference in their mean length for age. Similar findings were observed for mean weight for age z-scores. The mean weight for length z-scores for infants on exclusive breastfeeding, exclusive replacement feeding and mixed feeding were not significantly different (ANOVA; p=0.151).

Table 4.17: Comparison of mean z-scores by mode of infant feeding

<table>
<thead>
<tr>
<th>Variable</th>
<th>EBF (n=87)</th>
<th>ERF (n=17)</th>
<th>MF (n=14)</th>
<th>ANOVA P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean LAZ ± SD</td>
<td>-0.18 ± 1.3&lt;sub&gt;a&lt;/sub&gt;</td>
<td>-0.54 ± 1.6&lt;sub&gt;a&lt;/sub&gt;</td>
<td>-0.47 ± 1.5&lt;sub&gt;b&lt;/sub&gt;</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Mean WAZ ± SD</td>
<td>-0.29 ± 1.0&lt;sub&gt;a&lt;/sub&gt;</td>
<td>-0.25 ± 1.14&lt;sub&gt;a&lt;/sub&gt;</td>
<td>-2.1 ± 1.4&lt;sub&gt;b&lt;/sub&gt;</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Mean WLZ ± SD</td>
<td>-0.11 ± 0.8&lt;sub&gt;a&lt;/sub&gt;</td>
<td>0.348 ± 1.5&lt;sub&gt;a&lt;/sub&gt;</td>
<td>-0.33 ± 1.3&lt;sub&gt;a&lt;/sub&gt;</td>
<td>0.151</td>
</tr>
</tbody>
</table>

* Significant at p< 0.05

4.7 Challenges to optimal infant feeding

The mothers/caregivers reported facing various challenges to optimal feeding practices of the HIV-exposed infants. The following challenges were identified.
4.7.1 Financial constraints

The discussants in the FGDs asserted that finance was a hindrance to ERF because most of the mothers/caregivers could not afford formula milk. They were in agreement that it was expensive to sustain ERF due to the cost of formula milk. ‘Every week I use more than 3,000 Kenyan shillings to buy this milk’ said mother/caregiver (M₉FGD₃, 2015). ‘I am really struggling to buy this milk because I do not have enough money, I might not be able to complete the 6 months that the nurse advised me,’ explained another mother/caregiver (M₁FGD₂, 2015). Those employed or doing business and financially stable were comfortable with ERF. Similar views were expressed by healthcare workers in the KII. ‘We have some patients who have very high viral load to whom we suggest infant formula, but when you take their history, you realize that they cannot even afford to take 2 meals in a day,’ explained a nutritionist (KI₁, 2015).

4.7.2 Stigma

Following the discussion with the mothers, it was evident that they were comfortable discussing about their choice of feeding with the healthcare worker compared to discussing with the family member. ‘The nurses are normally very approachable and it is easy to discuss with them because they are already aware of my status,’ said one of the mothers (M₉FGD₁, 2015). Most of them who had disclosed their status to the other members of the family had varied opinions. ‘I received full support and encouragement from my husband. He makes sure everything works well for me and my baby,’ said one of the mothers (M₉FGD₃, 2015). ‘From the time my mother learnt of my status, she has been uneasy when she is around me.’
Those whose spouses were the only ones aware about their status had difficulties explaining to other family members why the infant should not be given any other feed. ‘I am forced to carry my child wherever I go to ensure that the other siblings do not feed the baby while am away,’ explained one of the mothers (M₄_FGD₄, 2015). Two of the mothers on ERF had stigma associated to ERF. One of them reported that she had to feed her child in the bedroom as she did not want the relatives to know that she was not breastfeeding. This revealed self-stigmatization. Similar opinions were expressed in the KIIIs. ‘There are some mothers who have not accepted their status and when they are asked to join PMTCT support groups, they refuse to be part of them. Others even request not to be counselled by the adherence counsellors,’ explained one nurse (KI₃, 2015).

4.7.3 Cultural beliefs

Most mothers/caregivers in the FGDs were in agreement that cultural beliefs and practices were major hindrances to optimal infant feeding. Majority of the mothers/caregivers reported to being pressured to give herbal medications that were believed to help relieve abdominal pain and improve bowel movement. ‘My mother in law has threatened to chase me away if I did not give the herbal medication to the baby,’ explained one mother/caregiver (M₆_FGD₂, 2015). Another mother/caregiver (M₅_FGD₃, 2015) insisted that the herbs were important, ‘I bathed my older children with it and put others in their tongues to protect them from people with evil eyes, and they are very healthy. They rarely fall sick.’ Similar views were expressed in the KIIIs, ‘I think traditional beliefs are still rampant especially around Chepalungu area (in Bomet County). They believe that they
should wash their new-borns with some herbs and they even give them some to drink,’ a nurse (KI5, 2015) explained.

4.7.4 Conflicting knowledge on current guidelines and recommendations of IYCF

Key Informant Interviews were conducted among the nutritionists, nurses, adherence counsellors (peer educators of people living with HIV receiving HIV services in Tenwek Hospital) and the clinicians attending to HIV-exposed infants at the Tenwek paediatric clinic. The knowledge of the guidelines and recommendations varied with the various cadres of healthcare workers interviewed. From the findings of the KII s it was evident that issues regarding feeding were perceived to be the work of nutritionists and partly that of nurses. The clinicians, nurses and adherence counsellors referred the women visiting antenatal clinic to a nutritionist to teach them on infant feeding options in the context of HIV. All the nutritionists interviewed were conversant with the latest recommendations ‘We usually have quarterly updates at the county on emerging nutrition issues and one of them is IYCF,’ explained a nutritionist (KI2, 2015). The nurses and clinicians were aware that EBF should be practiced for six months and would refer patients to the nutritionist for further counselling ‘I normally just refer the mother to the nutritionist,’ said a clinician (KI7, 2015). Some non-nutrition staff interviewed had inadequate knowledge on the recommended feeding practise. One mentioned that modified cow’s milk could be used as a replacement feed in cases where the mother cannot produce enough milk for the baby. ‘It has been long since I went for those updates but I think it is ok, or what do you think?’ The adherence counsellor (KI11, 2015) said she was aware of EBF and ERF and thought that ERF was only for infants whose mothers were sick or deceased ‘Is that the milk given to babies when their mothers die?’ asked one non-nutrition staff (KI9, 2015).
From the FGD findings, the mothers/caregivers were not sure of when they should stop breastfeeding. ‘Today we are told to stop breastfeeding at 6 months, the next time you come, you are told to continue breastfeeding up to 1 year, now you wonder which one to follow,’ explained a mother/caregiver (M3FGD2, 2015).

