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"A thesis submitted to the School of Health Sciences in partial fulfillment for the degree of Master of Science of Kenyatta University".

August, 2007
DECLARATION

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

Signed

Date 27th 8 2007

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“We confirm that the work reported in this thesis was carried out by the candidate under our supervision as University supervisors.

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ABSTRACT

HIV/AIDS has become a major global catastrophe. There are 2.5 million children under 15 years of age who are living with HIV/AIDS. In Kenya, there are 90,000 children who are HIV positive. The probability of an HIV positive mother transmitting the virus during pregnancy is 5-8%, 10-20% during labour and delivery, and 10-15% during breastfeeding. To prevent HIV transmission to infants through breastfeeding, UNICEF/UNAIDS/WHO have formulated guidelines on infant feeding for HIV positive mothers. Current infant feeding guidelines provide for major breastfeeding options such as exclusive and continued breastfeeding, modified breastfeeding, replacement feeding, and breastfeeding by an HIV negative woman. HIV positive mothers find themselves in a great dilemma in choosing a feeding method since in most African settings breastfeeding is the norm. Accurate information on nutritional adequacy and risks of the several feeding options is still incomplete. The Mothers are counseled but the growth of the infants is not measured against the mode of feeding. It is on this basis that this study sought to determine the feeding practices by HIV positive mothers and nutritional status of the infants and the relationship between the two. The study targeted infants 0-12 months born to HIV positive mothers attending Homa-Bay prevention of mother to child transmission (PMTCT) Clinic. Purposive sampling was used to select mothers who are HIV positive and have undergone nutrition counselling on infant feeding options and have infants aged 0-12 months. Mothers attending clinic between April and July 2005 who knew their HIV status and were willing to participate in the study were interviewed. The entire population of 100 was included in the study. An interview schedule was used to gather data. Anthropometrical indices were used to determine the nutritional status of infants. Data were analyzed using the statistical package for the social sciences (SPSS). Anthropometrical indices were analyzed using Epi-info. Chi Square was used to determine relationships between feeding practices and nutritional status of infants born to HIV positive mother. The results showed that knowledge of transmission through breastfeeding does not change women’s preference for breastfeeding. About 89% of the respondents had breastfed their infants. Mixed feeding was the most common (79 %) followed by exclusive breastfeeding (16%) early cessation (3%) and commercial; infant formula and home-prepared milk had 1% respectively. No mother opted for wet nursing and heat-expressed milk. The nutrition status of the infants was generally poor. Only 24.9% fell within the normal reference range, stunting prevalence rate was 21.5 %, wasting 17% and stunting and wasting was 31 %. There was a significant difference (p values) on nutritional status between those who breastfed and those on alternative feeding. The chi-square results ($X^2=7.44; df=3; p=0.05$) indicated that there was a significant difference between feeding practice and nutritional status of infants. The contingency coefficient showed that 27% of the observed variations in nutritional status could be attributed to breastfeeding. In conclusion, the results indicate that despite many programmes designed to reduce MTCT of HIV, the feeding practices of mothers have not changed. The findings of this study reaffirm the need for a concerted effort and strategic campaigns on exclusive breastfeeding as a most effective form of intervention in resource poor settings. The study is useful in counseling of HIV positive mothers on infant feeding options. The researcher recommends that replacement feeding be made more available or at reduced costs in rural setting and HIV positive women should receive information on infant feeding prior to conception to allow sufficient time for reflection on the feeding options.
# TABLE OF CONTENTS

ABSTRACT .................................................................................................................. III

TABLE OF CONTENTS .............................................................................................. IV

LIST OF TABLES ........................................................................................................ VIII

LIST OF FIGURES ....................................................................................................... IX

DEDICATION .................................................................................................................. X

ACKNOWLEDGEMENTS ............................................................................................. XI

ACRONYMS .................................................................................................................. XII

CHAPTER ONE ............................................................................................................. 1

INTRODUCTION ......................................................................................................... 1

1.1 Background information ....................................................................................... 1

1.2 Statement of the problem ...................................................................................... 5

1.3 Hypothesis ............................................................................................................ 6

1.4 Purpose of the study ............................................................................................ 6

1.5 Objectives ............................................................................................................ 7

1.6 Significance and anticipated outputs .................................................................... 7

1.7 Conceptual framework ......................................................................................... 8

1.8 Scope of the study .............................................................................................. 9

CHAPTER TWO ......................................................................................................... 11

LITERATURE REVIEW ............................................................................................. 11

2.1 Introduction ......................................................................................................... 11

2.2 Prevalence of hiv/aids ....................................................................................... 11
2.3 Mother to child transmission of HIV and prevention strategies

2.4 International and national guidelines on HIV and infant feeding

2.5 Health, nutrition status and feeding practices of infants born to HIV positive mothers

2.6 Impact of mothers' HIV status on nutritional status of infants

2.7 Summary

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

3.2 Research design

3.3 Research variables
   3.3.1 Independent variables
   3.3.2 Dependent variables

3.4 Area of study

3.5 Sample size and sampling procedure

3.6 Inclusion and exclusion criteria

3.7 Data collection instruments

3.8 Ethical consideration

3.9 Data collection procedures

3.10 Training of research assistants

3.11 Pre-testing

3.12 Data analysis

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

4.2 Socio-demographic characteristics of the study participants
   4.2.1 Age of respondents
4.2.2 Marital status of the respondents by age .................................................. 30
4.2.3 Number of other children ever born and are living by age of mothers ........................................... 31
4.2.4 Children ever born but died ....................................................................... 32
4.2.5 Type of family among HIV positive mothers ............................................. 33
4.2.6 Literacy Level of HIV Positive mothers compared to the National Levels .... 34
4.2.7 Income level and level of education ............................................................. 35

4.3 Factors influencing choice of feed ................................................................... 37
4.3.1 Counseling on infant feeding .................................................................... 37
4.3.2 Choice of feeding practice ......................................................................... 38
4.3.3 Factors influencing the choice on infant feeding ......................................... 39
4.3.4 Reasons and benefits for specific choices on infant feeding ....................... 40

4.4 Feeding practices of infants born to HIV positive mothers ......................... 41
4.4.1 Infant feeding options as selected by the HIV positive mothers ................. 42
4.4.2 Actual feeding practices of infants born to HIV positive mothers ............... 42
4.4.3 Exclusive breastfeeding and modified breastfeeding ................................. 43
4.4.4 Breastfeeding patterns ............................................................................ 44
4.4.5 Duration of time before initiating breastfeeding ....................................... 45
4.4.6 Duration of breastfeeding ....................................................................... 46
4.4.7 Frequency of breastfeeding among HIV positive mothers ...................... 47
4.4.8 Heat-treated expressed milk .................................................................... 47
4.4.9 Wet Nurse ............................................................................................... 47
4.4.10 Replacement Feeding ........................................................................... 48
4.4.11 Mixed Feeding ...................................................................................... 48
4.4.12 Complementary feeding ...................................................................... 49

4.5. Health and Nutrition status of the infants ...................................................... 51
4.5.1. Health Status ...................................................................................... 51
4.5.2 Nutrition status of the infants .................................................................. 54

4.6 Selected variables and the nutrition status of infants born to HIV positive mothers ........................................................................................................................................ 59
4.6.1 Sex ........................................................................................................ 59
4.6.2. Birth Weight ....................................................................................... 60
4.6.3 Nutrition status by type of feeding option among infants ...................... 60
4.6.4. Nutrition status by Social-economic characteristics of the HIV positive mothers ................................................................. 62

CHAPTER FIVE ........................................................................................................ 66

SUMMARY, CONCLUSION AND RECOMMENDATIONS ........................................ 66

5.1 Overview ........................................................................................................ 66

5.2 Summary of the study ................................................................................... 66
5.2.1 Socio- demographic characteristics of the HIV positive mothers .......... 67
5.2.2 Feeding Practices of Infants Born To HIV Mothers .................................. 68
5.2.3 Factors influencing choice of infant feeding among HIV positive mothers .... 69
5.2.4 Nutritional status of infants born to HIV positive mothers .................... 69
5.2.5 Associations between nutritional status and breastfeeding and alternative feeding .................................................................................................................. 70

5.3 Conclusion ........................................................................................................ 70

5.4 Recommendations ........................................................................................... 71
  5.4.1 Recommendations to policy makers ......................................................... 71
  5.4.2 Recommendations for practice ............................................................... 71
  5.4.3 Suggestion for further research ............................................................... 72

REFERENCES ........................................................................................................... 73

Appendix I: Interview Schedule ........................................................................... 79

Appendix II: Letter of Authorization (Kenyatta University) ............................... 89

Appendix III: Letter of Authorization (Ministry of Education Science and Technology) ........................................................................................................ 90

Appendix IV: Letter of Authorization- Office of The President .......................... 91

Appendix V: Map of Homabay District ................................................................ 92
LIST OF TABLES

Table 3.1: Waterlow classification ................................................................. 27
Table 3.2: Cut-Off Points For Muac (Gibson 1990) ........................................... 28
Table 4. 1 - Distribution of hiv positive mothers by age ..................................... 30
Table 4. 2: Distribution of respondents by age and marital status .......................... 31
Table 4. 3: Other children ever born and are living by mother’s age ......................... 32
Table 4. 4: Children ever born and are dead among the hiv positive mothers .......... 33
Table 4. 5 Mothers level of education by number of children ever born and dead ....... 33
Table 4. 6 Type of family by marital status of the respondents .............................. 34
Table 4. 7: Distributions of respondents by literacy levels as compared to national levels. ................................................................. 35
Table 4. 8: Income level, level of education and marital status of hiv positive mothers ................................................................. 36
Table 4. 9: Distribution of hiv positive mothers by source of information on infant feeding........................................................................................................ 37
Table 4. 10: Persons influencing decision on infant feeding among hiv positive mothers ........................................................................................................ 39
Table 4. 11: Factors influencing decision on infant feeding .................................... 39
Table 4. 12: Reasons and benefits for specific choices on infant feeding by hiv positive mothers .......................................................................................... 41
Table 4. 13: Breastfeeding duration of infants born by hiv positive mothers .......... 46
Table 4. 14: Frequency of breastfeeding infants among hiv positive mothers ........ 47
Table 4. 15 Complementary foods given and modal age of introduction of the foods 50
Table 4. 16 Illness suffered by infants two weeks preceding the study .................... 51
Table 4. 17 Measures taken when a child falls ill .................................................. 52
Table 4. 18 Illness suffered by type of feeding among infants ................................. 53
Table 4. 19 Distribution of respondent’s infants by birth weight ............................. 54
Table 4. 20 Nutrition status by sex among infants born of hiv positive mothers ......... 59
Table 4. 21 Nutrition status by birth weight ........................................................ 60
Table 4. 22 Distribution of nutrition status of infants by type of feeding option .......... 61
Table 4. 23 Nutrition status by breastfeeding status of infants born of hiv+ mothers. 61
Table 4. 24 Nutrition status of infants by income level of mother ........................... 63
Table 4. 25 Nutrition status of infants by literacy of the hiv positive mothers .......... 64
Table 4. 26 Nutrition status of infants by mothers’ marital status ............................ 65
LIST OF FIGURES

Figure 4.1 Actual feeding practices of infants born of HIV positive mothers........... 43
Figure 4.2 Duration of time before initiating breastfeeding .................................. 45
Figure 4.3 Nutrition status by gender using MUAC............................................. 56
Figure 4.4 Nutritional status of infants born to HIV positive mothers in homabay... 57
DEDICATION

To my loving husband Lameck Odidah, Sons Bill and Churchill, who kept the fire for further education burning and my dear parents, Elly Ochuma and Zilpa Ochuma, who have always been my sources of inspiration.
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### ACRONYMS

<table>
<thead>
<tr>
<th>ACC/SCN</th>
<th>Administrative Committee on Coordination, Sub Committee on Nutrition of the United Nations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>Acquired Immune deficiency Syndrome</td>
</tr>
<tr>
<td>ARVS</td>
<td>Anti Retroviral</td>
</tr>
<tr>
<td>CBS</td>
<td>Central Bureau of Statistics</td>
</tr>
<tr>
<td>df</td>
<td>Degree of freedom</td>
</tr>
<tr>
<td>FANTA</td>
<td>Food and Nutrition Technical Assistance</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>KANCOs</td>
<td>Kenya Aids Non Governmental Consortium</td>
</tr>
<tr>
<td>KDHS</td>
<td>Kenya Demographic Health Survey</td>
</tr>
<tr>
<td>KEMRI</td>
<td>Kenya Medical Research Institute</td>
</tr>
<tr>
<td>MCH</td>
<td>Maternal Child Health</td>
</tr>
<tr>
<td>MUAC</td>
<td>Middle Upper Arm Circumference</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MTCT</td>
<td>Mother to Child Transmission</td>
</tr>
<tr>
<td>MSF</td>
<td>Medicines sans Frontiers</td>
</tr>
<tr>
<td>NACC</td>
<td>National Aids Control Council</td>
</tr>
<tr>
<td>NARESA</td>
<td>Network of Aids Research of Eastern and Southern Africa</td>
</tr>
<tr>
<td>NASCOP</td>
<td>National Aids and Sexually Transmitted Disease Control Programme</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organizations</td>
</tr>
<tr>
<td>P</td>
<td>Probability, also the success probability of binomial variable</td>
</tr>
<tr>
<td>PMTCT</td>
<td>Prevention of Mother to Child Transmission</td>
</tr>
<tr>
<td>ROK</td>
<td>Republic of Kenya</td>
</tr>
<tr>
<td>SD</td>
<td>Standard Deviations</td>
</tr>
</tbody>
</table>

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Kenya's Demographic Health Survey (KDHS) is a national survey that provides comprehensive data on health, nutrition, and demographic indicators. It is conducted every three years, with the most recent rounds in 2019.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>STD</td>
<td>Sexually Transmitted Diseases</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNAIDS</td>
<td>United Nations Programme on Aids</td>
</tr>
<tr>
<td>UNFPA</td>
<td>United Nations Family Planning Association</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations International Children’s and Education Fund</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Assistance International Development</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td>Computed value of Chi Square test</td>
</tr>
</tbody>
</table>
CHAPTER ONE
INTRODUCTION

1.1 Background information

Human Immunodeficiency Virus (HIV) infection is increasing at an alarming rate. In the year 2005, there were 700,000 new infections among children under the age of 15 years and 570,000, AIDS related deaths (United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO), 2005). In Sub-Saharan Africa, one third of pediatric hospital admissions are related to HIV/AIDS (Ministry of Health, 2005). In Kenya, there were about 90,000 children who were infected with the HIV/AIDS virus in the year 2003 (Ministry of Health, 2003). According to a survey conducted by national coordination for agency for population and development, the number of HIV infected children has increased to 140,000 (MoH, 2005). HIV prevalence in women aged 15-49 is nearly 9% (CBS, 2004). Mother to child transmission is accountable to over 90% of the HIV infections in children (National Aids and STD Control Programme, 2002; WHO, 2004; MoH, 2005). AIDS is responsible for an increasing share of under age five mortality. There is an increase in the proportion of women being affected for example in 2005, 17.5 million women were living with HIV, and this is an increase of one million as compared to 2003 with 13.5 million living in the Sub-Saharan Africa. Without HIV prevention measures, 35% of children born to HIV positive mothers will contract the virus. The HIV epidemic in children is reversing the gains in child health survival and has made caring for HIV infected children costly for families and health systems.

Homa-Bay District was specifically selected for this study because it is ranked top in HIV/AIDS prevalence in Kenya (CBS, 2004). HIV/AIDS was first diagnosed in the district in 1986 (RoK (b), 2002). Since then, the prevalence has continued to rise with the
current rate standing at 24%. In the year 2000, Homa-Bay recorded the highest prevalence rate with 12 persons dying per week. HIV prevalence among antenatal clients is about 33 percent, one of the highest in Kenya (NARESA, 2004). The main factors contributing to the rapid spread of the disease in the District are widow inheritance, loose lifestyles among migrant fishermen, negative cultural beliefs, pre marital sex, and night disco dances (RoK, 2002).

The District has established constituency AIDS Control Committee at the district level to coordinate prevention and control efforts by all stakeholders to ensure that the pandemic is curbed. Several sensitisation meetings have been conducted at community level. Other efforts have involved training of youth and widows, peer HIV/AIDS counsellors by community-based organisations. These offer counselling services and encourage the community to seek treatment for STDs and go for Voluntary Counselling and Testing (VCT). Expectant mothers are being encouraged to take advantage of the UNICEF funded prevention of mother to child transmission (PMTCT) programme at the district hospital. It was therefore easy for the research team to access the HIV positive mothers from the PMTCT Clinic, which has been opened at the district hospital.

Homa-Bay District Hospital was chosen because it is one of the pilot areas used to implement the prevention of mother to child transmission programme. It has one Hospital, 20 Health centres and 15 Dispensaries. The Hospital forms a suitable convergent point for the study population also acting as a referral for the other health centres. Homa-Bay District hospital also hosts Medicines Sans Frontiers (MSF), an international NGO that supports HIV patients by offering free ARVs. The National Aids
Research for East and South Africa (NARESA) also has a PMTCT programme in the hospital. Infant mortality rate stands at 137/1000 and immunization coverage is only 35%.

Homa-Bay was selected because it is ranked among the areas having greatest number of people living below the poverty line. The estimation was 77.49%, above that of Nyanza Province level of 63% and national level of 52% (RoK (a), 2002). This provided a typical set up of the rural setting where more than 50% live below the poverty line. The high level of poverty is attributed to local’s passive attitude towards manual work and poor fishing, agricultural marketing, processing and storage methods. Other reasons include exploitation of farmers, fishermen, women, by middlemen, negative cultural practices that impede agricultural production at family level, lack of investments and entrepreneurial risk-taking skills among locals and inaccessibility to credit facilities. The excessive burden on the would-be investors by the extended family of orphans left behind by dead relatives, high incidence of HIV/AIDS related deaths, inadequate social services e.g. health facilities and poor infrastructure especially roads also seem to have contributed a great deal to the poverty situation (RoK (b), 2003).

UNAIDS and WHO, (2004) recommends that to reduce the risk of mother to child transmission, an HIV positive mother should practice replacement feeding if it is acceptable, feasible, affordable, sustainable and safe and avoid breastfeeding. Otherwise exclusive breastfeeding is recommended during the first six months of life and then should be discontinued as soon as it is feasible. The impact of introducing these guidelines on mothers’ actual feeding practices has not previously been examined and might increasingly raise the risk of Mother To Child Transmission. (Ministry of Health, 2005). There is incomplete knowledge about the safety of exclusive breastfeeding and
solid knowledge about the rate of replacement feeding in environments with poor sanitation and economic constraints. HIV positive mothers face difficult choices about how to feed their infants (Latham and Preble, 2000).

The national policy stipulates that women should be counseled about different possible infant feeding alternatives. The basic ethical principle of informed choice requires that HIV positive women be provided with the adequate information; however, the mother’s choice of infant feeding should be respected. Mothers’ choices are often influenced by familial, medical and cultural attitudes, norms and economic conditions. In Kenya, breastfeeding is the norm and most women find it difficult to practice alternative feeding (NASCOP, 2002; Kenya Non Governmental Consortium, 2000; Oguta, 2002). Breast milk substitutes are costly to buy. For example in Kenya, the monthly cost of formula milk for a baby would be around ksh.3000 (the same as the monthly minimum wage). Women often end up breastfeeding, despite knowledge on the risk of HIV transmission through breast milk (Oguta, 2002).

Breastfeeding is the dominant infant feeding practice in Kenya. Breast milk has immunoglobulins and white blood cells and growth factors which stimulate the development of the infant’s gut. Though in a recent survey done in Kenya, exclusive breastfeeding is not common as only 29 percent of children under two months and 9 percent of those below four months of age are exclusively breastfed. By age 4-5 months, two thirds of children are given complementary foods (CBS, 2004).

Feeding guidelines for infants for HIV infected mothers are being formulated in many resource poor settings to try and reduce the mother to child transmission. However, there
is incomplete information on the impact of introducing these guidelines. The mothers’ actual feeding practices have not previously been examined and might inadvertently increase the risk of Mother to Child Transmission (MTCT). It is preferable to replace breast milk with artificial feeding to reduce the risk of HIV transmission to her infant. The risk of replacement feeding should be less than the potential risk of HIV transmission through infected breast milk. The risk of HIV transmission through breastfeeding needs to be weighed against the dangers posed by artificial feeding. This study sought to determine the feeding practices of infants born of HIV positive mothers as per the WHO guidelines.

1.2 Statement of the problem

The HIV positive mothers find themselves in a great dilemma in choosing a method of feeding. Great efforts have been made in recent years to promote breastfeeding by all mothers. Nearly all African women initiate breastfeeding at birth and the duration of breastfeeding is often greater than 24 months. Breast milk has nutritional, immunological, and psychological and birth spacing benefits, yet a very high risk of transmitting the HIV virus. Replacement feeding will reduce mother to child transmission of HIV but there is the risk and fear of high mortality, morbidity and stigmatization that can result from not breastfeeding. Women need accurate information and counseling to enable them to decide on the best available feeding practice.

There are few studies with data on the risks of artificial feeding. Little is known regarding nutritional risks associated with good formula feeding and modified breastfeeding among HIV positive women. Investigations have been done using questionnaires, case studies but very few have related these preventive measures to the nutritional status of infants (WHO, 2003).
The plight of children affected and infected with HIV/AIDS is of particular concern, because when parents are ill, have died or are caring for ill relatives, less time is available for childcare. It is, therefore, important to determine the nutritional status of these children so that proper strategies are put in place for their survival, growth and development.

Little research is available on nutritional intervention for infants born of HIV infected mothers (Food and Nutrition Technical Assistance, 2001). Mothers are normally counseled but the infants’ growth is not monitored and evaluated in terms of nutritional status against the mode of infant feeding (FAO, 2003). It is on this basis that this study sought to find out if there was any significant difference on the nutritional status of infants who are born of HIV positive mothers and all different feeding practices.

1.3 Hypothesis

H₀ (Null Hypothesis)

There were no significant differences between the nutritional status of infants who are breastfed and those on alternative feedings by HIV positive mothers.

1.4 Purpose of the study

The purpose of this study was to generate information on the relationship between infant feeding practices of HIV positive mothers and nutritional status of infants at Homa-Bay PMTCT Clinic. This information will be useful for planning of interventions aimed at improving health and nutritional status of children. Additionally, the study will contribute valuable information to the ongoing research on infant feeding in the context of HIV.
1.5 Objectives

The objectives of the study were:

1. To determine factors influencing choice of infant feeding practices among HIV positive mothers
2. To determine the infant feeding practices by HIV positive mothers
3. To determine the nutritional status of infants born of HIV positive mothers
4. To determine if there is any significant difference between the nutritional status of infants born of HIV positive mothers and different feeding practices.

1.6 Significance and anticipated outputs

The information will be useful in counselling HIV positive mothers. The study will form a basis for further research on interventions on infant feeding practices and also help nutritionists and food scientists in formulating appropriate coping strategies to improve nutritional and health status of infants born of HIV positive mothers.
1.7 Conceptual Framework

This framework attempts to explain factors that influence the nutritional status of infants born to HIV positive mothers. It includes the infant feeding practices and factors that influence the choice of feed following nutrition counselling on feeding options recommended by Word Health Organization.

**INFANT NUTRITIONAL STATUS**

- **Breastfeeding**
  - Exclusive
  - Early cessation
  - Express & heat-treated wet nurse

- **Replacement Feeding**
  - Commercial infant formula
  - Home-prepared formula

- **Enriched Family Diet (6 months)**
  - Porridge
  - Soups
  - Mashed potato

**HIV/AIDS POSITIVE MOTHER**

- Nutrition counselling and feeding options following visiting and acceptance of HIV positive results.
- Infant feeding information and physical aid, social support during pregnancy, childbirth and postpartum.
- Familial, medical, cultural attitudes and norms. Demographic, economic conditions, national and international guidelines.

Figure 1.1 Correlation of nutritional status of infants born of HIV/AIDS mothers

*Source: Modified from WHO 2002: IFRI ACC/SCN 2003*
1.8 Scope of the study
The study was limited to a PMTCT Clinic set up for HIV counselled mothers taking informed infant feeding choices in Homa- Bay District Hospital.

1.8.1 Limitations of the study
The study was not able to establish the HIV status of the children because infants below 12 months still have antibodies of their mothers. The HIV ribonucleic acid polymerase chain reaction blood test which can be done to detect the virus was not being done at Homa- Bay hospital. Prevailing social norms and possible stigmatisation may have influenced responses. Study was limited to Homa-Bay District Hospital thus generalisation of findings to other settings should be done with caution.

1.8.2 Assumptions of the study
The HIV positive mothers opt for a variety of feeding choices upon getting all the required nutrition information (counselling).

1.8.3 Operational definitions of terms

**Nutritional status:** refers to the state or condition of the body in relation to food intake and utilization to meet the body’s requirement for growth, maintenance and reproduction.

**Infant:** refers to a child who is below 12 months old.

**Alternative feeding:** refers to a process of feeding a child who is not receiving breast milk with a diet that ideally provides all the nutrients the infant needs.

**Exclusive breastfeeding:** refers to giving an infant no other feed including water and juice, apart from breast milk.
Mixed feeding: refers to feeding the child on breast milk and giving home-made foods or commercial infant formula and complementary feeding.

Commercial infant formula: refers to specially formulated milk processed specifically for infants and sold in shops or provided by the government or NGO's through programmes designed to prevent HIV transmission by mothers to infants.

Home modified animal milk: refers to fresh or processed animal milk that is modified by adding water, sugar and nutrition supplements.

Wet nursing: refers to having another woman breastfeed an infant, in this case ensuring that the other woman is HIV negative.

Expressing and heat-treating breast milk: refers to removing milk from the breasts manually or with a pump then heating it to kill the HIV virus.

Complementary feeding: refers to any food whether manufactured or locally prepared, suitable to be given to infants together with breast milk or infant formula to satisfy the nutritional requirements of the infant.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The literature has been reviewed under the following main sub-themes: prevalence of HIV/AIDS, mother to child transmission and preventive strategies, international and national guidelines on HIV and infant feeding, health and nutritional status of infants on different feeding practices, impact of mothers' HIV status on nutritional status of infants.

2.2 Prevalence of HIV/AIDS

HIV is a virus that attacks the immune system, the body's security force that fights off infection. When the immune system breaks down, one loses this protection and can develop many serious often-deadly infections and cancer, which makes it the most destructive epidemics in recorded history (UNAIDS, 2005). Estimated 40.3 million people worldwide are living with HIV/AIDS of whom two thirds (25.8 million) are in Sub-Saharan Africa (UNAIDS, 2005). Close to 5 million people were newly infected in 2005. The highest levels of HIV/AIDS are found in Southern Africa with prevalence rates exceeding 30% among the adult population (UNAIDS and WHO, 2004). In Kenya, 6.3% of the Kenyan adults are infected whereby the highest total rates of HIV infections exist in Nyanza Province (15.1%) and Nairobi (9.9%) (MoH, 2005). According to KDHS (2003), the Luo have the highest prevalence of 17.5% of men and 25.8% of women among the ethnic groups.

UNAIDS (2005) reported that the number of people who have lived or are living with HIV/AIDS since the start of the epidemic had reached 38 million of which 2.6 million had already died by December 2005. The number of HIV infections in children less than
15 years of age as at the end of 2005 was 2.3 million (UNAIDS, 2005). Approximately 90% of these children live in Sub-Saharan Africa. Two thirds of all people living with HIV/AIDS virus in Kenya are children (NASCOP, 2005). An estimated 2.4 million people died of HIV/AIDS related illness in this region in 2005, while a further 3.2 million were infected with 140,000 children of the infected living in Kenya.

The prevalence of HIV/AIDS among pregnant women (15 – 24 years of age) in Kenya in 2002 was 9.8% countrywide with 11.9% occurring in urban sites and 8.3% in rural sites (United Nations International Children’s Education Fund, 2004). Nyanza Province has a prevalence level of 14%, which was above the national average with Homa-Bay District having a prevalence of 26% (CBS, 2004). According to WHO (2000), nearly 600,000 children were infected with HIV through their mothers whereby it is estimated that 50,000 to 60,000 are infected in Kenya, which is about one child every minute, every day (KANCOs, 2000). By the year 2010, AIDS may have increased mortality of children less than 5 years of age by more than 100% (UNAIDS, 2004).

2.3 Mother To Child Transmission of HIV and prevention strategies

Most children who get HIV are infected through their mother at a rate of 20 – 25% (NASCOP, 2002). The risk of transmission is increased if the woman has full blown AIDS, a high viral load or acquires HIV while breastfeeding (Harman, 1999, WHO, 2000; NASCOP, 2002; UNAIDS, 2005). Other risk factors include infection with sexually transmitted diseases, obstetric procedures, and duration of breastfeeding, condition of breasts and condition of baby’s mouth (WHO, 2002; KEMRI, 2003; UNAIDS, 2005). About 5 to 8% of babies become infected through transmission across the placenta, labour and delivery poses the greatest risk for transmission with 10 to 20%
of exposed infants becoming infected. HIV virus may be transmitted when maternal blood enters the fetal blood circulation or by mucosal exposure to the virus during labor and delivery. During breastfeeding 10 to 15% of infants become infected (NASCOP, 2002). Overall, half of the breast milk transmission takes place by 6 weeks and three quarters by 6 months (MoH, 2001). It is estimated that in the absence of breastfeeding, about 30% of MTCT occurs during pregnancy and 70% during labour and delivery (MoH, 2005). The overall MTCT rate is approximately 40% without intervention. This reverses the gains in child health and survival and has made caring for HIV children costly for families and health systems. In Kenya, which has a population of about 31 million and about 1.02 million births per annum, the HIV prevalence in mothers is 13% (MOH, 2005). Total number of HIV positive infants per annum in Kenya assuming 40% transmission is therefore 53,000 (MoH, 2005).

A group of UN organizations (UNAIDS and WHO, 2004) started to implement anti-retroviral therapy using a single 200mg Table for the mother to take at the onset of labour and a single dose of oral suspension given to the infant immediately after birth or within 72 hours of delivery. Other measures included restricting the use of invasive obstetric procedures such as artificial rupture of membranes and episiotomy to reduce the exposure of the infant to the blood of an infected mother and replacement feeding for the infant. Despite the interventions the rate of HIV infection among infants still increases and HIV positive mothers in resource poor setting still breastfeed. It is therefore the purpose of this study to determine factors that determine choice of feed among HIV positive mothers in Homa-Bay, Kenya.
2.4 International and national guidelines on HIV and infant feeding

WHO/UNICEF/ UNAIDS recommend that all women and men irrespective of their reproductive health must have access to information and services that allow them to protect their own and their family’s health. As a general principle, in all populations, irrespective of HIV infection rates, breastfeeding should continue to be protected, promoted and supported (WHO, 1998; UNAIDS and WHO, 2004). Infants should be exclusively breastfed for the first 6 months of life, thereafter to meet their evolving nutritional requirements, infants should begin to receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to 2 years of age or beyond (Shinskies and Lauwers, 2002).

In the context of HIV, WHO (1998) recommends that when replacement feeding is acceptable, feasible, affordable, sustainable and safe, an HIV positive mother should avoid breastfeeding the infant. Replacement feeding options include the use of commercial infant formula; home prepared formula; and modified breastfeeding practices, such as feeding an infant on expressed and breast milk or early cessation of breastfeeding. In Kenya, the national policy stipulates that all pregnant and lactating mothers should be provided with information regarding infant feeding options. The policy promotes the right of HIV exposed mothers to choose how and what to feed their infants following information on different infant feeding options (MoH, 2005). Similarly, breastfeeding should be encouraged and free samples and supplies of breast milk substitutes should not be acceptable (NASCOP, 2000; MoH, 2004). Appropriate complementary feeding should be discussed and the mother should be provided with vitamin A, iron, folic acid and zinc supplements and infections should be treated promptly (NASCOP, 2000; MoH 2004).
The WHO guidelines however face challenges in terms of implementation. Exclusive breastfeeding for six months is far from an existing practice; many women work outside home, or are in formal employment where maternity leave is only for 60 working days. Devising feeding of mothers with HIV without the nutritional safety net of breast and with limited access to infant formula or animal milk is also a great challenge (UNICEF, 2001). HIV positive mothers in resource poor populations have no suitable replacement in view of their economic status (Tuitoek, Shalo and Mwale, 2005). There is clear need for intensified research to guide formulation of policy and intervention programs for infant feeding in the context of HIV/AIDS.