4.8 Summary of the findings

Majority of the infants practiced the recommended feeding practice which is exclusive breastfeeding and exclusive replacement feeding. Most of them were on exclusive breastfeeding. Those practicing mixed feeding were few and did so because of financial constraints and stigma. Healthcare workers with the exception of nutritionists were not up to date with the current infant feeding recommendations for HIV-exposed infants. The major barriers to appropriate infant feeding was culture, stigma, financial constraints and conflicting information on the current guidelines and recommendations on infant feeding. Overall, infants on exclusive breastfeeding were better nourished than those on mixed feeding in terms of stunting and underweight.
CHAPTER FIVE: DISCUSSION

5.1 Infant feeding practices among HIV-exposed infants

The WHO guidelines, recommend similar feeding practices for all mothers regardless of their HIV status: early initiation of breastfeeding within 1 hour of birth, exclusive breastfeeding for the first 6 months and introduction of appropriate complementary foods at 6 months, followed by continued breastfeeding for the prevention of mother-to-child transmission of HIV (PMTCT) (WHO et al., 2010). The only exception is that mothers living with HIV are advised to breastfeed for 12 months, which is less than the 24 months recommended for mothers not living with HIV.

The findings of this study in which more infants were on exclusive breastfeeding, compared to those on exclusive replacement feeding and mixed feeding show the same trends as the Kenyan Demographic and Health Survey (KDHS) in which most infants are on EBF (KNBS et al., 2015). The KDHS however, covers data of the general population with no clear statistics on HIV specific rates of EBF. Other studies with similar findings among HIV-exposed infants include a study conducted by Okanda et al., (2014) in Kisumu, Kenya and another one in northwest Ethiopia by Muluye et al., (2012) where majority of the mothers practiced EBF. In regards to EBF, this study showed higher EBF rates (73.7%) than those reported in other studies conducted in India (37.2%) (Khan et al., 2012) and Yobe State and Ibadan in Nigeria (21.1% and 6.2%) respectively (Ajibuah, 2013; Oladokun et al., 2010).
Mixed feeding is an undesirable practice among infants 0-5 months of age. It has been reported that mixed feeding damages the intestinal lining of the infant’s gut leading to an increased risk of HIV transmission through breast milk (Coovadia et al., 2007; Renaud et al., 2008). With regard to mixed feeding, this study findings were in agreement with studies conducted in Ethiopia (Muluye et al., 2012), South Africa and Nigeria (Olatona et al., 2013) where few mothers practised mixed feeding. Majority of those who practiced mixed feeding in this study did so because they believed that breast milk alone was not enough (perceived hunger). Traditionally, mothers may believe that breast milk alone is not enough for optimal child growth and hence they give other feeds. The current study findings however, were higher than the findings reported from Kitale, Kenya (Bii et al., 2008), India (Suryavanshi et al., 2003) and Nigeria (Oladokun et al., 2010). The difference in the findings may be explained by the fact that in the South African and Nigerian studies, infant formula was supplied free of charge to mothers living with HIV unlike in the present study where infant formula was not supplied for free. The studies in South Africa and Nigeria were conducted before the current WHO guidelines had been updated while this study was conducted in the context of the updated infant and young child feeding recommendations.

Timely initiation of breast feeding improves the growth, development, and health outcomes of an infant. Delayed initiation deprives infants of the immunological and nutritional benefits of colostrum, and is likely to impede optimal nutritional status (Edmond et al., 2006). The World Health Organization recommends that breast feeding be initiated within the first hour after birth, while the Kenyan Ministry of Health recommends initiation within half an hour after birth (WHO, 2009). The findings of this study where most mothers
initiated breastfeeding within one hour of birth are in agreement with those of a study conducted in Northwest Ethiopia that found that majority of the respondents had initiated breastfeeding within an hour of delivery. The rates for timely initiation of breastfeeding in this study were higher than those of the KDHS (2015) as well as from studies conducted in India (Khan et al., 2012) and Nigeria (Ajibuah, 2013). The KDHS (2015) rates are however, for the general infant population. The high rates of timely initiation in this study can be associated with the fact that most mothers delivered at a health facility where standard practice is to encourage timely initiation of breastfeeding upon delivery.

5.2 Nutrition status of HIV-exposed infants

The HIV-exposure influences the nutrition status by the fact that the infant may be born small for gestational age due to intrauterine growth retardation. The infants may also be infected with HIV which leads to increased needs thus influencing the nutrition status of the infant. The prevalence of stunting, underweight and wasting recorded in this study would be categorized as an emergency situation, if the findings had been for the general infant population. The sample however, is a HIV-exposed population that could have experienced intra-uterine growth retardation and/or HIV infection. As expected, the nutrition status was better among infants who were on exclusive breast feeding and exclusive replacement feeding as recommended by WHO.

The findings from this study are in agreement with KDHS (KNBS et al., 2015) where the level of stunting in Bomet County is 35.5%, underweight (12%) and wasting (1.8%). Some of the possible reasons for these high levels of malnutrition could be low socio-economic status as most of the mothers/caregivers in this study were of socio-economic status.
Similar rates for stunting, underweight and wasting were reported in studies conducted in Nairobi, Kenya, by Sherry, Embree and Mei, (2000) and McGrath et al., (2012), where there was a drop in length for age, weight for age and weight for length z-scores by the age of 3 weeks among HIV-exposed infants. In the wider African context, studies conducted in South Africa (Ramokolo et al., 2014), Zambia (Makasa et al., 2007) and in Tanzania (Webb, Manji, Fawzi, & Villamor, 2009) also yielded similar results.

In contrast, studies conducted in Tanzania (Mcdonald et al., 2012) and Europe (Newell et al., 2003), did not find stunting, underweight and wasting between the age of 0-6 months in HIV-exposed infants. They however, found significantly lower nutrition status as age increased. In the study conducted by Mcdonald et al., (2012), stunting, underweight and wasting were prevalent at 8.7, 7.0 and 7.2 months respectively.

5.3 Relationships between infant feeding practices and nutrition status among HIV-exposed infants

Under nutrition negatively affects a child’s survival, health, growth and development. Feeding practices affect the nutrition outcomes of infants. Good infant feeding practices can have a substantial positive influence on the nutrition status and the overall development of children. The HIV-exposed infants have increased nutrition needs which may influence the nutrition status of the infant when there is sub optimal infant feeding. The highest rate of HIV infection often occurs in children who are on mixed feeding (breastfeeding and other feeds) before the age of 6 months and thus improving the practice of exclusive breastfeeding reduces the problem of under-nutrition and HIV infection (Amegah, 2009; Safari, Kimambo & Lwelamira, 2013). The observation that most infants on exclusive
breastfeeding and exclusive replacement feeding had normal nutrition status was not unique to this study. Katepe-Bwalya, (2008) also found that nutrition status was significantly associated with infant feeding practices in Zambia, where those on EBF were likely to have good nutrition status. Findings from studies conducted in Nairobi, and Bangladesh were also similar to the current study where infants who were not on EBF for six months were more likely to be underweight than those who were on EBF (Giashuddin et al., 2003; Muchina & Waithaka, 2010).