2.5 Health, nutrition status and feeding practices of infants born to HIV positive mothers

Nutrition status of a child is influenced by the nutritional intake, health status, environment and care the child is receiving (FANTA, 2001; CBS, 2004). Poor nutrition status is one of the most important problems facing Kenya today and afflicts most vulnerable groups (women and children). Numerous socio economic and cultural factors influence the decision on patterns of feeding and nutrition status.

Malnutrition is the underlying cause of death in about 60% of children younger than 5 years old worldwide and about 50% of that age in Africa. In Kenya at the national level, 30% of children below five years are stunted (low weight for age); while 6% of children are wasted (low weight for height) and 20% are under weight ((low weight for age) according to KDHS, (2003). Evaluation of nutritional status is based on rationale that in a well-nourished population, there is a statistically predictable distribution of children of
given age with respect to height and weight (CBS, 2004). Use of a standard reference population as a point of comparison facilitates the examination of differences in the anthropometrical status of subgroups in a population and of changes in nutritional status over time. One of such standard references is the U.S. National Center for Health Statistics Standard (NCHS)), which is recommended for use by WHO. It is based on the finding that all population groups have similar genetic potential for growth (CBS, 2004).

Decisions about infant feeding in setting of high prevalence of HIV/AIDS require a balancing of risks. On one hand is the risk and fear of transmitting HIV through breastfeeding, and on the other is the risk and fear of mortality and morbidity that can result from not breastfeeding (Piwoz and Preble, 2000). Breastfeeding is normally the best way to feed an infant (WHO, 2003). Breast milk has anti-infective factors that protect the child against infections. It also has almost all the nutrients required by the infant for a healthy growth (UNAIDS, 2002).

In the middle income countries, most HIV positive women go for formula feeding as shown in a study done in northern Thailand whereby 94% exclusively formula fed their babies, 5% fed on both breast milk and formula milk and only one percent exclusively breastfed (Talawat, Dore, Coeur, Lallemant, 2002). Formula feeding was the predominant infant feeding choice in most PMTCT sites in South Africa (FANTA, 2001). In the poor countries, most HIV positive mothers opted for breastfeeding. A study conducted in the North Eastern part of Tanzania found that women often end up breastfeeding despite knowledge of HIV transmission through breast milk (Ameena, Moeng and Matji, 2004). These results were similar to a study in Zimbabwe which revealed that nearly all HIV
positive mothers still chose to breast feed despite being provided with full information on infant feeding (Tavengwa, Ali and Piwoz, 2000).

A study done in Nairobi, Kenya revealed that breastfed infants tended to have better nutrition status, significantly so during the first six months of life (Nduati et al; 2001). Breastfeeding decreases incidence of diarrhea and lowers respiratory infection and chronic digestive diseases (UNAIDS and WHO, 2004). Another study done in Mukuru slum in Nairobi, Kenya showed that breast fed children performed better in mental development test at 18 months and 7 years (Habte, 2001). Infants who are not breastfed have higher rates of childhood illnesses, malnutrition and mortality (WHO, 2000; Poggensee et al; 2004). However, in a randomized clinical trial done in Nairobi, Kenya, infants assigned to formula feeding and breastfeeding groups had a similar mortality rate and incidence of diarrhea and pneumonia during the first 2 years of life (Nduati et al; 2001).

Early cessation on the other hand may cause the infant to refuse other foods leading to malnutrition (Israel and Kroeger, 2003). Express and heat treated milk contains high quality nutrition and disease protection of a mothers’ milk (Harman, 1999). Replacement milk, lack vitamin C, vitamin E, folic acid, iodine, and selenium, which are essential for a baby’s growth. Home-prepared milk does not meet the essential fatty acid needs of an infant (Papathakis, 2004). Cow milk is not easily digestible and has low calorie content. Cow milk can lead to infantile obesity making infant fat and sluggish (KEMRI, 2002). Mixed feeding places the baby at risk both of HIV and of other infections (KANCOs, 2000; NASCOP, 2002; Piwoz and Preble, 2003).
The formula milk is quite expensive in terms of cost and this predisposes the child to malnutrition. Studies done in Harare, Zimbabwe and Homa-Bay, Kenya reveal that even after free testing and counselling HIV positive mothers continue to breastfeed (Piwoz and Preble, 2000; Oguta, 2002). A study in Kiambu, Kenya, found that cow milk was the most acceptable alternative (Howitz, 2003). In the efforts to ensure that infants are born HIV free and remain HIV free. Researchers should not ignore possible adverse effects it may cause on the nutrition status of infants (UNICEF and WHO, 2003).

Onyango, Recoverur and Esney (2002) in a study in western Kenya stressed that the nutritional role of mothers’ milk during the second year is inversely related to the adequacy of the complementary diet. When weaning diet is inadequate breast milk assumes greater nutritional significance in second year of life but does not guarantee adequate nutrient intakes. There is little data on the relative risks and benefits of different feeding options. It is not clear which option would save most lives of the infants, be of least cost to the caregivers and have the fewest negative effects.

2.6 Impact of mothers’ HIV status on nutritional status of infants

Nutrition and HIV are strongly related. Any immune impairment worsens the effect of HIV and contributes to more rapid progression. A woman who has inadequate food intake before and during pregnancy is at increased risk during labour and delivery and more likely to have a baby with low birth weight (Food and Nutrition Technical Assistance, 2001).

Pregnancy and childbirth creates new health demands on the HIV infected woman and often contributes to progression of HIV (MoH, 2005). An HIV infected mother may
become sickly, resulting in the child getting less care and being at greater risk of malnutrition (MoH, 2005; UNICEF and WHO, 2003). HIV infected women are at increased risk for nutritional impairment due to HIV related complications that may affect appetite, cause mal-absorption of nutrients and increase in the basal metabolic rate (Jackson, 2002). Also, micro and macro deficiency results in an increased number of pre-term and low birth weight (MoH, 2005).

Illness and death in a household can reduce availability of food through lack of money, inability to work on the land fully, or prepare food. When there is emotional stress, eating is not so readily supported (UNICEF and WHO, 2003). This may affect nutritional status of the child because the child may be at increased risk of illness if not breastfed or if infected with HIV and need extra care (UNICEF and WHO, 2003). Additionally, the mothers’ health including infectious diseases can interfere with lactation. Anything that interferes with the mothers’ confidence can lead to interference with breastfeeding (Jellife, 1985). Increased expenditure for caring for the sick combined with reduction in income results in less purchasing power for the HIV/AIDS affected households and less market accessibility to food.

Financial constraints from loss of employment or increased health expenditure limit the family resources while psychological stress of HIV disease limit the parent’s ability to ensure a varied and nutritious diet for the child (KANCOs, 2000). In very poorly nourished women, the volume of milk produced is less than it could be, lack of some nutrients such as vitamin A, which is common among HIV positive mothers, can also lower breast milk (Jeliffe, 1985). It is on this basis that this study sought to determine the nutritional status of infants born to HIV positive mothers.
2.7 Summary

The number of children suffering from HIV/AIDS and of those dying from AIDS is alarming (3 million). Their life has become a big challenge to the scientists, health professionals and policy makers alike. A lot of interventions have been put in place to try and prevent AIDS, and PMTCT is one of these interventions. The children are innocent and yet they fall victims of circumstances. The mothers are forced to make difficult decisions in order to select infant feeding options that are the best for their children. There are few studies with data on the risks of artificial feeding in African setting because breastfeeding is nearly universal, making balancing of risks especially challenging. Women lack sufficient information, medication, supplies and support when it comes to options for infant feeding (NASCOP, 2000).

There are issues that remain unclear, limiting the capacity to adequately counsel HIV mothers on infant feeding options. It’s evident that there is paucity of literature regarding the nutritional status of infants using different options of feeding available. It is therefore the purpose of this study to determine the nutritional status of the infants who are breastfed and those on alternative feeds.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction
This chapter focused on research design, research variables, and area of study, target population, data collection instruments, and data collection procedures and data analysis.

3.2 Research design
Non-experimental study design was used in this study since the researcher did not introduce any effect on the variables under consideration. Consequently, a cross-sectional descriptive study method was used to collect both qualitative and quantitative data. This method was appropriate because it allowed for extensive data collection and in-depth investigation within a short time frame (Mugenda and Mugenda, 1999).

3.3 Research variables
3.3.1 Independent variables
These were variables that had already happened and the researcher had no control over them. The variables included socio-demographic information, infant feeding options, breastfeeding rate, bottle-feeding rate, complementary feeding and morbidity status.

Infant feeding options: Exclusive breastfeeding, early cessation, wet nurse, home prepared formula, commercial infant formula.

Breastfeeding rate: percentage of infants less than 12 months breast fed within 1 hour of birth or never breastfed over total number infants

Bottle-feeding rate: total number of infants bottle-fed over total number of infants

Complementary feeding: percentage of infants fed on manufactured or locally prepared food together with breast milk or infants formula over total number of infants.
Social Demographic information: Mothers' age, marital status, parity, type of family, income level and source, and education.

Morbidity status: Illness experienced 2 weeks prior to the study and immunisation status.

3.3.2 Dependent variables

Nutrition status: This is an outcome, or a function of the independent variable. It was expressed as weight for height (this is sensitive index of current nutrition status). Prevalence of wasted children was taken as the percentage of infants with a height that is more than two Z scores below referenced weight for height. Height-for-age (which reflects extended periods of inadequate food intake and increased morbidity). Prevalence of stunted children was taken as percentage of infants with a weight that is more than two Z scores below the referenced height for age. MUAC was used as an additional indicator of adequacy of nutrition. An infant who was >13.4cm was considered adequately nourished. An infant who was <13.4cm and >12.4 cm was moderately malnourished while an infant who was < 12.5 cm was considered as severely malnourished.

3.4 Area of study

This study was carried out at Homa-Bay PMTCT Clinic in Nyanza Province, Kenya. Homa-Bay District is located in the south-western part of Kenya along Lake Victoria and is one of the twelve districts of Nyanza Province. It borders Rachuonyo District to the north, Kisii District to the east, Migori District to the south and Suba District to the west. It is located between longitude 34’and 40’ east, latitude 0’ 28’ and 0’ 40’ south. The District has a total area of 1,160.4 square km out of which 29.5 square km is under water. Appendices xii and xiii illustrate the location and administrative boundaries. The Districts’ total population in 2002 was 312,885 persons (148,264 male and 164,264 male).
female) with a sex ratio of 100:110. The district has inland Equatorial climate. In general, temperatures are highest between December and March with maximum temperatures being experienced in February. The lowest temperatures are experienced between October and November.

3.5 Sample size and sampling procedure
Multi-stage sampling was used to select a study sample. A comprehensive sample of all HIV positive mothers who attended follow up clinic between June and July 2005 were enlisted into the study upon their consent. Selection was opportunistic whereby the research nurse got all eligible HIV positive mothers who knew their HIV status prior to obtaining consent of the study. The HIV positive mother would only be enlisted in the study if she had received advice during pre and post-test counselling on infant feeding options and had infants 0-12 months old. There were about 60 mothers who visited the clinic in a month according to the hospital records. Therefore for the two months (June and July 2005) that the researcher was in the field, she was able to reach 110 respondents. However, 10 respondents were omitted because either they didn’t attend post-test counselling on infant feeding or the infants were acutely ill. A total of 100 respondents were reached.

3.6 Inclusion and exclusion criteria
The study included known HIV positive mothers who had undergone infant feeding counselling and had infants who were 0-12 months old. On the other hand, mothers who were HIV negative, mothers who were HIV positive but were not involved in the infant feeding counselling programme and mothers of children over one year were excluded from the study.
3.7 Data collection instruments
The instruments used to collect data were structured questionnaire, 24 Hour Dietary Recall, anthropometric measurements and secondary data from the hospital records and clinic cards.

**Questionnaire:** An interview schedule was used to gather data. A set of questions both closed and open ended were used to collect data from each respondent. The interviews provided social demographic information such as maternal age, parity, marital status, education, infant sex, and source of income.

**24-hour dietary recall** was used to clearly specify the type of feeding for evaluation purposes. In 24 Hour Dietary Recall the mother was asked to recall what the child consumed during the previous 24 Hour Dietary Recall periods. The interviewer recorded a detailed description of all foods and beverages consumed.

**Anthropometrical measurements:** Anthropometrical measurements of infants were taken by use of a paediatric scale, beam balance, length-board and regular measuring tape. Anthropometrical indices were expressed in relationship to the reference population. The reference was used to compare the infants’ measurements with the median for children of the same sex and age for height.

**Secondary data:** Child health cards were used to verify child’s age and birth weight and immunisation status of the infant.

3.8 Ethical consideration
The study was approved by board of postgraduate studies of Kenyatta University (Appendix II), Ministry of Education (Appendix III), District Commissioner Homa-Bay and Ministry of Health, Homa-Bay (Appendix IV). The respondents, on understanding
that their identity would be anonymous and information received would be confidential.

gave a verbal consent.

3.9 Data collection procedures

The respondents were accessed from Homa-Bay PMTCT Clinic as they came for maternal child health services. Upon consent the interview schedules were then administered in the local language using a pre-tested questionnaire. Anthropometrical measures were taken. Weight was taken using a paediatric scale for infants and a beam balance.

The scale was adjusted to zero and the infant was then placed on the pan scale. To ensure accuracy, the child was weighed with minimum clothing and the infant was placed at the centre of the pan to ensure weight is distributed equally. Weight was then recorded as soon as the indicator on the scale had stabilised to the nearest 0.1kg. In cases where the infants would not be still, a beam balance was used whereby the mother and the infant were weighed together, and then the mother alone. The infants’ weight was then calculated by subtraction. Height measurement was taken using a length-board. The child was laid on a flat fixed board. The head was positioned firmly against the fixed headboard, with the eyes looking vertically. The knees were extended, usually by firm pressure applied by an assistant, and the feet were flexed at right angles to the lower legs. The upright sliding foot piece was marked to obtain firm contact with the heels and length read to the nearest 0.1cm. The upright sliding foot piece was then moved to obtain full contact with the heels and length read to the nearest 0.1cm. MUAC was measured using the regular measuring tape. Age was obtained directly from the infants’ documentations such as clinic cards.
3.10 **Training of research assistants**
To ensure quality assurance of data collected, research assistants were trained for two days prior to data collection. The training consisted of practising weighing and measuring of infants' weight and length and middle upper arm circumference on the same infant to compare inter and intra-observer error. The research practised the sequence of activities. Practical training sessions were held on anthropometrical, and data collection techniques and research ethics. Volunteer infants with the informed consent of their mothers were used to provide practice.

3.11 **Pre-testing**
To test consistency in producing a reliable result (reliability), a test-retest method was used. A sample of one percent of the sample size was drawn from the study area (these subjects did not participate in the main research) as part of a pre-test (Orodho, 2004). The interview schedule was administered to the subjects and then repeated after two weeks and a comparison of the answers made and analysed. A correlation coefficient of 0.8 was considered reliable for the study (Orodho, 2004, Waudo, 2004).

To ascertain the degree to which the test measures what it purports to be measuring (validity), the interview schedule was given to three experts in the field of infant feeding research to examine individually and provide feedback. The instrument was then revised and adjusted based on responses obtained.