In contrast, Kamudoni, Maleta, & Shi, (2014) in Malawi, found EBF not to be associated with LAZ, WAZ or WLZ among infants 0-6 months. Another study in Europe by Newell et al., (2003) found neither length nor weight to be associated with HIV-exposure at birth. A randomized control trial conducted in Nairobi by McGrath et al., (2012) also, found no significant difference in the nutrition status of infants on EBF and those on ERF. Stunting was however prevalent among children 2 years of age in infants on both EBF and ERF in the study by McGrath et al., (2012). There was generally limited literature on the association between nutrition status and feeding practices among HIV-exposed infants 0-5 months of age.

Exclusive breastfeeding and exclusive replacement feeding have a positive influence on the nutrition status. The positive influence that exclusive breastfeeding had on the nutrition status of infants in this study can be explained by the fact that breast milk is the best source of nourishment as it has complete nutrients and confers immunological benefits to the baby (UNICEF, 2006). Further, in exclusive breastfeeding, there is less exposure to unsafe water, which could result in illness and thus leading to poor nutrition status. In regards to
exclusive replacement feeding, the composition of infant formula feeds have been modified to provide benefits that are almost similar.

### 5.4 Challenges to optimal infant feeding

Several challenges leading to sub-optimal infant feeding were identified in this study. Financial constraints was reported to influence the choice infant feeding in this study as well as other studies in Nigeria by Oladokun et al., (2010), Ojong, (2015) and Olatona et al., (2013) and a study in Ghana by Laar & Govender, (2011) where majority of the mothers indicated financial constraints as an hindrance to practicing exclusive replacement feeding. Most participants in these studies reported high cost of infant formula resulting in mothers preferring exclusive breastfeeding. Majority of the mothers/caregivers in the current study were of low socio-economic status and this could explain why financial constraints was cited as a challenge. Financial constraints was further exhibited among mothers living with HIV and HIV negative mothers when the work or employment status of an individual influences their ability to EBF, as reported in this study and others by Ogada, (2014) and Oladokun et al., (2010).

Cultural beliefs and practices were reported to influence feeding of HIV-exposed infants. There was pressure from family members to give other feeds and herbs. In most African communities, mothers (regardless of their HIV status) are expected to breastfeed their infant and therefore choosing not to breastfeed can be a challenge in such settings. Other studies reporting cultural pressure include those conducted in Kenya by Ogada, (2014) and in Nigeria by Oladokun et al., (2010). Further, stigma associated with HIV can influence the choice of mode of infant feeding. A study conducted in Nigeria by Oladokun et al.,
(2010) found that stigma was associated with mixed feeding, and is thus in agreement with the findings of this study.

Several guidelines have been developed to guide policy makers, health workers and mothers on the most appropriate methods to feed HIV-exposed infants. Difficulties have however, been reported in implementing earlier recommendations and guidelines on HIV and infant feeding within health-care systems (Sagoe-Moses, Mwinga, Habimana, Toure, & Ketsela, 2012). Thus the WHO recommendations developed in 2010, took into consideration the available evidence, systematic reviews, risk-benefit analysis, the potential impact of the recommendations on human rights issues and costs (WHO et al., 2010). The changes in the current guidelines show how mothers living with HIV should feed their infants, and how health workers should support them. This study’s findings where a number of the healthcare workers interviewed did not have knowledge on the current infant feeding recommendations was therefore a constraint to the implementation of the guidelines by mothers who received confusing and sometimes conflicting information from the healthcare workers. The findings of this study are similar to a study conducted in Malawi by Chinkonde, Sundby, Paoli and Thorsen, (2010). Other major challenges identified by Chinkonde et al., (2010) were the lack of consensus about HIV and infant feeding, the lack of overarching national guidelines for health workers and contradictory infant feeding messages.
CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of findings

The purpose of the study was to determine the infant feeding practices and nutrition status among HIV-exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital in Bomet County. The study found that a large proportion (88.1%) of the participants followed the recommended infant feeding practice by either exclusively breastfeeding or exclusive replacement feeding, with 11.9% practicing mixed feeding. The prevalence of undernutrition (stunting, underweight and wasting) was high. Across all the indices, over a third of the infants were malnourished, with stunting and underweight being more prevalent than wasting. Infants who were on mixed feeding were more likely to be stunted and/ or underweight compared to those who were on exclusive breastfeeding and exclusive replacement feeding. Mothers reported facing challenges such as stigma, cultural beliefs, financial constraints and knowledge on the latest IYCF guidelines among others.
6.2 Conclusions

The following conclusions were made based on the study objectives and findings:

1. Majority of the HIV-exposed infants were fed in accordance with the WHO guidelines (exclusive breastfeeding and exclusive replacement feeding) although mixed feeding was still recorded. Most of the infants were breastfed exclusively.

2. The prevalence of undernutrition (stunting, underweight and wasting) was high. Across all the indices, over a third of the infants were malnourished, with stunting and underweight being more prevalent than wasting.

3. The mode of feeding influenced the nutrition status of infants (0-5 months) with infants on mixed feeding being more likely to be malnourished compared to those on exclusive breastfeeding or exclusive replacement feeding.

4. The challenges to optimal infant feeding included stigma, cultural beliefs, financial constraints and lack of knowledge on the latest IYCF guidelines.

Two of the three study hypotheses were rejected and one was not rejected;

$H_{01}$: There is no significant relationship between infant feeding practices and stunting among HIV-exposed infants 0-5 months of age; rejected.

$H_{02}$: There is no significant relationship between infant feeding practices and underweight among HIV-exposed infants 0-5 months of age; rejected.

$H_{03}$: There is no significant relationship between infant feeding practices and wasting among HIV-exposed infants 0-5 months of age; not rejected.
6.3 Recommendations

6.3.1 Recommendation for policy

To cater for mothers/caregivers who may not be able to exclusively breastfeed and cannot afford exclusive replacement feeding, the Ministry of Health and NASCOP should develop a policy to support them access the infant formula, as they are likely to practice mixed feeding, therefore compromising the health of their infants. This is because financial constraint was reported as the major contributor to mixed feeding as well as a barrier to exclusive replacement feeding.

6.3.2 Recommendation for practice

There is need for training or orientation of healthcare workers on the new guidelines and recommendation as conflicting information for healthcare workers was cited as one of the barriers to appropriate choice of mode of feeding for HIV-exposed infants. The Ministry of Health, County Government of Bomet and Tenwek Hospital should organize refresher courses in line with the current guidelines on infant and young child feeding in the context of HIV.

6.3.3 Recommendation for further research

Further research or studies should be conducted in the following areas;

1. The association between the nutrition status of mothers living with HIV and the nutrition status of their infants.

2. The predictors of malnutrition among the HIV-exposed infants.
REFERENCES


Cambridge University Press.


APPENDICES

APPENDIX A: Proposal approval from Graduate school

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

Internal Memo

FROM: Dean, Graduate School
TO: Chepkorir Lang’at Purity
     C/o Food, Nutrition & Dietetics Department.

DATE: 2nd August, 2015
REF: H60/CE/24077/12

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting of 29th July 2015, approved your Research Proposal for the M.Sc. Degree Entitled, “Feeding Practices and Nutritional Status of HIV-Exposed Infants 0-5 Months of Age Attending Tenwek Hospital in Bomet County, Kenya”.