3.12 **Data analysis**
Upon completion of data collection, the interview schedules were edited, coded and entered into a computer spreadsheet in a standard format to allow for analysis of both descriptive and inferential statistics. The Statistical Package for the Social Sciences
(SPSS) computer software was used for analysis. Statistical procedures were applied to the data to express concepts and relationships. The researcher used both descriptive and inferential statistics. Measures of central tendency (mean, mode, median) and frequencies and percentages were used to describe the population.

Chi-square test was used to determine the statistical significance of relationships between feeding practices and the nutritional status of children born to HIV positive mothers. The statistical differences were measured at 0.05 level of significance. The weight and height was analysed for stunting and wasting using EPI-info computer software. The National Centre for Health Statistics and World Health Organisation (NCHS/WHO, 1989) international growth reference was used as standard. Raw values of weight, height and age, in combination with sex were transformed into nutritional indices for weight for height, height for age and weight for age using EPI-info 2000. Standard deviations were computed and the Waterlow classification cut-off points used to interpret the outcome as shown below.

Table 3.1: Waterlow Classification

<table>
<thead>
<tr>
<th>Height for Age</th>
<th>Weight for Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of stunting</td>
<td>Degree of wasting</td>
</tr>
<tr>
<td>Percent (Grade)</td>
<td>&gt;90% (0)</td>
</tr>
<tr>
<td>&gt;90% (grade=0)</td>
<td>Normal</td>
</tr>
<tr>
<td>95-90 % (grade=1)</td>
<td>Stunting</td>
</tr>
<tr>
<td>85-90% (grade=2)</td>
<td>&lt;85% (grade=3)</td>
</tr>
</tbody>
</table>
Table 3.2: Cut-off points for MUAC (Gibson 1990)

<table>
<thead>
<tr>
<th>Mid upper arm circumference (cm)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;13.4</td>
<td>Normal</td>
</tr>
<tr>
<td>&gt;12.5 – &lt;13.4</td>
<td>Possibly mild malnourished</td>
</tr>
<tr>
<td>&lt;12.5</td>
<td>Malnourished</td>
</tr>
</tbody>
</table>
CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.1 Introduction
This chapter presents the research findings in a study on nutrition status and feeding practices of infants born of HIV positive mothers: A case of Homa-Bay PMTCT Clinic. The social demographic characteristics of the mothers and the findings of the study are presented according to the objectives of the study, which include factors influencing choice of infant feeding among HIV positive mothers, feeding practices and nutrition status of infants born to the HIV positive mothers. The chapter also discusses the relationship between demographic factors and infant nutritional status and relationship between feeding practice and infant nutritional status. The data were collected from 100 face-to-face interviews with HIV positive mothers with infants under 12 months attending Homa-Bay PMTCT Clinic.

4.2 Socio – demographic characteristics of the study participants
The Socio-demographic attributes assessed in the study included mother’s age, marital status, number of children ever born and are living, number of children ever born and are dead, type of family, level of education, income and occupation. This data was important because it gave a clear picture on the respondents’ background. The socio-demographic helped in identifying the study population ability in terms of food availability (whether from local production or other sources) and their access and stability of access to the infant feed. Educational level plays a role in shaping food habits, consumption patterns and food supply systems in general.
4.2.1 Age of respondents

The results presented in Table 4.1 indicate that all the mothers were in the reproductive age ranging from 15-49 years. The modal age bracket was 20-24 years, while the mean age was 28 years. The results indicated that less than a quarter (17%) of the population were adolescent mothers. It is therefore clear that reproductive health programs should focus on this age group especially on issues relating to HIV/AIDS. The study results are almost similar to the Kenya Demographic and Health Survey of 2003, in which the women of reproductive age ranged between 15-49 years and majority of the population were 30 years and below (CBS, 2004).

<table>
<thead>
<tr>
<th>Age Category (Years)</th>
<th>Percentage (%) (n = 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 19</td>
<td>17</td>
</tr>
<tr>
<td>20 - 24</td>
<td>32</td>
</tr>
<tr>
<td>25 - 29</td>
<td>29</td>
</tr>
<tr>
<td>30 - 34</td>
<td>13</td>
</tr>
<tr>
<td>35 - 39</td>
<td>7</td>
</tr>
<tr>
<td>40 - 45</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

4.2.2 Marital status of the respondents by age

Table 4.2 shows that (63%) of the mothers interviewed were married, with 10% being single, 2% divorced, and 6% separated while 15% were widowed. Notably that 4% of the mothers were inherited after their husbands died. The single mothers were relatively young (15 – 29 years).

The single mothers may be in-experienced and insecure about their beliefs and logically turn to their families particularly mothers, for parenting help. The parents of the single
mothers may insist on their own decisions or less frequently implement their preferred feeding practices without the adolescent’s consent and may thus influence choice of infant feed. The married women on the other hand could be getting financial assistance as well as moral and psychological support from their spouses and hence are in better mental state to make a preferential choice on type of feeding choice than the single mothers (Waswa, 2004).

Table 4.2: Distribution of respondents by age and marital Status.

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Mothers age by marital status</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Married</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Divorced</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Separated</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Widowed</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Inherited</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>32</td>
</tr>
</tbody>
</table>

These results are almost similar to the 2003 Kenya Demographic Health Survey where 54.5% were married, 29.8% were single, and 5.9% were divorced or separated. This indicates that marriage is still nearly universal in Kenya and divorce or separations are uncommon. Similarly in Columbia, 72% of the women who tested HIV positive at an antenatal site reported being in a stable relationship while in India, a significant proportion of new infections is occurring among married women (UNAIDS, 2005).

4.2.3 Number of other children ever born and are living by age of mothers

The results in Table 4.3 show that a higher proportion (31.0%) of mothers had one child alive. The study found those with more than four children accounted for only eight percent and almost all of them were 30 years and above. Consonant with expectations, the mean number of children ever born and are living rise with age of women.
Table 4.3: Other children ever born and are living by mother’s age

<table>
<thead>
<tr>
<th>AGE</th>
<th>Number of Children ever Born and Living (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>15-19</td>
<td>8</td>
</tr>
<tr>
<td>20-24</td>
<td>5</td>
</tr>
<tr>
<td>25-29</td>
<td>1</td>
</tr>
<tr>
<td>30-34</td>
<td>0</td>
</tr>
<tr>
<td>35-39</td>
<td>0</td>
</tr>
<tr>
<td>40-44</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
</tr>
</tbody>
</table>

4.2.4 Children ever born but died
The study results notably revealed that 94% of the mothers interviewed had lost at least one of their children. The highest number of death to one parent was six. Thus, there is a high rate of child mortality among this study population, which could be higher than the national (77 deaths per 1000 live births) or even Homa-Bay District average (13 per 1000 live births) as indicated in KDHS 2003. It was not clear whether these deaths were related to the mothers’ HIV/AIDS status or to other factors. The children born of HIV/AIDS mothers could have a dual or multiple risk of survival given that the poverty level was also high among the studied mothers. Table 4.4 shows the relationship between the mothers’ age and children ever born and dead. The study revealed that the young mothers (15-29) had the highest number of children ever born and are dead (78%) though most of them had lost just one child.
Table 4.4: Children ever born and are dead among the HIV positive mothers

<table>
<thead>
<tr>
<th>AGE</th>
<th>Number of children ever born and are dead (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None 1 2 3 4 5 6 Total</td>
</tr>
<tr>
<td>15-19</td>
<td>0 16 1 0 0 0 0 17</td>
</tr>
<tr>
<td>20-24</td>
<td>3 17 5 5 0 1 1 32</td>
</tr>
<tr>
<td>25-29</td>
<td>1 14 6 2 5 1 0 29</td>
</tr>
<tr>
<td>30-34</td>
<td>1 8 1 3 0 0 0 13</td>
</tr>
<tr>
<td>35-39</td>
<td>0 3 1 1 0 2 0 7</td>
</tr>
<tr>
<td>40-44</td>
<td>0 1 1 0 0 0 0 2</td>
</tr>
<tr>
<td>Total</td>
<td>5 59 15 11 5 4 1 100</td>
</tr>
</tbody>
</table>

The number of children ever born alive and living and those ever born and dead was further correlated with the mothers’ level of education and linked to child survival as shown in Table 4.5. Higher levels of education are generally associated with lower mortality rates, since education exposes mothers to information about childhood illness and treatment (KDHS, 2003).

Table 4.5 Mothers level of education by number of children ever born and dead

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Number of children ever born and dead</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 None</td>
<td></td>
</tr>
<tr>
<td>Std 1-4</td>
<td>5 2 1 0 1 0 0 9</td>
<td></td>
</tr>
<tr>
<td>Std 5-8</td>
<td>30 6 6 5 3 1 3 54</td>
<td></td>
</tr>
<tr>
<td>Form 1-2</td>
<td>13 5 2 0 0 0 2 22</td>
<td></td>
</tr>
<tr>
<td>Form 3-4</td>
<td>5 1 1 0 0 0 0 7</td>
<td></td>
</tr>
<tr>
<td>College/university</td>
<td>2 1 1 0 0 0 0 4</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>3 0 0 0 0 0 0 3</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>58 15 11 5 4 1 5 99</td>
<td></td>
</tr>
</tbody>
</table>

4.2.5 Type of family among HIV positive mothers

Children are increasingly living in various types of families including households headed by single parents, grandparents and children. The alternate forms of families are
constantly evolving and psychological distress affect ability to cope. As shown in Table 4.6, 66% of respondents were living in nuclear families of which 47% were married. Almost 90% of the single mothers were living in extended families. Those living in extended families may hesitate to contradict family's opinions regarding infants feeding especially if they are financially and emotionally dependent upon others.

Table 4. 6 Type of family by marital status of the respondents

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Nuclear</th>
<th>Extended</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>1</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Married</td>
<td>47</td>
<td>11</td>
<td>58</td>
</tr>
<tr>
<td>Divorced</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Separated</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Widowed</td>
<td>9</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Inherited</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>62</strong></td>
<td><strong>32</strong></td>
<td><strong>94</strong></td>
</tr>
</tbody>
</table>

4.2.6 Literacy Level of HIV Positive mothers compared to the National Levels

A majority of the HIV positive mothers interviewed had not gone beyond primary level of education as indicated in Table 4.7. The findings indicated that 9% did not complete primary school, 54% completed primary school, 22% did not complete secondary school, 7% completed secondary school and 4% went up to College or university. Notably only 4% did not attend school. The low literacy levels among mothers limit their acquisition of knowledge about food value and selection. It also affects childcare through inability by mothers to utilize available resources and services for the benefits of the children (UNICEF, 2002). The low education level could also imply that most women lacked comprehensive knowledge on HIV virus transmission.
The study results are slightly different from the Kenya Demographic Heath Survey of 2003, which indicated that the majority of the population went up to class 4 (32.8%), though the trends in the upper levels were similar. The higher the academic level the less the number of respondents.

Table 4. 7: Distributions of respondents by literacy levels as compared to National levels.

<table>
<thead>
<tr>
<th>Literacy Level</th>
<th>Percentage</th>
<th>National*</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal Education</td>
<td>4</td>
<td>32.8</td>
</tr>
<tr>
<td>Class 1-4</td>
<td>9</td>
<td>25.2</td>
</tr>
<tr>
<td>Class 5-8</td>
<td>54</td>
<td>11.2</td>
</tr>
<tr>
<td>Form 1-2</td>
<td>22</td>
<td>12.3</td>
</tr>
<tr>
<td>Form 3-4</td>
<td>7</td>
<td>5.9</td>
</tr>
<tr>
<td>University/College</td>
<td>4</td>
<td>12.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

*Source: (CBS, 2004)

4.2.7 Income level and level of education

The income levels were determined based on respondents' answers. This was the only way since the study was conducted in the hospital environment away from the respondents' household settings where corroboration with asset ownership would have been appropriate. The results in Table 4.8 indicate that two-thirds (65%) had incomes below 2000 per month with only 9% having incomes between Kshs.4000 and 8000 per month. None of the mothers interviewed had incomes above KSh. 8000 per month. The low incomes by women could have put them at risk of being infected with HIV (UNAIDS; WHO, 2005). Poverty constrains women's decision about how to feed their infants. Efforts to reduce the high levels of poverty may influence women's confidence
and ability to direct their lives and control their health and that of the infants (Campbell and Macphail, 2002).

Table 4.8: Income level, level of education and marital status of HIV positive mothers

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Income Level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-2000</td>
<td>2001-4000</td>
</tr>
<tr>
<td>0 (4%)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Class 1-4 9%</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Class 5-8 (54%)</td>
<td>39</td>
<td>13</td>
</tr>
<tr>
<td>Form 1-2 (22%)</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Form 3-4 (7%)</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>University/College (4%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65</strong></td>
<td><strong>26</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>0-2000</th>
<th>2001-4000</th>
<th>4001-6000</th>
<th>6001-8000</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single 10%</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Married 63%</td>
<td>39</td>
<td>18</td>
<td>5</td>
<td>1</td>
<td>63</td>
</tr>
<tr>
<td>Divorced 4%</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Separated 6%</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Widowed 15%</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Inherited 2%</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65</strong></td>
<td><strong>26</strong></td>
<td><strong>7</strong></td>
<td><strong>2</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The results indicate that most of the women got their earnings through combination of farming and business (39%) and by farming only (29%), business only 22% and gifts 10%. The married women had a higher income than the others. The explanation could be that married women were getting financial support from their spouses and therefore were better placed to afford better feeds for their children.
4.3 Factors influencing choice of feed

The study sought to determine the factors influencing the choice of infant feeding option. The HIV positive mothers find themselves in a great dilemma in choosing a feeding method given the several options; breastfeeding, modified breastfeeding, home prepared milk, commercial infant formula and later complementary feeding. The factors influencing their choice are discussed in the following sub-sections.

4.3.1 Counseling on infant feeding

Proper knowledge on nutrition is essential in upholding the nutritional status of infants born of HIV/AIDS mothers. In principle, decision making can only take place when women are provided with individualized, unbiased and accurate information about infant feeding options. As indicated in Table 4.9, almost all the respondents got the counseling at the hospital (82%) while others received counselling from women groups (2%), mass media (4%) and welfare groups (12%). The high number of those counseled at the hospital could be because all the respondents were accessed at the hospital.

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>82</td>
</tr>
<tr>
<td>Women groups</td>
<td>2</td>
</tr>
<tr>
<td>Mass media</td>
<td>4</td>
</tr>
<tr>
<td>Welfare</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Most of the counselling sessions in hospital took between 30-40 minutes (44%) followed by 20-30 minutes (31%). Surprisingly, some sessions took as little as 10-20 minutes.
while only 17% took an hour and above. Health staff and trained counsellors could be under time constraints to complain about complex aspects such as relative risks and personal risks. The nurses and counsellors advise mothers according to formal guidelines without being adequately aware of the mothers’ preferences, skills and home circumstances and therefore implying that the mothers might not be making informed choices.

The study further revealed that the HIV positive mothers were mainly counselled once (70%), twice (16%), thrice (6%) and more than three times (8%) during their visits to the ante natal clinic; therefore, the respondents were not being counseled adequately as stipulated in the national guidelines that the mothers should be counseled whenever they visit the M.C.H. Clinic and this could have led to the high number of mothers practising mixed feeding since there was no follow up. Information on infant feeding counselling advice in resource rich communities such as the UK, indicate that all HIV infected mothers decide not to breastfeed when they know their status (Lyall, Stainsby, Tailor, Aitkhaled, Bingham, Evans, 1998).