You may now proceed with data collection, subject to clearance with the Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking forms per semester. The form has been developed to replace the progress report forms. The supervision Tracking Forms are available at the University’s website under Graduate School webpage downloads.

Thank you.

EDWIN ORUNGU
FOR DEAN, GRADUATE SCHOOL

C.c. Chairman, Department of Foods, Nutrition & Dietetics

Supervisors:

1. Dr. Irene Ogada
   C/o Department of Foods, Nutrition & Dietetics
   Kenyatta University

2. Dr. Audrey Steenbeek
   School of Nursing & Department of Community Health & Epidemiology
   Dalhousie University, Canada
   C/o Department of Foods Nutrition & Dietetics
   Kenyatta University
APPENDIX B: Approval letter from Ethics and Review Committee

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

F. O. Box 43844 - 00100 Nairobi
Tel: 877/0901/12
Fax: 8711245/8711975
Website: www.ku.ac.ke

Our Ref: KU/8/COMM/51/528

Date: 31st August, 2015

Dear Chepkorir,

RE: APPLICATION NUMBER PKU/381/E38: “FEEDING PRACTICES AND NUTRITIONAL STATUS OF HIV-EXPOSED INFANTS 0-8 MONTHS OF AGE ATTENDING TENWEK HOSPITAL IN BOMET COUNTY, KENYA”.

1. IDENTIFICATION OF PROTOCOL:
The application before the committee is with a research topic “Feeding practices and nutritional status of HIV-Exposed infants 0-8 months of age attending Tenwek Hospital in Bomet County, Kenya” received on 22nd July, 2015 and discussed on 11th August, 2015.

2. APPLICANT
Chepkorir Langat Purity

3. STUDY SITE
Tenwek Hospital

4. DECISION
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (Section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines AND APPROVED that the research may proceed for a period of ONE year from 31st August, 2015.

5. ADVICE/CONDITIONS
i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

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

[Signature]

PROF. NICHOLAS K. GIKOROYU
CHAIRMAN ETHICS REVIEW COMMITTEE

1. Chepkorir Langat Purity accept the advice given and will fulfill the conditions therein.

Signature... Dated this day of... 2015.

cc. Vice-Chancellor
APPENDIX C: Approval letter from Tenwek Institution Research Committee (IREC).

8th July, 2015

Purity Chepkorir Lang’at
P.O Box 6545-0100
Nairobi

RE: Request to conduct research at Tenwek Hospital “Feeding Practices and Nutrition Status of HIV-exposed Infants 0-5 months of age attending pediatric clinic at Tenwek Hospital”

We received your request as listed above to conduct research at Tenwek Hospital. The IREC committee met on July 8, 2015 to review your proposal. We were quite impressed with your research proposal and the work that has gone into it to date. We have only one request prior to you starting your research here at Tenwek Hospital. Please refer to this committee as the IREC committee instead of the Tenwek Research committee for clarity purposes.

You request to conduct research is approved. We wish you the best.

Sincerely,

Carol D. Spears, MD, MBA, FACS
Interim Medical Superintendent and IREC Chair

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Tenwek Hospital is a Christian community committed to excellence in compassionate health care, spiritual ministry and training for service.
APPENDIX D: Research permit from National Commission for Science, Technology and Innovation (NACOSTI)

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 3241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote
Ref. No. NACOSTI/P/15/6639/8070

Purity Chepkorir Langat
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Feeding practices and nutritional status of HIV-exposed infants 0-5 months of age attending Tenwek Hospital in Bomet County, Kenya,” I am pleased to inform you that you have been authorized to undertake research in Bomet County for a period ending 1st November, 2016.

You are advised to report to the County Commissioner, the County Director of Education and the County Coordinator of Health, Bomet County before embarking on the research project.

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

SADIK HUSSEIN
FOR: DIRECTOR GENERAL/CEO

Copy to:
The County Commissioner
Bomet County.

The County Director of Education
Bomet County.

The County Coordinator of Health
Bomet County.

APPENDIX E: Introductory and informed consent form for mothers/caregivers

How are you?

My name is Purity Lang’at. I am a postgraduate student at Kenyatta University School of Applied Human Sciences. I am carrying out a study feeding practices and nutrition status of HIV exposed children 0-5 months of age attending paediatric clinic at Tenwek Hospital. Whenever researchers study children, we talk to the parents and ask them for their permission. After you have heard more about the study, and if you agree, then we can begin.

Before you decide, you can talk to anyone you feel comfortable with. There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask me or any another researcher.

A. Purpose of the Research Study:

The purpose of this study is to determine the feeding patterns and nutrition status of HIV exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital in Bomet County.

B. Procedures Description

In this study, I will ask you some questions on the feeding options that you are aware of, the choice that you made, the experiences, challenges that you have faced, suggestions and any other concerns you have with the feeding practice that you chose. I will also ask you about your socio-demographic information, where you go for information about health, and whether you get the information and services you need and want. I will not ask you to share personal stories or anything that you are not comfortable sharing.

As for your child, I will take his/her weight and length so that we can assess his/her nutrition status.
C. Duration

The estimated time to complete this study is approximately 6 months from now. The duration for this session will be between 20 to 30 minutes. You may leave the study at any time. If you decide to stop participating, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with this facility.

D. Risks, Discomforts and Benefits

Your participation in this study does not involve any physical risk or emotional risk to you beyond the risks of daily life as there will be no drawing of blood or ingestion of chemical or drugs. There will be no monetary benefits to you or others in this study. The knowledge gained through this study will help us to improve the nutrition care for infants who are born to HIV infected mothers. However, counselling will be conducted in the cases where your child experiences growth faltering or when the choice of feeding that you have chosen is not in line with the IYCF recommendation.

E. Confidentiality

I will not be sharing information about your child outside of the research team. The information that we collect from this research project will be kept confidential. Information about your child that will be collected from the research will be put away and no-one but the researchers will be able to see it. Any information about your child will have a number on it instead of his/her name. Only the researchers will know what his/her number is and we will lock that information up with a lock and key. It will not be shared with or given to anyone except the research team.

All data will be destroyed responsibly after the required retention period of three years elapses. Your privacy will be maintained in all published and written data resulting from this study. Your name or other identifying information will not be used in our reports or published papers

F. Compensation/Incentive

There will be no financial remuneration for participating in this study with an exception of refreshments that will be served after the discussion ends.
G. Voluntary participation/withdrawal from the study

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time. Your decision to not participate or to withdraw from the study will not affect you or your infant’s other medical care in this health facility. We however encourage you to participate.

H. Contact Information and Questions

1) If you have any questions or concerns about the research you may contact

Purity Lang’at,

Tenwek Hospital,

P.O Box 39-20210, Bomet.

lapuritie@gmail.com

2) If you have any questions, concerns or complaints about your rights as a participant in this research, you can contact the following office at Kenyatta University

Kenyatta University Ethical Review Committee,

P.O Box 43844-00100,

Nairobi.