**4.3.2 Choice of feeding practice**

Table 4.10 indicates that information obtained from the nurses influenced the decision of half (52%) of the mothers on infant feeding. The counsellors advice influenced (17%) of the women, husbands (2%) and both nurses and counsellors influenced (19%). It has been documented that African women lack the power to make independent decisions regarding their own health care and that of their children (Medley, Moreno, Magill, and Maman. 2003). In this study most of the mothers relied on the nurses maybe because they are believed and trusted to have requisite knowledge on infant feeding.
Table 4.10: Persons influencing decision on infant feeding among HIV positive mothers

<table>
<thead>
<tr>
<th>Person</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse</td>
<td>52</td>
</tr>
<tr>
<td>Husband</td>
<td>2</td>
</tr>
<tr>
<td>Nutritionist</td>
<td>4</td>
</tr>
<tr>
<td>Counselor</td>
<td>17</td>
</tr>
<tr>
<td>Relative</td>
<td>2</td>
</tr>
<tr>
<td>Nurse &amp; Counselor</td>
<td>17</td>
</tr>
<tr>
<td>Self</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

4.3.3 Factors influencing the choice on infant feeding

Table 4.11 shows other factors influencing choice of feed, the majority of the mothers were influenced by finance (28%), availability of the feeds (26%), medical (8%), culture (8%), stigma (6%), medical and finance (8%), culture and finance (16%). Finance constrains women’s decision on how to feed their infants. Culturally, women in Kenya have no right to ownership of land, no access to employment and education. Efforts to reduce high levels of poverty and unemployment among women may improve their confidence and ability to direct their lives and take control of their health and of their children (Campbell and Macphall, 2002).

Table 4.11: Factors influencing decision on infant feeding.

<table>
<thead>
<tr>
<th>Factors influencing choice of feed</th>
<th>Percentage N = 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>28</td>
</tr>
<tr>
<td>Availability of feeds</td>
<td>26</td>
</tr>
<tr>
<td>Medical</td>
<td>8</td>
</tr>
<tr>
<td>Culture</td>
<td>8</td>
</tr>
<tr>
<td>Stigma</td>
<td>6</td>
</tr>
<tr>
<td>Medical &amp; Finance</td>
<td>8</td>
</tr>
<tr>
<td>Culture and Finance</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Most of the mothers in this study had low income and therefore could not opt for the options that involved costs. Breastfeeding was a cheaper option because it's a natural product that costs nothing. It is easily available at all times and at the right temperature and maybe that is why 89% of the women opted to breastfeed. A notable finding in the study is that only 6% of the women opted for breastfeeding to avoid stigma, choosing replacement feeding would be tantamount to announcing their HIV status. The number is quite low and is mainly attributed to the awareness forums within the hospital. Availability of treatment and enhanced outreach could have led to more openness about AIDS and thus helped in breaking down on stigma. Gilliard and colleagues in a study done in Nairobi, Kenya in the year 2000 found that 76.1% of the HIV positive women never intended to disclose their status for fear of partner’s reaction.

4.3.4 Reasons and benefits for specific choices on infant feeding
The HIV positive mothers who were interviewed gave different reasons for their specific choice of feed and benefits. Most of the mothers who opted for replacement feeding said that, it was because they wanted to prevent transmission of HIV through breast milk. For most women who practices mixed feeding, it was because they believed that they had less production of milk. The summary of the reasons and benefits of specific choices on infant feeding are in Table 4.12.
<table>
<thead>
<tr>
<th>Choice of feed</th>
<th>Reasons for choice of Feeding %</th>
<th>Benefits of choice of Feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive breast feeding</td>
<td>Cheap (10%)</td>
<td>Healthy (18%)</td>
</tr>
<tr>
<td></td>
<td>Hide status (4%)</td>
<td>Child rarely got sick</td>
</tr>
<tr>
<td></td>
<td>Prevent HIV transmission (4%)</td>
<td>(11%)</td>
</tr>
<tr>
<td></td>
<td>Nutritious (1%)</td>
<td>Cheap (2%)</td>
</tr>
<tr>
<td></td>
<td>Child’s right (1%)</td>
<td>Hide status &amp; prevent</td>
</tr>
<tr>
<td></td>
<td>Taught (24%)</td>
<td>HIV infection (11%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nutritious (2%)</td>
</tr>
<tr>
<td>Early Session</td>
<td>Had to go to work (4%)</td>
<td>Healthy (3%)</td>
</tr>
<tr>
<td></td>
<td>Less production of milk (2%)</td>
<td>Child rarely gets sick</td>
</tr>
<tr>
<td></td>
<td>Breast infection (2%)</td>
<td>(6%)</td>
</tr>
<tr>
<td></td>
<td>Advised by nurse</td>
<td>Cheap (6%)</td>
</tr>
<tr>
<td>Home Prepared milk</td>
<td>Cheap &amp; available (2%)</td>
<td>Cheap &amp; available (1%)</td>
</tr>
<tr>
<td></td>
<td>Prevent HIV transmission (6%)</td>
<td>Prevent HIV transmission</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(6%)</td>
</tr>
<tr>
<td>Commercial Infant Formula</td>
<td>Prevent HIV transmission (4%)</td>
<td>Prevent HIV transmission</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mother sickly (1%)</td>
</tr>
<tr>
<td>Mixed feeding</td>
<td>Less Milk (23%)</td>
<td>Had to go to work (11%)</td>
</tr>
<tr>
<td></td>
<td>Had to go to work (3%)</td>
<td>Availability (17%)</td>
</tr>
<tr>
<td></td>
<td>Hide status (2%)</td>
<td>Hide status (3%)</td>
</tr>
<tr>
<td></td>
<td>Cheap (4%)</td>
<td>Less milk (3%)</td>
</tr>
</tbody>
</table>
4.4.1 Infant feeding options as selected by the HIV positive mothers

Majority of the HIV positive mothers (89%) opted to breastfeed. In this study, 46% had indicated they exclusively breastfed, 10% indicated they were practicing early cessation, 4% indicated they were using commercial infant formula. No mother opted for heat-treating milk and wet nursing and only 33% indicated from the onset that they would practise mixed feeding. Through in-depth interviewing, the study revealed that there was a discrepancy between mothers’ stated feeding intention and their actual feeding practice as shown in Figure 4.1. Using the 24 hour dietary recall the study established the following regarding the feeding practices of the infants:

4.4.2 Actual feeding practices of infants born to HIV positive mothers

The study therefore revealed that there was a discrepancy between mothers’ stated feeding intention and their actual feeding practice. Mixed feeding was practiced by most of the mothers (79%). Exclusive breastfeeding was practiced by only of 16% of the mothers but notably that over 90% of them had infants 0-2 months. Early cessation was practiced by 3% of the mothers while commercial and home prepared was practised by only 1% respectively.
Figure 4.1 Actual feeding practices of infants born of HIV positive mothers

These results are similar to a study done by Nduati et al in a cohort study in 2000 which indicated lack of compliance in a randomized clinical trial in Nairobi, Kenya. Mothers were assigned to breast feed and formula feed, those allocated artificial feed did not comply (Nduati et al, 2001).

4.4.3 Exclusive breastfeeding and modified breastfeeding

Data on the prevalence of exclusive breast-feeding vary widely in African countries; in this study only 16% practiced exclusive breastfeeding. According to Kenya Demographic health survey, the rate of exclusive breastfeeding was 29% for children under the age of two months in 2003 (CBS, 2003). A similar study conducted in Zimbabwe found that 70 percent of the 224 mothers interviewed practiced exclusive breastfeeding for infants less
than 2 months, which is slightly higher than our study (Tavengwa, Ali, and Piwotz, 2000). The study found out that even after counseling on infant feeding in the context of HIV, nearly all HIV positive mothers (89%) still chose to breastfeed for cultural economic or personal reasons. This is similar to a study done in Lusaka, Zambia on infant feeding practices of mothers of known HIV status, where all mothers were breastfeeding (Aika, et al., 2002). In a different study in Western Tanzania and Uganda, a total of 19% and 48% of the study participants, respectively stated to exclusively breastfeed their infants at the age of 4 months (Ameana, Moeng, and Matjhi 2004).

In developed countries, the scenario is different as most of the mothers use commercial infant formula. Coutsoudis et al (2000), in a prospective study in South Africa, reported a median duration of exclusive breastfeeding of 3 weeks and a probability of still breastfeeding at month 3 of 29% (Coutsoudis, Annacoovadia, Pillay, Kutin 2001). In northern Thailand, a study was done on infant feeding practices among 200 Women with HIV infection, only 1 percent of the mothers exclusively breastfed and only a total of 5 percent breastfed (Tallawat, Dore cover and Lallemant, 2002).

4.4.4 Breastfeeding patterns

Breastfeeding is important for growth and development of a child, however for children born of HIV positive mothers, an infant should be exclusively breastfed for six months and then complementary feeding is introduced or practice early cessation by exclusively breastfeeding for three months and then stops to minimize the risk of HIV infection.
4.4.5 Duration of time before initiating breastfeeding

Duration of time before initiating breastfeeding is very critical in child development and health. More than half of the mothers (54%) introduced breast milk to the child within one to six hours of birth with another 31% indicating they began breastfeeding immediately after birth, as shown in Figure 4.2.

![Duration of time before initiating breastfeeding](image)

**Figure 4.2: Duration of time before initiating breastfeeding**

The first milk (colostrums) is full of antibodies that help the baby to fight infections (Hampton and Campbell, 1999). This could be the reason why infants who were breastfed in this study had better nutrition status than those who were not breastfed.

Feeding the child with colostrums is a remarkable change of practice; initially most women would discard colostrums and instead give sugared water. This positive change
could be attributed to advise from the counselors on infant feeding. According to the 2003 health survey, 52% of children are breastfed within one hour of birth and a trial of 82% within one day of delivery, in Nyanza 46.2% are fed within 1 hour and 77.5% were breastfed within one day of birth (CBS, 2003).

4.4.6 Duration of breastfeeding
The results presented in Table 4.13 indicate that the predominant duration of breastfeeding among the study population was 6 months followed by 1-2 years, 3 months, more than 2 years and 9 months.

Table 4. 13: Breastfeeding duration of infants born by HIV positive mothers

<table>
<thead>
<tr>
<th>Duration</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 months</td>
<td>14</td>
<td>15.73</td>
</tr>
<tr>
<td>6 months</td>
<td>41</td>
<td>46.07</td>
</tr>
<tr>
<td>9 months</td>
<td>1</td>
<td>1.12</td>
</tr>
<tr>
<td>1-2 years</td>
<td>26</td>
<td>29.21</td>
</tr>
<tr>
<td>More than 2 years</td>
<td>8</td>
<td>8.99</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>89</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

These findings show that despite the mothers’ knowledge of the risks involved with prolonged breastfeeding, they still intended to breastfeed for longer periods beyond the stipulated six months (39.4%). Those who had stopped breastfeeding during the time of the study indicated that they had stopped mainly to prevent infection (16%); a small number had stopped because the infant was ill or refused to breastfeed (2%) while other mothers stopped because they felt they had less production of milk (4%). Notably, 62% also intended to stop at 3 months or 6 months. This could be attributed to the counselling given on infant feeding during the counselling sessions.
4.4.7 Frequency of breastfeeding among HIV positive mothers

The majority of the mothers (91%) fed their infants on demand while only 9% had scheduled times as shown in Table 4.14.

Table 4.14: Frequency of breastfeeding infants among HIV positive mothers

<table>
<thead>
<tr>
<th>Feeding schedule</th>
<th>Frequency (n=89)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>81</td>
<td>91</td>
</tr>
<tr>
<td>Three times</td>
<td>6</td>
<td>6.7</td>
</tr>
<tr>
<td>Four times</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>100</td>
</tr>
</tbody>
</table>

Breastfeeding on demand is responsive to the baby’s need to feed in a warm environment and fulfilling manner (RoK, 2004). It minimizes weight loss in the first few days of life and lowers the incidence of jaundice in the new born. Breastfeeding on demand provides a valuable nutritional insurance for the infant.

4.4.8 Heat-treated expressed milk

In this study no mother opted for heat-treated expressed milk. Oguta (2002) in his study on HIV positive mothers in Homa-bay earlier had also indicated that this practice was found strange and unacceptable to the community and the suggestion was met with surprise and disbelief.

4.4.9 Wet Nurse

Wet nursing was also not practiced by the mothers in our study population, possibly because of the intricacies involved. Wet nursing would lead to disclosure of the mothers’ HIV status. The wet nurse would also need to declare her status. The wet nurse is also required to practice optimal exclusive breast-feeding and safer sex practices to ensure that
she is not infected with HIV while breastfeeding the infant. The wet nurse would need to be available to feed the child on demand throughout the day and night and she must receive services to prevent and treat any breast problems (FANTA, 2004). Maybe most mothers found this to be too much to ask of someone else.

4.4.10 Replacement Feeding
In the context of HIV, WHO, (1998) recommends that when replacement feeding is acceptable, feasible, affordable, sustainable and safe, an HIV positive mother should avoid breastfeeding the infant. In our study only 2% of the HIV positive mother practiced replacement feeding as shown in Figure 4.2

Commercial infant formula is considerably expensive. The price range is KSh. 300-700 per day depending on the brand (CBS, 2003). Most of our study participants (65%) earned a total of KSh. 2000 a month, which means that this option would not be practical. Nationally, in a normal population only 5% of children less than six months receive commercial infant formula. Mothers may be unable to sustain supplies leading to over dilution of the milk, which is a risk of malnutrition. Customarily the baby is put to the breast within a short time after delivery and during subsequent weeks the breast is used as a comforter pacifier even when the infant is predominantly on replacement feeding. Home prepared milk was also not common (1%), possibly because most mothers tended to combine with other feeds and is therefore classified among those who were mixed feeding.

4.4.11 Mixed Feeding
In our study, the most common practice was mixed feeding (79%). Mixed feeding is a very dangerous practice for HIV positive mothers since it leads to reduction in dietary
antigens and pathogens, which are assumed to provoke an inflammatory response or alter the infants gut integrity, the promotion of beneficial intestinal micro flora by breast milk is also absent (Smith and Kuhn 2000, WHO, 2003). This was confirmed in this study, the infants who were on mixed feeding had the highest number of incidences of illness in the two weeks prior to the study as indicated in Table 4.18

The findings of this study therefore agree with a study in Ndola, Zimbabwe which revealed that infant feeding options are very limited because of economic and social concerns (Piwoz and Preble, 2000).

4.4.12 Complementary feeding
After the age of six months, breast milk and other forms of milk alone are not adequate to meet the baby’s nutritional requirements, the transition from exclusive breastfeeding to family food, is referred to as complementary feeding and typically covers the period from 6-24 months of age and is a very vulnerable period.

This study found out that there was a great deal of variety in the precise constituents and pattern of introduction of complementary foods as shown in Table 4.16. The general theme that emerged from the study was that complementary foods were introduced quite early and there was no clear age for introducing foods for specific age group.
Table 4. 15 Complementary foods given and modal age of introduction of the foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Percentage giving (N=62)</th>
<th>Modal age of introduction in months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain water</td>
<td>62</td>
<td>0-2</td>
</tr>
<tr>
<td>Sugared water</td>
<td>54</td>
<td>0-2</td>
</tr>
<tr>
<td>Tea/cocoa</td>
<td>43</td>
<td>2-4</td>
</tr>
<tr>
<td>Fresh milk</td>
<td>63</td>
<td>2-4</td>
</tr>
<tr>
<td>Fruits</td>
<td>50</td>
<td>2-4</td>
</tr>
<tr>
<td>Banana</td>
<td>44</td>
<td>4-6</td>
</tr>
<tr>
<td>Wheat</td>
<td>42</td>
<td>2-4</td>
</tr>
<tr>
<td>Porridge</td>
<td>50</td>
<td>0-2</td>
</tr>
<tr>
<td>Rice</td>
<td>34</td>
<td>4-6</td>
</tr>
<tr>
<td>Cassava</td>
<td>1</td>
<td>4-6</td>
</tr>
<tr>
<td>Potatoes</td>
<td>46</td>
<td>4-6</td>
</tr>
<tr>
<td>Eggs</td>
<td>38</td>
<td>4-6</td>
</tr>
<tr>
<td>Poultry</td>
<td>22</td>
<td>6-8</td>
</tr>
<tr>
<td>Meat</td>
<td>37</td>
<td>4-6</td>
</tr>
<tr>
<td>Vegetables</td>
<td>48</td>
<td>4-6</td>
</tr>
<tr>
<td>Pulses</td>
<td>47</td>
<td>4-6</td>
</tr>
<tr>
<td>Fish</td>
<td>42</td>
<td>4-6</td>
</tr>
<tr>
<td>Millet</td>
<td>50</td>
<td>2-4</td>
</tr>
</tbody>
</table>

The study found out that 63% of the mothers were giving complementary foods. Generally, the median age of introduction was 4-6 months. The foods given by most mothers were plain water, sugared water, tea/cocoa, fresh milk (cow), millet, maize porridge and pulses which are foods that are of low nutrient and low energy dense foods. Water was given by all the mothers, possibly because it’s wrongly believed that water should be added to baby’s diet and that babies become thirsty and should be given water at a tender age. Giving or feeding the infant on foods, tea and other liquids could be motivated by beliefs about how infants should be fed.

In a study done in Western Tanzania and Uganda (2001), milk was the most frequent added fluid in Uganda whereas in Tanzania various liquids such as juice, water were used among infants born to HIV positive mothers (Pogensee, Schulza, Moneta, Mbezi,
Baryomunsi and Harms 2002). The findings are similar to a study done in Peri-urban Township in Yangon, Myanmar in the year 2003 which also found out that 95% of the 200 women interviewed gave water and 69% gave other drinks before the infants were four months of age (Thyra and Khin, 2000). Early complementation can lead to physiological stress because the gut is not yet ready to digest the food; the breast milk is replaced by poor food leading to malnutrition. This could have contributed to the high rate of malnutrition among the infants in this study population.

4.5. Health and Nutrition status of the infants

4.5.1. Health Status
Nutrition status of a child is influenced by the Nutritional intake, health status, environment and care the child is receiving (FANTA 2001). This study sought therefore to find out the health status of the infants in the two weeks preceding the study and also determined the health status by mode of feeding and later relate to the Nutrition status of the infants since malnutrition is associated with morbidity patterns.

Table 4.16 summarizes the diseases that the infants had suffered from during the two weeks preceding the study.

<table>
<thead>
<tr>
<th>Illness</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory tract infections (cough cold, flu, ENT)</td>
<td>18</td>
<td>33%</td>
</tr>
<tr>
<td>Diarrhea conditions (Diarrhea, stomach ache)</td>
<td>19</td>
<td>35%</td>
</tr>
<tr>
<td>Malaria (fever, vomit)</td>
<td>15</td>
<td>27%</td>
</tr>
<tr>
<td>Skin conditions (boils, rashes)</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Slightly more the half (55%) of the study population had suffered from different illness. The most common ailment was diarrhea conditions (35%), respiratory tract infections (33%), Malaria (27%) while skin conditions had 5%.

*Treatment of illness among the HIV positive mothers*

Table 4.17 shows the first action taken during the time the child was ill. Nearly all the mothers 90.9% sought treatment for their infants who were taken ill during the two weeks preceding the study. The study found out that most of the mothers (72.2%) who sought advice for treatment got advice from government hospital, 18.2% from private hospital and notably 9.1% went to herbalists

**Table 4.17 Measures taken when a child falls ill**

<table>
<thead>
<tr>
<th>Place where help was sought</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government hospital</td>
<td>72.7%</td>
</tr>
<tr>
<td>Private hospital</td>
<td>18.2%</td>
</tr>
<tr>
<td>Herbalists</td>
<td>9.1%</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

The high number seeking advice at government hospital could be because most of the respondents were accessed from the hospital where they get the services at a minimal cost.

*Immunization status*

The data showed that 62% of the infants were fully immunized at their age. High coverage of immunization against diseases of childhood is considered to be a safeguard to better nutrition and health (Waswa, 2004). The infants had higher immunization coverage than the districts’ (Homa-bay), which is 35% and National, which is 42% (CBS,
This could be because most of the mothers visit the hospital frequently for follow up clinics.

**Illness suffered by infants by type of feeding**

The study showed that out of the 55 infants who were ill 92 % were practicing mixed feeding as indicated in Table 4.18 and most (35 %) suffered from diarrhea conditions.

<table>
<thead>
<tr>
<th>Type feeding</th>
<th>Exclusive breastfeeding</th>
<th>Early cessation</th>
<th>Commercial infant formula</th>
<th>Home prepared milk</th>
<th>Mixed feeding</th>
<th>Total (n=55)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory tract infections</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>29</td>
</tr>
<tr>
<td>Diarrhea conditions</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td>Malaria</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>Skin conditions</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2</strong></td>
<td><strong>4</strong></td>
<td><strong>0</strong></td>
<td><strong>2</strong></td>
<td><strong>92</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The study findings confirm that mixed feeding places the baby at risk of other infections (Piwoz and Preble, 2003, NASCOP, 2002). The low incidence of illness among those who exclusively breastfed could be because breastfeeding decreases incidence of diarrhea, lower respiratory infections and chronic digestive diseases (UNAIDS, 2004).

Acute infection affect primarily weight and could have contributed to the number of those who were wasted 17% whereby chronic infection affects all parameters of growth and could possibly have influenced the results on nutrition status especially those who were stunted, or stunted and wasted. During infections, the body increases its use of energy it tries to fight off the infection. During this time, the body can be affected by poor absorption of nutrients or anorexia related to infection (MOH, 2005)
Birth weight and sex of the infants

Birth weight is one of the major determinants of a child’s survival and is highly influenced by the mother’s nutrition status before and during pregnancy. A low pre-pregnancy weight and inadequate weight gain during pregnancy are the most significant predictors of low birth weight. Birth weight is therefore an important beginning point in nutritional assessment. (Piwoz and Preble, 2000). The infants studied were 52 boys and 48 girls. A total of 89% of the infant’s were born with a normal weight while only 11% were born underweight as indicated in Table 4.19.

Table 4.19 Distribution of respondent’s infants by birth weight.

<table>
<thead>
<tr>
<th>Birth weight</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Low birth weight BWT&lt;=2.5KG</td>
<td>5</td>
<td>9.6</td>
<td>6</td>
</tr>
<tr>
<td>Normal birth weight BWT&gt; = 2.5KG</td>
<td>47</td>
<td>90.4</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>54.5</td>
<td>48</td>
</tr>
</tbody>
</table>

The HIV positive women may have had inadequate food intake before and during pregnancy and therefore at increased risk during pregnancy, which may have increased risk during labor and delivery hence likely to have a baby with low birth weight (FANTA, 2004)

4.5.2 Nutrition status of the infants

In addition to question on health status and birth weight, which was verified from the road to health card, this study also included the anthropometrics component in which all the infants in the study were both weighed and measured and weight recorded. The raw data was then entered in the Epi-info 2000 software plus the date of birth. The data was further analyzed using SPSS version 11.5 to determine relationships between nutrition
status and selected variables. It's very important to note that at birth 89% of the infants were normal and only 11% had low birth.

Next to the fetal period, infant’s first year of life is the phase of most rapid growth. A normal infant doubles his/her birth weight by the age of five months and triples the birth weight by the age of one year. Similarly there is an increase in the length of the infant from 50 cm at time of birth to about 75 cm during the first year of life (Khamna, 2002). This was not the case in most of the infants in this study as discussed below under the sub theme Nutrition Status of infants.

Nutrition status of the infants born to HIV positive mothers
The study used MUAC, height for age (stunting) weight for height wasting as nutrition indices to determine the nutrition status of the infant.

Mid-upper arm-circumference
Mid upper arm circumference (MUAC) was used to assess the nutrition status of the infants. MUAC increases during the first year of an infant’s life and is a useful additional indicator of adequacy of nutrition. The results presented in Figure 4.3 reveals that 5% of the infants were severely malnourished, 14% were moderately malnourished, 15% were at risk and 66% were normal. The boys generally had poor nutrition status than girls.

The percentage of normal infants was quite high (66%). The results agree with the sentiments of Gibson that validity of mid-upper arm circumference indices in the assessment of nutrition status is disputable (Gibson, 1990).
Figures 4.3 Nutrition status by gender using MUAC

**Nutrition status of infants born of HIV positive mothers**

The nutrition status of the infants was analyzed using the Waterlow classification, which uses both height-for-age and weight for height as indices and the 50th percentile of NCHS reference data used as the reference point. Four broad categories of malnutrition are defined as normal, wasting, stunting and wasting and stunting as shown in Figure 4.4.

**Stunting**

Stunting in linear growth occurs in the first year of life or even before birth (Gibson 1990). Stunting reflects failure to receive adequate nutrition over a long period of time and may also be caused by recurrent chronic illness. In this study 21.5% were stunted lower than the national levels which stand at 30 percent for children under five years old. The difference should be because the study population consisted of infants below 12 months and stunting may not be very distinct as it is highest during the second or third year of life. Linear growth is partly regulated by initial body mass or fatness in infants (Moran and Agett, 2005). There is an increase in the length of the infant from 50cm at
the time of birth to about 75cm during the first year of life (Khann, 2002). A deficit in height takes some time to develop; assessment on height for age alone may result in an underestimation of malnutrition in infants. The study therefore further analyzed the weight for height indices.

Figure 4.4 Nutritional status of infants born to HIV positive mothers in Homabay.

Wasting

Weight for height (wasting) is a sensitive index of current nutritional status. In this study, wasting was extremely high (18%) compared to national levels which is 6%. In a normal population wasting prevalence’s should not exceed 10% (MOH, 2005). The high number of wasted children could be because some of the infants may be infected.
This study was not able to establish the HIV status of the children because at 0-12 months they still have the antibodies of their mothers (UNAIDS, 2005). Prophylaxis medications given to treat opportunistic infections may produce side effects such as taste changes, loss of appetite, vomiting, nausea and diarrhea (FANTA, 2001). It is important to monitor the nutritional status of the infants (wasting) because for those who turn out to be HIV positive timely improvement in nutritional status can help strengthen the immune system, thereby reducing the incidence of infection, preventing loss of weight and lean body mass and delaying disease progression (UNAIDS, 2005).

**Stunted and Wasted**

These were infants who were both thin (wasted) and short (stunted). These infants should receive highest priority for intervention. Wasting is associated with impairment of mental development, which may be irreversible though with proper care and nutritional rehabilitation they can gain their normal body build. Recovery in height takes much longer (Gibson, 1990).

Our study shows that 33.3% were both stunted and wasted meaning that they had grade 2 (70-80%) and grade 3 (<70%) degrees of malnutrition, which in other terms we can refer to them as severely malnourished. This could be attributed to the mothers HIV status, the mothers health, including infectious diseases could have interfered with the caring practices. Her illness could have reduced availability of food through lack of money, inability to work on the land fully, or prepare food (MoH, 2005). Psychological stress of HIV disease may have limited the parent’s ability to ensure a varied and nutritious diet for the child (KANCOs 2001).
4.6 Selected variables and the nutrition status of infants born to HIV positive mothers

Nutritional status is the result of complex interactions between food consumption and the overall health and care practices. This study sought to further determine if there was any significant difference between sex, birth weight, feeding practices, education, income, health status and nutrition status of the infants.

4.6.1 Sex

The biological differences associated with an individual’s sex can have profound effect on nutritional status. Table 4.20 indicates that female infants had the highest proportion (29.8%) of those with normal weight than that of male counterparts (23.9%). Male infants had the highest proportion of those with stunted and wasted. These findings are similar to those of Waswa, 2004 done in Kimilili division and Shikuri (2005) done at Kenyatta National Hospital, Kenya. This could possibly be attributed to the fact that boys have high activity level which increases their energy. The girls have a stronger immunity and are able to fight disease much longer than their counterparts.

Table 4.20 Nutrition status by sex among infants born of HIV positive mothers

<table>
<thead>
<tr>
<th>Sex</th>
<th>Normal</th>
<th>Wasted</th>
<th>Stunted</th>
<th>Stunted and wasted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>14 (29.8%)</td>
<td>8 (17.0%)</td>
<td>7 (14.9%)</td>
<td>18 (38.3%)</td>
<td>47 (100.0%)</td>
</tr>
<tr>
<td>Male</td>
<td>11 (23.9%)</td>
<td>9 (19.6%)</td>
<td>13 (28.3%)</td>
<td>13 (28.3%)</td>
<td>46 (100.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>25 (26.9%)</td>
<td>17 (18.3%)</td>
<td>20 (21.5%)</td>
<td>31 (33.3%)</td>
<td>93 (100.0%)</td>
</tr>
</tbody>
</table>

($\chi^2 = 3.01; \ df = 3; \ p = 0.39$)
4.6.2. Birth Weight

Table 4.21 indicates that those who were underweight had the highest proportion of those who were wasted and also stunted. However, there was no representation in the normal weight category among infants born underweight. Those who had normal weight had the highest proportion in the normal category of those who are both stunted and wasted. It is also indicated that only 30 percent of the children with normal weight at birth retained the status quo with the remaining proportion (70%) being stunted, wasted or stunted and wasted. Thus the nutritional status of children born to HIV positive mothers has greater risk of being malnourished.

Table 4.21 Nutrition status by birth weight.

<table>
<thead>
<tr>
<th>Birth Weight</th>
<th>Normal</th>
<th>Wasted</th>
<th>Stunted</th>
<th>Stunted and wasted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>(33.3%)</td>
<td>(33.3%)</td>
<td>(33.3%)</td>
<td>(100%)</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>24 (29.6%)</td>
<td>12 (14.8%)</td>
<td>17 (21.0%)</td>
<td>28 (34.6%)</td>
<td>81 (100%)</td>
</tr>
<tr>
<td>Total</td>
<td>24 (26.7%)</td>
<td>15 (16.7%)</td>
<td>20 (22.2%)</td>
<td>31 (34.4%)</td>
<td>90 (100%)</td>
</tr>
</tbody>
</table>

\[ X^2 = 4.89; \, df = 3; \, p=0.18 \]

The chi-square test indicated that the observed variation in the nutrition status was not significant at 0.05 probability of error. The results of contingency coefficient indicated that birth weight could be attributed to 23 percent of the variations in nutritional status.

4.6.3 Nutrition status by type of feeding option among infants

As is shown in Table 4.22, the highest proportion of normal nutrition status was recorded in the exclusive breastfeeding category, early cessation. Mixed feeding had the highest number of malnourished children.
Table 4. 22 Distribution of nutrition status of infants by type of feeding option

<table>
<thead>
<tr>
<th>Feeding option</th>
<th>Normal</th>
<th>Wasted</th>
<th>Stunted</th>
<th>Stunted and wasted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive breastfeeding</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>(33.3%)</td>
<td>(13.3%)</td>
<td>(20%)</td>
<td>(33.3%)</td>
<td>(100%)</td>
</tr>
<tr>
<td>Early cessation</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(33.3%)</td>
<td></td>
<td></td>
<td>(66.7%)</td>
<td>(100%)</td>
</tr>
<tr>
<td>Commercial infant formula</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(100%)</td>
<td></td>
<td></td>
<td></td>
<td>(100%)</td>
</tr>
<tr>
<td>Home prepared</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(100%)</td>
<td></td>
<td></td>
<td>(100%)</td>
</tr>
<tr>
<td>Mixed feeding</td>
<td>18</td>
<td>14</td>
<td>17</td>
<td>26</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>(24%)</td>
<td>(18.67%)</td>
<td>(22.7%)</td>
<td>(34.7%)</td>
<td>(100%)</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>17</td>
<td>20</td>
<td>33</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>(26.3%)</td>
<td>(17.9%)</td>
<td>(21.1%)</td>
<td>(34.7%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

Mixed feeding replaces breast milk with less nutritious food. It cause irritation of Intestinal Mucus and therefore increases risk of diarrhea as previously shown in Table 4.18. Home prepared milk which was mainly cow’s milk could lead to wasting because of its high solute load which can lead to iron deficiency because it’s low in iron and calcium. Calcium can inhibit absorption of iron from other dietary sources. Before 9 months of age, fresh cow’s milk can cause intestinal blood loss (FAO, 2003) cow milk has a lower calorie content compared to breast milk (NASCOP, 2002).