Do you have any questions about the above information?

Do you wish to participate in this study?

Participant Consent:

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

Participant Signature/Thumb print: __________________Date__________________
APPENDIX F: Introductory and informed consent form for focus group discussions

How are you?

My name is Purity Lang’at. I am a postgraduate student at Kenyatta University School of Applied Human Sciences. I am carrying out a study feeding practices and nutrition status of HIV exposed children 0-5 months of age attending paediatric clinic at Tenwek Hospital. Whenever researchers study children, we talk to the parents and ask them for their permission. After you have heard more about the study, and if you agree, then we can begin.

Before you decide, you can talk to anyone you feel comfortable with. There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask me or any another researcher.

A. Purpose of the Research Study:

The purpose of this study is to determine the feeding patterns and nutrition status of HIV exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital in Bomet County.

B. Procedures Description

In this study, you will take part in a discussion with 8-12 other mothers/caregivers. This discussion will be guided by my research partner or me. The group discussion will start with me, or the focus group guide, making sure that you are comfortable. We will also answer questions about the research that you might have. Then we will ask questions about the health system in this community. We will talk about the various feeding options that you are aware of, the choice that you made, the experiences, challenges that you have faced, suggestions and any other concerns you have with the feeding practice that you chose. We will also discuss on where you go for information about health, and whether you get the information and services you need and want. These are the types of questions we will ask. We will not ask you to share personal stories or anything that you are not comfortable sharing.
The discussion will take place in MCH classroom, and no one else but the people who take part in the discussion and the guide or I will be present during this discussion. The entire discussion will be tape-recorded, but no-one will be identified by name on the tape. The tape will be kept in a locked drawer in a locker room. The information recorded is confidential, and no one else except me will be allowed to listen to the tapes. The tapes will be destroyed after 6 period of time. As for your child, we will take his/her weight and length so that we can assess his/her nutrition status. We shall also require you to come with your MCH booklet so that we can determine the growth patterns of your child.

C. Duration

The estimated time to complete this study is approximately 7 months from now. The duration for this discussion will be between 60 to 90 minutes. You may leave the study at any time. If you decide to stop participating, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with this facility.

D. Risks, Discomforts and Benefits

Your participation in this study does not involve any physical risk or emotional risk to you beyond the risks of daily life. There will be no monetary benefits to you or others in this study. The knowledge gained through this study will help us to improve the nutrition care for infants who are born to HIV infected mothers.

E. Confidentiality

We will not be sharing information about your child outside of the research team. The information that we collect from this research project will be kept confidential. Information about your child that will be collected from the research will be put away and no-one but the researchers will be able to see it. Any information about your child will have a number on it instead of his/her name. Only the researchers will know what his/her number is and we will lock that information up with a lock and key. It will not be shared with or given to anyone except the research team.

All data will be destroyed responsibly after the required retention period of three years elapses. Your privacy will be maintained in all published and written data resulting from
this study. Your name or other identifying information will not be used in our reports or published papers.

**F. Compensation/Incentive**

There will be no financial remuneration for participating in this study with an exception of refreshments that will be served after the discussion ends.

**G. Voluntary participation/withdrawal from the study**

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time. Your decision to not participate or to withdraw from the study will not affect you or your infant’s other medical care in this facility.

**H. Contact Information and Questions**

1) If you have any questions or concerns about the research you may contact

Purity Lang’at,

Tenwek Hospital,

P.O Box 39-20400, Bomet.

lapuritie@gmail.com

2) If you have any questions, concerns or complaints about your rights as a participant in this research, you can contact the following office at Kenyatta University

Kenyatta University Ethical Review Committee,

P.O Box 43844-00100,

Nairobi.

Do you have any questions about the above information?

Do you wish to participate in this study?

**Participant Consent:**

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

Participant Signature/Thumb print: __________________ Date__________________
How are you?

My name is Purity Lang’at. I am a postgraduate student at Kenyatta University School of Applied Human Sciences. I am carrying out a study feeding practices and nutrition status of HIV exposed children 0-5 months of age attending paediatric clinic at Tenwek Hospital.

There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask me or any another researcher.

**A. Purpose of the Research Study:**

The purpose of this study is to determine the feeding patterns and nutrition status of HIV exposed infants 0-5 months of age attending the paediatric clinic at Tenwek Hospital in Bomet County.

**B. Procedures Description**

In this study, I will ask you questions on the recommendations of IYCF, trends in growth patterns, feeding practices and nutrition status among infants 0-5 months of age in Tenwek. I will also answer questions about the research that you might have. Then we will ask questions about the health system in this community. These are the types of questions that I will ask. I will not ask you to share personal stories or anything that you are not comfortable sharing.

The discussion will take place in MCH examination room, and no one else but the people who take part in the discussion and the guide or I will be present during this discussion. The entire discussion will be tape-recorded, but no-one will be identified by name on the tape. The tape will be kept in a locked drawer in a locker room. The information recorded is confidential, and no one else except me will be allowed to listen to the tapes. The tapes will be destroyed after 6 period of time.
C. Duration

The estimated time to complete this study is approximately 6 months from now. The duration for this discussion will be between 20 to 30 minutes. You may leave the study at any time. If you decide to stop participating, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with this facility.

D. Risks, Discomforts and Benefits

Your participation in this study does not involve any physical risk or emotional risk to you beyond the risks of daily life. There will be no monetary benefits to you or others in this study. The knowledge gained through this study will help us to improve the nutrition care for infants who are born to HIV infected mothers.

E. Confidentiality

We will not be sharing your information outside of the research team. The information that we collect from this research project will be kept confidential. Information about you that will be collected from the research will be put away and no-one but the researchers will be able to see it. Any information about you will have a number on it instead of your name. Only the researchers will know what your number is and we will lock that information up with a lock and key. It will not be shared with or given to anyone except the research team.

All data will be destroyed responsibly after the required retention period of three years elapses. Your privacy will be maintained in all published and written data resulting from this study. Your name or other identifying information will not be used in our reports or published papers.

F. Compensation/Incentive

There will be no financial remuneration for participating in this study with an exception of refreshments that will be served after the discussion ends.
G. Voluntary participation/withdrawal from the study

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time. Your decision to not participate or to withdraw from the study will not affect you or your infant’s other medical care in this facility.

H. Contact Information and Questions

1) If you have any questions or concerns about the research you may contact

Purity Lang’at,
Tenwek Hospital,
P.O Box 39-20210, Bomet.
lapuritie@gmail.com

2) If you have any questions, concerns or complaints about your rights as a participant in this research, you can contact the following office at Kenyatta University

Kenyatta University Ethical Review Committee,
P.O Box 43844-00100,
Nairobi.

Do you have any questions about the above information?

Do you wish to participate in this study?

Participant Consent:

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

Participant Signature/Thumb print: __________________Date________________
APPENDIX H: Informed consent for the mothers/caregivers translated to Kipsigis.

`Tounet/kanamet ak kayonjinet


A. Amunee si keyoe chikilisiet (research)

Kiit nebo maana si keyoe chikilisiet ko sikikuyen komie elenyolundo keripto ak omitwokik logok chetinye HIV chebo orowek muut kongeten onge siich checham kimutweech kobwa sibitalit ab logok chemengech en Tenwek, Bomet county.

B. Olekisiptoi ok Ororutiet

En chikilisioni, kemoche kenyorun kundisiek che kaiumak chebo kamatik sisit otkoit taman ak somok si kengalal. Indoiiweech agenge en biik chekiboisei tuigul en ngalalet. En ngalaletab kundit ko anendet nee inomee. kimoche kegeer kele miten chitugul komie een ole teben ko makinam tuiyet. Kichobotin kewolwok tebutik chetinyeege ok ngalalet ne bo raini ako yeibata ketebenok ak okweek akobo sibitalisek ak konyoised ak olingwonget. Kingolelen kora akobo oratinwek chechang chenyolu keboisien yonkiboe lagok ok oret ne kararan nenyolu keboisien. Kora keeororuu elenyolu obendi yon omoche onyoru kanetet akobo otebet ab borwekwokt ago kimoche kora kenai angot onyoru konetisyet ak toretet neyamat. Kitinye teputik che terter, kisomok kebchei ngalek che chaang alan ko ngal alak tugul chetinye chemacham komemoche imwochi chii.

Ngalalet nikiyoe keyoen kotab MCH ako kimokyinige kityo biik cheboto ngalalet neketinye en raa komiten yoton. Anendet ok chito ne toretech en ngalalet che miten en

C. Kasarta (muda)


D. Taabut, Terchinet ok Borotet


E. Olekiripto ngalek ok siri


Kibuche ngalek choton chekokinyoru en oret nenyolunot ye ibata kenyisiek somoku kongeten inguni. Siri chebo chito age tugul kekonori komie ako moite keboisien kesir kitabusiek alan keboisien kesir kosetishek alak tugul.
F. Lipanet/konunotyot

Mokikoitoi konunotyot age tugul netinyegee ak rabinik en biik tugul chekabwa kinetke tugul,kobaten miten kityo chaik chekinokto yeibata ngololutik.

G. Chametabchii konyo/Alan komanyo

Taagat chiitugul konyo konetisiet en chamenyin. Imuche komenyon alan kora imuche imande en ole kinetisien en chamengung. Chamengung inyon alan komenyon komo konu teerchinet age tugul en inye alan ko lakwengung en toretet ne cham onyoru en sibitalini.

H. Namba chechuk yon itinye tebut

En chito age tugul netinye tebut age tugul alan komokyin gee konetutik koyakwan kobwa Purity Lang’at,

Tenwek Hospital,
P.O Box 39-20210, Bomet. lapuritie@gmail.com

1) Angot itinye tebut, maoni alan ko terchinet age tugul akobo haki chekuket chekangem chikilishet imuche ongalal ak ofisitab Kenyatta University.

Kenyatta University Ethical Review Committee,
P.O Box 43844-00100, Nairobi.
Itinye tebut agobo ngalechu? Ibitunat inyon konetisiet?

Koyonchinet/sirchinet

Karasoman ok okuye ngalechu.karayan anyu ouk agenge en biik chebwone ak kotoretok en chikilishet noyoe.

Kainet………………………………….Torigit…………………………………………………………
Kinde Sein/Siyet………………………………….Torigit……………………………………
APPENDIX I: Questionnaire for mothers/caregivers

How are you?

My name is Purity Lang’at. I am a postgraduate student at Kenyatta University School of Applied Human Sciences. I am carrying out a study feeding practices and nutrition status of HIV exposed children 0-5 months of age attending paediatric clinic at Tenwek Hospital. I am going to ask you some questions that will be relevant to this study. Any information collected will be treated with confidentiality.

**ANTHROPOMETRIC DATA OF THE INFANT**

<table>
<thead>
<tr>
<th>Measurements</th>
<th>1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt;</th>
<th>Average</th>
<th>W F H/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight to the nearest 0.1 kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length to the nearest 0.1 cm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>QUESTION</th>
<th>ANSWER CODES</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>SECTION SD-SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS</td>
<td></td>
</tr>
<tr>
<td>SD1</td>
<td>Sex</td>
<td>Male _______________________________1</td>
</tr>
<tr>
<td></td>
<td>SEX</td>
<td>Female _______________________________2</td>
</tr>
<tr>
<td></td>
<td>Birthdate</td>
<td>Day/Month/Year…..</td>
</tr>
<tr>
<td></td>
<td>RECORD FROM AGE DOCUMENTATION.</td>
<td>LEAVE BLANK IF NO VALID AGE DOCUMENTATION.</td>
</tr>
</tbody>
</table>
| SD3 | Child’s age in completed months | 0-1……………………………1  
|     |                                | 2-3……………………………2  
|     |                                | 4-5……………………………3  |
| SD4 | Mother/caregiver’s highest level of education | Never attended school………………1  
|     |                                | Primary incomplete…………………2  
|     |                                | Primary complete…………………3  
|     |                                | Secondary plus…………………4  |
| SD5 | Mother/caregiver’s Religion | Christian…………………………1  
|     |                                | Muslim……………………………2  
|     |                                | Others……………………………3  |
| SD6 | Mother/caregiver’s Main occupation | Casual labour…………………………1  
|     |                                | Farmer……………………………2  
|     |                                | Labor (salaried)…………………3  
|     |                                | Business…………………………4  
|     |                                | Housewife………………………5  
|     |                                | Other……………………………6  |
| SD7 | Mother/caregiver’s Marital Status | Single……………………………1  
|     |                                | Married…………………………2  
|     |                                | Living together…………………3  
|     |                                | Widowed………………………4  
|     |                                | Divorced/Separated………………5  |
| SD8 | Mother/caregiver’s Parity | 1……………………………1  
|     |                                | 2-3……………………………2  
|     |                                | >3……………………………3  |
| SD9 | Main Income | 0-5,000……………………………1  
|     |                                | 5,001-10,000………………………2  |
### SECTION IF - INFANT FEEDING

**IF1** Has [NAME] ever been breastfed?
- Yes ........................................1
- No ......................................... 2
- Don’t know .................................. 8

IF answer is 2 or 8 go to IF4

**IF2** How long after birth did you first put [NAME] to the breast?
- Less than one hour ......................... 1
- Between 1 and 23 hours ...................... 2
- More than 24 hours .......................... 3
- Don’t know .................................... 8

**IF3** Was [NAME] breastfed yesterday during the day or at night?
- Yes ........................................1
- No ......................................... 2
- Don’t know .................................... 8

**IF4** Has [NAME] ever been given any other foods, liquids or syrup other than breast milk?
- Yes ........................................1
- No ......................................... 2
- Don’t know .................................... 8

**IF5a** Has [NAME] been ill in the previous 2 weeks?
- Yes ........................................1
- No ......................................... 2
- Don’t know .................................... 8

**IF5b** If YES, what was the illness
- Diarrhoea ..................................... 1
- Respiratory tract infections .................. 2
- Fever ........................................ 3
- Other ......................................... 4
**SECTION IF2**

**IF6**  
Now I would like to ask you about liquids that [NAME] may have had yesterday during the day and at night. I am interested in whether your child had the item even if it was combined with other foods. Yesterday, during the day or at night, did [NAME] receive any of the following?