Table 4. 23 Nutrition status by breastfeeding status of infants born of HIV+ mothers

<table>
<thead>
<tr>
<th>Status</th>
<th>Normal</th>
<th>Wasting</th>
<th>Stunted</th>
<th>Stunted and wasting</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breastfeeding</td>
<td>24</td>
<td>12</td>
<td>19</td>
<td>27</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>(29.3%)</td>
<td>(14.6%)</td>
<td>(23.2%)</td>
<td>(32.9%)</td>
<td>(100.0%)</td>
</tr>
<tr>
<td>Not breastfeeding</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>(9.1%)</td>
<td>(45.5%)</td>
<td>(9.1%)</td>
<td>(36.4%)</td>
<td>(100.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>17</td>
<td>20</td>
<td>31</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>(26.9%)</td>
<td>(18.3%)</td>
<td>(21.5%)</td>
<td>(33.3%)</td>
<td>(100.0%)</td>
</tr>
</tbody>
</table>

\(X^2 = 7.44; \text{ df} = 3; p = 0.05\)
The infants who were breastfed had better nutrition status than those who were on alternative feeding. From the results shown in Table 4.23, the breastfed infants had higher proportion (29.3%) of those who had better nutritional status on the other hand infants who did not breastfeed had the highest proportion (36.4%) of those who were both stunted and wasted.

The Chi-square results \((X^2 = 7.44; \text{df}=3; p=0.05)\) indicated that the observed difference is significant 0.05 probability of error. The contingency coefficient showed that 27 percent of the observed variations in nutritional status could be attributed to the breastfeeding status. The infants given replacement feeds are more likely to develop malnutrition because they lack the close contact with their mother, which is necessary for full psychosocial development (WHO, 2003). On the other hand the breastfed infants had the benefit of getting enzymes from breast milk such as lipases that make it easier to digest food. Breast milk also contains modulators that promote maturation of epithelial cells.

4.6.4 Nutrition status by Social-economic characteristics of the HIV positive mothers

Practice and literature have shown that poor nutrition may be caused by a wide range of factors such as low income, illiteracy, and inadequate health services. The study therefore sought to determine if there was any association between nutrition status of infants and socio economic characteristics.

Nutrition status by income level

The nutrition status of the infants could have been influenced by the income of the mothers as shown in Table 4.24, which shows the nutrition status of the infants by income level of the mother. The mothers' with an income of less than Kshs. 2000 per month had
a high percentage of wasted infants (12%), stunted 9% while wasted and stunted were 21%. Those with a high-income level had no infant in the stunting category. This could be attributed to a continuous supply of food due to affordability. The chi square value shows that there was no association at 0.05 significant level between income and nutritional status, the difference could therefore be attributed to other factors.

Table 4.24 Nutrition status of infants by income level of mother

<table>
<thead>
<tr>
<th>Income level/Per month</th>
<th>Normal (Total)</th>
<th>Wasting</th>
<th>Stunted</th>
<th>Stunted and Wasted</th>
<th>Total (Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 2000</td>
<td>17 (18.27%)</td>
<td>12 (12.90%)</td>
<td>9 (9.68%)</td>
<td>21 (22.58%)</td>
<td>59 (63.44%)</td>
</tr>
<tr>
<td>2001-4000</td>
<td>5 (5.38%)</td>
<td>4 (4.30%)</td>
<td>9 (9.68%)</td>
<td>7 (7.53%)</td>
<td>25 (26.88%)</td>
</tr>
<tr>
<td>4001-6000</td>
<td>2 (2.15%)</td>
<td>1 (1.08%)</td>
<td>2 (2.15%)</td>
<td>2 (2.15%)</td>
<td>7 (7.53%)</td>
</tr>
<tr>
<td>6001-8000</td>
<td>1 (1.08%)</td>
<td>0</td>
<td>0</td>
<td>1 (1.08%)</td>
<td>2 (2.15%)</td>
</tr>
<tr>
<td>Total</td>
<td>25 (26.88%)</td>
<td>17 (18.29%)</td>
<td>20 (21.50%)</td>
<td>31 (33.33%)</td>
<td>93 (100%)</td>
</tr>
</tbody>
</table>

($X^2$=6.187, df = 9; p= 0.721)

Nutrition status of infants by literacy of the mothers

Maternal education is an important determinant of the nutrition status of the infants. An educated mother is likely to play a greater part in the intra family decision-making process in favor of the child’s need. Table 4.25 shows the association between the mothers’ education and nutrition status of the infant. The study found out that the mothers who had not completed primary education, had infants with poor nutrition status compared to their counterparts who had gone through college or university. The mothers who had gone to university or college did not have infants who were wasted. This can be attributed to the fact that educated mothers are likely to make earlier, informative and more effective decision on the use of health services. Differential access to education and
income generation activities and opportunities for women may be a barrier to their ability to improve dietary intake.

Table 4. 25 Nutrition status of infants by literacy of the HIV positive mothers

<table>
<thead>
<tr>
<th>Literacy level</th>
<th>Normal</th>
<th>Wasting</th>
<th>Stunted</th>
<th>Stunted and Wasted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1-4</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>(2.15%)</td>
<td>(3.23%)</td>
<td>(2.15%)</td>
<td>(1.08%)</td>
<td>(8.60%)</td>
</tr>
<tr>
<td>Class 5-8</td>
<td>14</td>
<td>10</td>
<td>10</td>
<td>17</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>(15.05%)</td>
<td>(10.75%)</td>
<td>(10.75%)</td>
<td>(18.27%)</td>
<td>(54.83%)</td>
</tr>
<tr>
<td>For 1-2</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>(4.30%)</td>
<td>(4.30%)</td>
<td>(5.38%)</td>
<td>(8.60%)</td>
<td>(22.58%)</td>
</tr>
<tr>
<td>Form 3-4</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>(1.08%)</td>
<td>(1.08%)</td>
<td>(2.15%)</td>
<td>(3.23%)</td>
<td>(6.45%)</td>
</tr>
<tr>
<td>University</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>(2.15%)</td>
<td>(1.08%)</td>
<td>(1.08%)</td>
<td>(1.08%)</td>
<td>(4.30%)</td>
</tr>
<tr>
<td>No Education</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(2.15%)</td>
<td>(1.08%)</td>
<td>(1.08%)</td>
<td>(3.23%)</td>
<td>(3.23%)</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>17</td>
<td>20</td>
<td>31</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>(26.88%)</td>
<td>(18.29%)</td>
<td>(21.50%)</td>
<td>(33.33%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

($\chi^2 = 10.35; df = 15; p = 0.797$)

Nutrition status of infants by mothers’ marital status

Table 4.26 presents the association between the mothers’ marital status and nutrition status of the infants. There was no association between the mothers’ marital status and nutrition status of the infants. These variations could be attributed to other variables like health of the mother, morbidity status of the infant and the feeding practice used.

The study reveals that the variation in growth could be a contribution of many factors such as socio-economic factors, feeding practices and health status. The mothers HIV status could also have made childcare less available and therefore contributing to the poor nutrition status among the study population.
Table 4. 26 Nutrition status of infants by mothers’ marital status

<table>
<thead>
<tr>
<th>Literacy level</th>
<th>Normal</th>
<th>Wasting</th>
<th>Stunted</th>
<th>Stunted and Wasted</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=93</td>
<td></td>
<td></td>
<td></td>
<td>n=93 (100%)</td>
</tr>
<tr>
<td>Single</td>
<td>2 (2.15%)</td>
<td>1 (1.08%)</td>
<td>2 (2.15%)</td>
<td>4 (4.30%)</td>
<td>9 (9.68%)</td>
</tr>
<tr>
<td>Married</td>
<td>18 (19.35%)</td>
<td>9 (9.68%)</td>
<td>13 (13.98%)</td>
<td>19 (20.43%)</td>
<td>59 (63.44%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>0</td>
<td>1 (1.08%)</td>
<td>1 (1.08%)</td>
<td>0</td>
<td>2 (2.15%)</td>
</tr>
<tr>
<td>Separated</td>
<td>2 (2.15%)</td>
<td>0</td>
<td>2 (2.15%)</td>
<td>2 (2.15%)</td>
<td>6 (6.45%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>2 (2.15%)</td>
<td>5 (5.38%)</td>
<td>2 (2.15%)</td>
<td>4 (4.30%)</td>
<td>13</td>
</tr>
<tr>
<td>Inherited</td>
<td>1 (1.08%)</td>
<td>1 (1.08%)</td>
<td>0</td>
<td>2 (2.15%)</td>
<td>4 (4.30%)</td>
</tr>
<tr>
<td>Total</td>
<td>25 (26.88%)</td>
<td>17 (18.29%)</td>
<td>20 (21.50%)</td>
<td>31 (33.33%)</td>
<td>93 (100%)</td>
</tr>
</tbody>
</table>
CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Overview
This chapter gives a summary of the findings, conclusion and recommendations of the study.

5.2 Summary of the study
The study was conducted at Homa-Bay district, which is located in southwestern part of Kenya. Homa-Bay was specifically selected for this study because it was ranked top in HIV/AIDS prevalence (33%) in Kenya (CBS, 2005). Homa-Bay district hospital was chosen because it is one of the pilot areas used to implement the PMTCT Programme and it also formed a suitable convergent point for the study population also acting as a referral for other health centres within the district.

HIV positive mothers, who attended postnatal care services between June and July 2005, were invited to participate in the study. Only HIV positive women with known maternal HIV status and who had undergone pre test counseling on infant feeding options were included. The infants included in the study were those who were under 12 months. The purpose of the study was to determine infant feeding practices, nutrition status and to determine if there was any significant difference between the nutrition status of infants who were breastfeeding and those on replacement feeding. The Ministry of Health, district health authorities and Ministry of Education approved the study. A descriptive design was used to collect both qualitative and quantitative data. The study participants were interviewed using a pre-tested questionnaire with close and open ended questions which included social demographic indices such as; maternal age, marital status, education, occupation, and income level. Taking anthropometrical measures assessed nutrition status of the infants. The basic information and measurements that constituted
the anthropometrical measures were age, sex, length, weight and MUAC. Data were coded, checked and entered using statistical package for social scientist (SPSS version 11.0.) Data were then analyzed and results presented using Tables, graphs while Chi Square was used to test associations between dependent variables and independent variables. A p-value of 0.05 was considered significant. Anthropometrical data were analyzed using Epi-Info. The child’s nutrition status was compared with the median for children of the same sex and age for height age and weight for height, the National Center for Health Statistics (NCHS) reference data was used. The study results are summarized in the following sub-headings.

5.2.1 Socio-demographic characteristics of the HIV positive mothers
All the 100 mothers interviewed were in the reproductive age falling in the range of 15-49 years, the modal age bracket was 20-24 years while the mean age was 28. Most of the mothers were married (63%) while 10% were single and 15% widowed. A large number (66%) were living in nuclear families while the rest (34%) were in extended families. The mothers had an average of four children alive though a large number had lost one (58%) or more children. It is important to note that only 6% had not lost any child.

The majority of the respondents (64%) had not gone beyond primary school, notably only 7% had completed secondary school and only 4% had college or university education. Generally the literacy level was high, as only 3% did not attend school at all. More than half (65%) of the interviewed HIV positive mothers earned less than ksh. 2000 per month, appallingly only 9% earned more than 4000 per month. Most earned a living through combining farming and business (39%) while the rest either practiced farming (29%) or business (22%) and only 10% received gifts.
5.2.2 Feeding Practices of Infants Born To HIV Mothers

The results indicate that despite the knowledge of HIV Status and counseling on infant feeding in the context of HIV, most mothers (89%) still opt to breastfeed and only 11% were not breastfeeding. The feeding practices have appreciably changed, out of the options given, 46% opted for exclusive breastfeeding, 10% opted for early cessation, 7% for home prepared, 4% for commercial and 33% for mixed while nobody opted for expressed heat treated milk and wet nursing.

The study also revealed that there was a discrepancy between the feeding intentions and the actual feeding practices. With in-depth interviewing and 24 hour dietary recall the results showed that actually only 16% practiced exclusive breastfeeding and out of this more than 95% was less than 3 months, 3% practiced early cessation and only 1% practiced commercial infant formula and home prepared formula respectively.

In the end the results showed that the majority of the mothers (79%) were practicing mixed feeding, while 16% practiced exclusive breastfeeding and a very minimal number practiced early cessation (3%), home prepared milk (1%) and commercial formula (1%). Therefore the feeding practices fall short of the WHO recommendations which state that a mother should exclusively breastfeed or practice replacement feeding. As shown from the results only 1% opted for commercial formula feeding, this could be mainly because 73% were living below the poverty line with earnings below Ksh.2000 per month.

Complementary foods were introduced very early at the age less than 3 months; the most common foods were plain water and milk. Water was mainly given to relieve the infant of thirst and to prevent constipation. The complementary foods given by the HIV positive
mothers were mainly characterized by foods that were low in nutrient and low energy dense foods (water 62%, sugared water 54%, and tea 43%).

5.2.3 Factors influencing choice of infant feeding among HIV positive mothers
The factors influencing choice of infant feeding among the study population were varied. The mothers' choice was influenced by finance (28%), availability of feeds (26%), culture and finance (16%), medical (8%), culture (8%), medical and finance (8%) and stigma (6%). The mothers' choice was also influenced by the nurses (52%), counselor (17%), counselor and nurse (17%), nutritionists (4%) and husband (2%). The respondents mainly chose the different feeding methods because it was cheap, to hide their HIV status or because they had to go to work.

5.2.4 Nutritional status of infants born to HIV positive mothers
The nutritional status of the infants was generally poor with only 25% falling under the normal category, 20% were stunted (low height for age) while 17% wasted and 31% were both wasted and stunted. All the mothers in this study were HIV positive and this may have influenced their ability to provide adequate care for the infants leading to poor nutrition. Most of the mothers lived below poverty line with 73% earning less than Ksh. 2000 a month. Therefore financial constraints due to increased health expenditure may limit the family resources and ability to ensure a varied and nutritious diet for the infant. A great number of the mothers also practice mixed feeding (79%), which in most cases replaces breast milk with less nutritious food, increase risk of diarrhea and also cause irritation of the intestinal mucosa. In this study 87% of the infants who had diarrhea in the two weeks preceding the survey were mixed feeding and 100% of those with cough and diarrhea...
were also practicing mixed feeding. Paradoxically these mothers feeding practice could
be putting these mothers at greater risk of both HIV transmission (40-45 %) risk of both
HIV and non-HIV related morbidity (Aika et al, 2000). There was a significant
difference between those whose mothers practiced alternative breastfeeding and those
who breastfed.

5.2.5 Associations between nutritional status and breastfeeding and alternative
feeding

The study revealed that 30.2% of the respondents who practiced breast-feeding were
normal while 11.3% were wasted, 30.2 %stunted and 28.3% were stunted and wasted. Of
those who practiced alternative feeding 9.7% of the totals were normal, 11.8% were
wasted, 4.5% were stunting and 17.2% were stunting and wasted. The study revealed that
there was an association between the nutrition status of the infants and type of feeding.
Those who were breast fed (exclusively breast and early cessation) were nutritionally
better off than those on alternative feeding (home prepared, commercial infant formula
and mixed feeding) at p ≤ 0.05 significant level and a nominal contingency coefficient
value of 0.297. Therefore we reject the null hypothesis and state that there is a significant
difference between the nutrition status of infants who are breastfed and those on
alternative feeding by HIV positive mother.

5.3 Conclusion

The study concluded that children born of HIV positive mothers had poor nutritional
status with only a quarter having normal nutritional status while a third being critically
malnourished. This could be attributed to poor feeding practices by adopted by these
mothers. As indicated earlier 79 percent preferred to use the mixed feeding method with
only 16 percent practicing exclusive breastfeeding. Some more appropriate alternative
feeding practices such as wet nursing and heat expressed were not practiced at all. It was concluded that the major factors influencing the choice of infant feeding was availability of finance and the availability of the infant feed itself. Factors like medical reasons and cultural impediments only explained a relatively smaller proportion of choices of infant feeding. There was therefore a strong indication of a relationship between nutritional status and feeding practice though not significant at 0.05 probability of error.

5.4 Recommendations

5.4.1 Recommendations to policy makers
1. Women should receive information as early as possible, prior to conception to allow sufficient time for reflection on the feeding practices.
2. The replacement feeding should be made available for free or at reduced costs like the ARVS or TB drugs so that they can be accessible, feasible, affordable, safe and sustainable.