ASK ABOUT EVERY LIQUID. IF ITEM WAS GIVEN, CIRCLE ‘1’. IF ITEM WAS NOT GIVEN, CIRCLE ‘2’. IF CAREGIVER DOES NOT KNOW, CIRCLE ‘8’. EVERY LINE MUST HAVE A CODE.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>DK</th>
</tr>
</thead>
<tbody>
<tr>
<td>7A. Plain water</td>
<td>7A…………………1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7B. Infant formula, for example Nan 1, Infacare 1, Lactogen 1</td>
<td>7B…………………1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7C. Milk such as tinned, powdered, or fresh animal milk</td>
<td>7C…………………1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7D. Juice or juice drinks</td>
<td>7D…………………1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7E. Clear broth</td>
<td>7E…………………1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7F. Sour milk or yogurt, for example Mursik, Mala</td>
<td>7F…………………1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7G. Thin porridge</td>
<td>7G…………………1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7H. Tea or coffee with milk</td>
<td>7H…………………1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7I. Any other water-based liquids, for example (e.g. sodas, other sweet drinks, herbal infusion, gripe water, clear tea with no milk, black coffee, ritual fluids)</td>
<td>7I…………………1</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>
Now I would like to ask you about solid or semi-solid foods that [NAME] may have had yesterday during the day and at night. I am interested in whether your child had the item even if it was combined with other foods. Yesterday, during the day or at night, did [NAME] receive any of the following?

ASK ABOUT EVERY SOLID OR SEMI-SOLID. IF ITEM WAS GIVEN, CIRCLE ‘1’. IF ITEM WAS NOT GIVEN, CIRCLE ‘2’. IF CAREGIVER DOES NOT KNOW, CIRCLE ‘8’. EVERY LINE MUST HAVE A CODE.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>9A Bread, rice, noodles, or other foods made from grains, including thick grain-based porridge</td>
<td>9A………………….1 2 8</td>
</tr>
<tr>
<td>9B White potatoes, white yams, manioc, cassava, or any other foods made from roots</td>
<td>9B………………….1 2 8</td>
</tr>
<tr>
<td>9C Pumpkin, carrots, squash, or sweet potatoes that are yellow or orange inside</td>
<td>9C………………….1 2 8</td>
</tr>
<tr>
<td>9D Any foods made from beans, peas, lentils or nuts, including Plumpy ‘nut</td>
<td>9D………………….1 2 8</td>
</tr>
<tr>
<td>9E Any dark green leafy vegetables</td>
<td>9E………………….1 2 8</td>
</tr>
<tr>
<td>9F Ripe mangoes, ripe papayas or (insert other local vitamin A-rich fruits)</td>
<td>9F………………….1 2 8</td>
</tr>
<tr>
<td>9G Any other fruits or vegetables</td>
<td>9G………………….1 2 8</td>
</tr>
<tr>
<td>9H Any meat such as beef, pork, lamb, goat, chicken or duck</td>
<td>9H………………….1 2 8</td>
</tr>
<tr>
<td>9I Eggs</td>
<td>9I………………….1 2 8</td>
</tr>
<tr>
<td>9J Any other foods that has not been mentioned</td>
<td>9J………………….1 2 8</td>
</tr>
</tbody>
</table>
APPENDIX J: Questionnaire translated to Kipsigis

Questionnaire (teputiik) ab kamatiik

Oamunee tugul?


BIMANETAB BORTO AK SIRUTIK CHEBO LAGOK

<table>
<thead>
<tr>
<th>Bimanutik</th>
<th>1st</th>
<th>2nd</th>
<th>Kwenetab kiloisiek (Avarage)</th>
<th>W F H/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiloisiek che rikyin kilo 0.1 kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koindo nee rikyin 0.1cm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NAMBARIT | TEPUTIET | WALUTIK

SECTION SD-OTEPTO, MOKORNOTET AK ITONDAP BIIK

<table>
<thead>
<tr>
<th>SD 1</th>
<th>Itondo</th>
<th>Murenik……………………………………..1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Itondo</td>
<td>Kwondo…………………………………….2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Betut/Arawet/Kenyit………………………</td>
</tr>
</tbody>
</table>

SD

Kenyit nee kikisichin.
INYIIT KOTIENGEE
SIRUTIK CHEMITEN AGOBO KENYITAB SIKET, MATINYIIT AGOT
<table>
<thead>
<tr>
<th>SD</th>
<th>KOMENGEEN KOMIE</th>
<th></th>
</tr>
</thead>
</table>
| 3   | Kenyit ab lagwet en kenyisiek cheisibi | 0-1..........................1  
|     |                  | 2-3..........................2  
|     |                  | 4-5..........................3  |
| 4   | Somanet nebo barak en kamet ab lagok | Masoman........................1  
|     |                  | Primary........................2  
|     |                  | Secondary......................3  
|     |                  | Tertiary.......................4  |
| 5   | Kasiit neye kamet ab lagok | Kasitab eut.....................1  
|     |                  | Temisiet.......................2  
|     |                  | Kasitab ofis...................3  
|     |                  | Mungaret.......................4  
|     |                  | Motinye kasit..................5  
|     |                  | Kasitab gaa/goot...............6  
|     |                  | Alak...........................7  |
| 6   | Mengisiet ab kamet ab lagok | Ma itunot......................1  
|     |                  | Itunot.........................2  
|     |                  | Kisirto boiyot................3  
|     |                  | Kibesio ak boiyot...............4  |
| 7   | Melekto nebo kila arawet | 0-5000............................1  
|     |                  | 5000-10000......................2  
|     |                  | 10000-20000.....................3  
|     |                  | 20000-40000.....................4  
|     |                  | Above 40000.....................5  |
|     | Olebunu rabisiek cheteer | Temisieet......................1  
|     |                  | Minutik.........................2  
|     |                  | Temisieet ak minutik............3  
|     |                  | Malik chemiten alak.............4  |

SECTION IF- INFANT FEEDING(OLE KIRIPTO LAGOK CHE MENGEECH)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mo chuchuni……………………..2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mongen………………………….8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF2</td>
<td>Kiib kasarta netiana kongeten ongesich [kainet] si kochuchun?</td>
<td>Saait agenge……………………1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kongeten sait 1 agoi 23…………2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kisiir saisiek 24………………3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mongen………………………….8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Koigochi [kainet] kochuchun en amut beet aln ko kemoiih?</td>
<td>Unotet…………………………1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maunoton………………………2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mongen……………………….8</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION IF2**

|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

<table>
<thead>
<tr>
<th></th>
<th>Iman</th>
<th>Maiman</th>
<th>DK</th>
</tr>
</thead>
<tbody>
<tr>
<td>7A. Beek che tililen</td>
<td>7A.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7B. olekiripto lagok(Infant formula), choton kou Nan 1, Infacare 1, Lactogen 1</td>
<td>7B.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7C. Chego che kikiamsi ak chebo teta</td>
<td>7C.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7D. Beek ab logoek(juice)</td>
<td>7D.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7E. Suteek</td>
<td>7E.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7F. Mursik alan ko yogurt</td>
<td>7F.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7G. Rongoriik(porridge)</td>
<td>7G.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7H. Chaiik alan ko kaweek</td>
<td>7H.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7I. omitwagiik alak tugul che beek (kou soda, chaiik chemotinye chego, kaweek ak alak.)</td>
<td>7I.</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

| IF5 | En ingunon omoche atebenen agobo omitwokik chekwam[KAINET]en amut beet alan ko kemo.Omoche kora anai ole kotesta nee omitwakik choton. En omut kowkam |                                               |                                               |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEEP AGOBO OMITWOKIK CHEKOKOCHI LAKWET.OTGO KOKIKOCHI KOBA KORA,CIRCLE'1'.OTKO MOKIKOCHI KOBA KORA,CIRCLE'2'.OTKO MANGEN RIBINDET,CIRCLE'8'.</td>
<td></td>
</tr>
<tr>
<td>Iman Maiman DK</td>
<td></td>
</tr>
<tr>
<td>9A Makatia,mchelek,ok omitwogik alak tugul chetinye tenderek.</td>
<td>9A.........1 2 8</td>
</tr>
<tr>
<td>9B Viazinik,mogo,ak omitwokik chekibolu en ngwony chetinye tigitik.</td>
<td>9B.........1 2 8</td>
</tr>
<tr>
<td>9C Mogobeek,carrat,robwonikche tolelyonen alan ko biriren en ort</td>
<td>9C.........1 2 8</td>
</tr>
<tr>
<td>9D Omitwogik chekichoben maharagwek,njorogeek alan ko soya</td>
<td>9D.........1 2 8</td>
</tr>
<tr>
<td>9E Ngweek alak tugul</td>
<td>9E.........1 2 8</td>
</tr>
<tr>
<td>9F Maembe che ruryotiik,ak logoek chetinye vitani A</td>
<td>9F.........1 2 8</td>
</tr>
<tr>
<td>9G logoek alak tugul alan ko ingweek</td>
<td>9G.........1 2 8</td>
</tr>
<tr>
<td>9H Bendo nebo teta,ngurweet, artet,ngororiet,ngokiet alan ko batait</td>
<td>9H.........1 2 8</td>
</tr>
<tr>
<td>9I Maainik</td>
<td>9I.........1 2 8</td>
</tr>
<tr>
<td>9J Amitwogik alak che tomo keteep</td>
<td>9J.........1 2 8</td>
</tr>
</tbody>
</table>
APPENDIX K: Focus Group Discussion (FGD) guide for mothers/caregivers

All information obtained from the participants will be treated in confidence and shall not be diverted to any other interest group or individuals other than for the purposes of this study. Where anonymity is requested, such shall be guaranteed. The interview will be tape recorded.

1. What are some of the common feeds that are given to HIV exposed infants?
2. Where did you get the information on the infant feeding practices?
3. Why did you choose this feeding practice?
4. What are your experiences regarding your choice of feeding?
5. What support do you get towards ensuring you have optimized on the choice of feeding?
6. What are the challenges that you are facing with the choice of feeding you decided on?
7. What are your suggestions on the feeding practices of HIV exposed infants 0-5 months of age?
APPENDIX L: Focus Group Discussion (FGD) guide translated to Kipsigis

Oleksiiptoi ngalalet nebo kundisiek

Ngaleek tugul ak ngololutiik chebunu chii age tugul koiku siri chechoket kityo ago mokingongto, kiboisien kityo en konetutik cheki tesen taa. Agot komemoche kenain alan kenai chekemwaa kemuche ketoritin keuny kainet ak tuguk tugul che kemwaa. Ngalelenyon ketae okinde caset.

1. Ochon omitwogik chegeebutyin lagok chetinye HIV?
2. Isiche en ano kanetutik akopo ye kipoitoo lakwet ne mingin?
3. Amunee siboisien omitwogiik cheu choton?
4. Mwoweech kit ne kirinetgee agobo ole kichopto omitwogik?
5. Oinon toretet nikirinyoru agoba ole kichopto omitwogiik?
6. Nee tabuut neenyoru yon iboe lakwet?
7. Maoni onion netinye agoba ole kiboito lagok chetinye HIV chebo aroweek muut?
APPENDIX M: Key Informant Interview (KII) guide for Healthcare workers

The information obtained from the participants will be treated with confidence and only used for the purposes of this study. Anonymity will be guaranteed. This interview may be recorded.

1. What are the guidelines/recommendations for feeding HIV exposed infants 0-5 months of age?

2. What are the trends in infant feeding practices, nutrition status and growth patterns among HIV exposed infants?

3. What are the promoters of optimal feeding practices and nutrition status of HIV exposed infants 0-5 months of age?

4. Are you aware of the changes in infant feeding recommendation? How is the uptake and dissemination of these recommendations?

5. What challenges do you face when talking to mothers living with HIV on infant feeding practices?

6. What are the challenges that the mothers face when feeding their infants?

7. How do you handle the issue of stigma among your patients living with HIV?

8. What are your suggestions regarding infant feeding practices and nutrition status of HIV exposed infants?
APPENDIX N: Key Informant Interview (KII) guide translated to Kipsigis

TEBUTIIK CHEKIWALU AK OLE KISIPTO

Ngaleek tugul chekibendi kengololen ko siri ago ngololutiik chebunu chii age tugul koiku siri chechoket kityo ago mokingongto. kiunye kainetab chii age tugul newendi ko ngolole. Ngalelenyon ketae okinde caset.

1. Kiripto ano lakwet netinye HIV nebo araweek muut ago itinye maoni ainon agoba ole kiripto?

2. Nee walet nebitu en ribet ab lakwet ak omitwokik chenomegee lakwet netinye HIV nebo araweek muut?

3. Ainon oreet age nekimuche keboisien en ole kiboito lagok, Toretito ano lagok maoni niton?

4. Itinye naet agoba walotik chekokobiit agoba kanetet nebo ole kiripto lakwet ak omitwokik che nyolchini?

5. Nee kewelindo ne nyoru yon ingololchini kamatik che tinkye HIV agoba ole kiboito lagok?

6. Nee kewelindo ne nyoru kamatik ingo poe lagok che mengeechen?

7. Kiripto ano biik che kiketengan bororiet amun tinkye HIV?

8. Maoni achon chetinye agoba olekiboito lagok chetinye HIV ak omitwokik chenyolchin?
(National AIDS Control Council [NACC], 2013)