5.4.2 Recommendations for practice
1. There should be more nutritionist so that they can spend more time for discussions with HIV positive women. The post test counseling should be more comprehensive, including PMTCT, a discussion of partner notification and disclosure, options for family planning, and strategies for increased partner involvement in PMTCT programmes. Antenatal clinics are short staffed and counselors are overburdened.
2. Provide guidance on appropriate complementary feeding with emphasis on the use of suitably locally available foods.
3. A team approach involving all health workers, nutritionists, nurses, counselors', doctors and community is needed and counseling should be regular and should include follow ups.

5.4.3 Suggestion for further research

1. An in-depth, boarder-based study, covering a wider geographical region and embracing greater demographic, ethnic, political, economic and social diversity than what was achievable in this study would be valuable, to establish whether the conclusions can be generalized.

2. Further studies should be conducted to determine which variables are most strongly associated with knowledge and attitudes related to nutritional status of infants born to HIV positive mothers.

3. Research is needed on the impact and effectiveness of MTCT programmes that provide infant feeding counseling and education on infant feeding decisions, practices and biological outcomes.

4. A similar study to be carried in a different setting and mothers followed to their homes over a long period e.g. from last trimester to the time child is 24 months

5. An understanding of the decision making process and its outcomes is needed to assess the advantages and disadvantages of advice both on the risk of MTCT of HIV and on infants nutritional status and morbidity.
REFERENCES


FAO (2003) Living well with HIV/AIDS a manual on nutritional care and support for people living with HIV/AIDS


KEMRI. (2003). The role of research in the fight against HIV/AIDS. *KEMRI AIDS Update, 5*(001), 10-12.


NASCOP (2005) National prevention of mother to child HIV transmission (PMTCT) training curriculum; Nairobi: Government printers


UNICEF (2001) *HIV and infant feeding counselling 200: a training course*

UNICEF (2001)*HIV/AIDS sectoral planning tool kits; University of Natal*


Appendix I: Interview Schedule

Interview Schedule

This interview is intended to provide the researcher with information to help gather information on the feeding practices and nutrition status of infants born to HIV positive mothers at Homa Bay PMTCT Clinic. Your participation in this study will be highly appreciated and information got will be treated as confidential. Thank you for your cooperation.

Name of Interviewer ...........................................

Interview schedule No. ....................

Date of Interview ....../....../2005

Section 1: Socio –Demographic Information.

(Question 1-3 check in the Clinic card)

1. What is the infant’s date of birth? Day....... Month......... year

2. What born is your child? (birth order) First [ ] Second [ ] Third [ ]
   Fourth [ ] Fifth [ ] Sixth [ ] Others (specify) [ ]

3. How many other children do you have? Alive _______ Dead----------

4. Have you attended counseling sessions at the Clinic? (1) Yes [ ] (2) No [ ]

5. What is your age (mother) .................................

6. What is your marital status? Tick one
   1. Married [ ]
   2. Divorced legally [ ]
   3. Separated temporarily [ ]
   4. Single [ ]
   5. Widowed [ ]
   6. Other.(Specify)________________________

7. What type is your family?
   1. Nuclear [ ]
   2. Extended [ ]
8. If extended, which relatives do you live with? (Tick where appropriate)
   1. Grandparents/own parents [ ]
   2. Aunties/uncles [ ]
   3. Cousins [ ]
   4. Nephews/nieces [ ]
   5. Sister/brother [ ]
   6. Others (specify)

9. Have you ever attended school?
   1. Yes [ ] 2. No [ ]

10. If yes, what level did you reach?
   1. Primary (standard one to four) [ ]
   2. Primary (standard five-eight) [ ]
   3. Secondary (form 1-2) [ ]
   4. Secondary (form 3-4) [ ]
   5. College/university [ ]
   6. Other (specify)________________________

11. What is your total income per month?
   1. Ksh. 2000 and below [ ]
   2. Ksh. 2001-4000 [ ]
   3. Ksh. 4001-6000 [ ]
   4. Ksh. 6001-8000 [ ]
   5. Ksh. 8001-and above [ ]

12. What is your Husband's total income per month? *(If married)*
   1. Ksh. 2000 and below [ ]
   2. Ksh. 2001-4000 [ ]
   3. Ksh. 4001-6000 [ ]
   4. Ksh. 6001-8000 [ ]
   5. Ksh. 8001-and above [ ]
13. Who is the main income earner?
   1. Self [ ]
   2. Husband [ ]
   3. Sons/daughters [ ]
   4. Parents [ ]
   5. Inheritor [ ]
   6. Others (specify) _____________________________

14. What are your other sources of income?
   1. Farming [ ]
   2. Business [ ]
   3. Gifts [ ]
   4. Other (specify) _____________________________

SECTION II: MATERNAL KNOWLEDGE AND SOURCE OF INFORMATION ON INFANT FEEDING.

15. When did you know your HIV status?
   1. Before Conception [ ]
   2. After Conception [ ]

16. Were you counseled on infant feeding options before you started feeding the child?
   1. Yes [ ] 2. No [ ]

17. If yes, where did you get the counseling?
   1. Hospital/MCH [ ]
   2. Women's Group [ ]
   3. Friends/relatives [ ]
   4. Mass Media [ ]
   5. Welfare Group [ ]
   6. Others (specify) _______________________________________

18. How long did the counseling take?
   1. 1 session [ ]
   2. 2 sessions [ ]
   3. 3 sessions [ ]
   4. Other (specify) _________________________________

19. How long did the sessions take?
1. 5-10 minutes [  ]
2. 10-20 minutes [  ]
3. 20-30 minutes [  ]
4. 30-40 minutes [  ]
5. 40-50 minutes [  ]
6. 1 hour and above [  ]
7. Other (specify) [  ]

20. Did anyone help you in making a decision on infant feeding?
   1. Yes [  ]
   2. No [  ]

21. If yes, who helped you in making a decision on infant feeding?
   1. Nurse [  ]
   2. Husband [  ]
   3. Nutritionist [  ]
   4. Peer counselor [  ]
   5. Relatives [  ]
   6. Other (Specify) ........................................

22. What other factors influenced your choice?
   1. Finance [  ]
   2. Medical [  ]
   3. Culture [  ]
   4. Stigma [  ]
   5. Availability [  ]
   6. Other (specify) ........................................

SECTION 111: INFANT FEEDING PRACTICES

23. Did you ever breast feed? 1. Yes [  ]
   2. No [  ]

24. What feeding option did you opt for?
   1. Exclusive breastfeeding [  ]
   2. Early cessation [  ]
   3. Express heat treated milk [  ]
   4. Commercial infant formula [  ]
   5. Home prepared formula [  ]
   6. Wet nursing [  ]
   7. Mixed feeding [  ]
25. Why specifically did you go for that option?

26. In your own opinion what are the benefits of that option?

27. Are there any problems that you experience with that option?

(For questions 28-43 answers where applicable)

28. How long after birth did you first put the baby to the breast? (If mother breastfed/breastfeeds)

1. Immediately
2. ____ ____ hours
3. ____ ____ days
4. Other (specify)

29. If you are breastfeeding, how often do you breastfeed?

1. 4times
2. 3 times
3. On demand
4. Others (specify)

30. Do you get the following problems?

1. Breast engorgement? Yes No
2. Nipples cracking? Yes No
3. Mastitis? Yes No
4. Less production of milk? Yes No

31. For how many months did you or intend to stop breast-feeding?

1. 3 months
2. 6 months
3. 9 months
4. Others (specify)
32. Why did you stop? *(If mother has already stopped breastfeeding)*
   1. child ill [ ]
   2. Child weak [ ]
   3. Child refused [ ]
   4. Nipple/ Breast problem [ ]
   5. Not enough milk [ ]
   6. Mother working [ ]
   7. started using contraception [ ]
   8. Other Specify ..................................................

33. Do you give the child any of the following in addition to breast milk?
   1. Plain water [ ]
   2. Glucose or Fruit juice [ ]
   3. Powdered or Fresh milk [ ]
   4. Oral Rehydration Salt [ ]

34. Did the early cessation affect the child or you? *(If mother practiced/ practices early cessation)*
   1. Yes [ ]
   2. No [ ]

35. If yes, in what way?

...............................................................

36. Do you express enough milk to feed the child? *(If mother expressed(s) milk)*
   1. Yes [ ]
   2. No [ ]

37. How much milk can you express in a day and for how long do you boil?

...............................................................

38. How expensive is infant formula milk? *(If mother used/uses infant formula)*
   1. Very expensive [ ]
   2. Affordable [ ]

39. How much do you spend per month on infant formula?

..............................................................
40. What type of milk do you use? *(If mother used/uses home prepared formula)*
   1. Goat [ ]
   2. Cow [ ]
   3. Camel [ ]
   4. Others specify .................................................

41. Do you dilute and boil the milk with water before giving it to the baby?
   1. Yes [ ] 2. No [ ]

42. Is the wet nurse available all the time you require her? *(If used/uses wet nurse)*
   1. Yes [ ] 2. No [ ]

43. Was the wet nurse tested for HIV before you engaged her services?
   1. Yes [ ] 2. No [ ]

44. What feed do you give the child? *(If mother practices mixed feeding)*
   1. Breast milk and cow milk [ ]
   2. Breast milk and infant formula (e.g. Non, lactogen) [ ]
   3. Breast milk and complementary foods (e.g. uji, tea juice) [ ]
   4. Infant formula and complementary foods (e.g. uji, tea juice) [ ]

45. Do you ever feed the child using a bottle with a teat or nipple?
   1. Yes [ ] 2. No [ ]

46. Are you giving your child any complementary feed?
   1. Yes [ ] 2. No [ ]
47. If yes, what are the types of complementary foods introduced to the child, age of introduction and method of feeding? *(Tick where applicable)*

<table>
<thead>
<tr>
<th>Complementary foods</th>
<th>[tick]</th>
<th>Ingredients/additions</th>
<th>Reason for additions</th>
<th>Age of Introduction</th>
<th>Method of feeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain water</td>
<td></td>
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<tr>
<td>Sugared water/glucose</td>
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<tr>
<td>Juice/mango/orange/lemon</td>
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<tr>
<td>Tea/cocoa/soya/milo</td>
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<tr>
<td>Fresh milk/cow/goat/kcc</td>
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<tr>
<td>Wheat/mandazi/chapati</td>
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<tr>
<td>Maize/uji ugali</td>
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<tr>
<td>Rice</td>
<td></td>
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<tr>
<td>Sorghum/millet uji/ugali</td>
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<tr>
<td>Cassava</td>
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<td></td>
<td></td>
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<tr>
<td>Potatoes</td>
<td></td>
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<tr>
<td>Bananas</td>
<td></td>
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<tr>
<td>Eggs</td>
<td></td>
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<tr>
<td>Fish/omena/engege/mbuta</td>
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<tr>
<td>Poultry/gweno</td>
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<tr>
<td>Meat</td>
<td></td>
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<tr>
<td>Vegetables (apoth/pumpkin)</td>
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<tr>
<td>Nuts/Avocado/mapera</td>
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<tr>
<td>Pulses/oganda/dengu/magira</td>
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<tr>
<td>Any other</td>
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</tbody>
</table>

**CODES:** Method of feeding  
1=Cup and spoon  
2=Feeding bottle  
3=Hands  
4=Feeding cup  
5=other (specify).................

**24 Hour Dietary Recall recall**

48. Yesterday during the day or night was the child given any of the following?

1. Plain water Yes [ ] No [ ]
2. Sugared water Yes [ ] No [ ]
3. Juice Yes [ ] No [ ]
4. Herbal tea Yes [ ] No [ ]
5. Baby formula Yes [ ] No [ ]
6. Tinned powdered milk Yes [ ] No [ ]
7. Fresh milk Yes [ ] No [ ]
8. Any food made from wheat, maize, rice, Sorghum or local grain Yes [ ] No [ ]
9. Eggs, fish, or poultry Yes [ ] No [ ]
10. Any other solid foods Yes [ ] No [ ]

**Section IV: Morbidity and Immunization Status**

49. Has the child been ill in the past two weeks?

1. Yes [ ] 2. No [ ]

50. If yes, what was the child suffering from? __________________________

51. Did you seek advice or treatment?

1. Yes [ ] 2. No [ ]

52. If yes, where did you seek advice?

1. Government health centre/ hospital [ ]
2. Mobile clinic [ ]
3. Private hospital clinic [ ]
4. Pharmacy/ Chemist [ ]
5. Traditional Practitioner [ ]
6. Others (specify) ........................................................................
53. Has your child been immunized fully for her/his age? (Tick if immunised- check immunization card)

<table>
<thead>
<tr>
<th>DOSE</th>
<th>BCG</th>
<th>DPT</th>
<th>ORAL POLIO</th>
<th>MEASLES</th>
<th>VITAMIN A</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>At birth</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st dose at six weeks</td>
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<td></td>
<td></td>
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<tr>
<td>2nd dose at 10 weeks</td>
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<tr>
<td>3rd dose at 14 weeks</td>
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<tr>
<td>6 months</td>
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<tr>
<td>9 months</td>
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<td>12 months</td>
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</table>

**Section V: Nutrition Status of the child**

54. Sex: 1. Male [ ] 2. Female [ ]

55. Date of birth: Day .......... Month ........ Year .......... (Check card)

56. Birth Weight.......................... (Check Card)

57. Weight (0.1kg): 1st reading ........ 2nd Reading ........ Average ........

58. Length (0.1cm): 1st reading ........ 2nd Reading ........ Average ........

59. MUAC for age (0.1cm) 1st reading ........ 2nd reading ........ Average ........
Appendix II: Letter of Authorization (Kenyatta University)

KENYATTA UNIVERSITY
GRADUATE SCHOOL
P.O. Box 43644,
NAIROBI
Tel. No. 810901/Ext. 57530
E-mail: kubps@yahoo.com

Our Ref: 1160/5414/03
Your Ref:

Date: 15th March, 2005

The Permanent Secretary,
Ministry of Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION:

I write to introduce Ms. Lynell Ochuma Odida who is a Postgraduate Student of this University. She is registered for M.Sc. degree programme in the Department of Foods, Nutrition & Dietetics.

Ms. Odida intends to conduct research for a project entitled, "Nutritional Status and Feeding Practices of Infants Born of HIV Positive Mothers: A Case Study of Homa-bay PMTCT Clinic."

Any assistance given to her will be highly appreciated.

Yours faithfully,

P. K. MUCHEMI
FOR AG. DEAN, GRADUATE SCHOOL

C.C. Registrar (Academic)
Dean, CS - to see on file
Dean, School of Environmental & Human Sciences
Chairman, Department of Foods, Nutrition & Dietetics

PKM: eww
Appendix III: Letter of Authorization (Ministry of Education Science and Technology)

MINISTRY OF EDUCATION SCIENCE AND TECHNOLOGY

Telgrams: EDUCATION™, Nairobi
FAX No.
Telephone: 334411
NAIROBI
When ringing please quote:
MOEST 137001735C 113/2

30th March, 2005

Lynech Ochuma Odida
Kenyatta University
P.O. BOX 43844
NAIROBI

Dear Madam

RE: RESEARCH AUTHORISATION

Please refer to your application for authority to carry out research on “Nutritional status and feeding practices of infants born of HIV positive mothers” I am pleased to inform you that you have been authorised to carry out research in HomaBay District for a period ending 30th May, 2006.

You are advised to report to the District Commissioner, the District Education Officer and the Medical Officer of Health, Homa Bay District before embarking on your research project.

On completion of your research, you are advised to submit two copies of your research findings to this Office.

Yours faithfully

B. O. ADEWA
FOR: PERMANENT SECRETARY

Cc
The District Commissioner
Homa Bay District
The District Education Officer
Homa Bay District
OFFICE OF THE PRESIDENT

OFFICE OF THE
DISTRICT COMMISSIONER
HOMA BAY DISTRICT
P.O. Box 1-40300
HOMA BAY

TO MRS. OCHERIA OJIDA

RE: AUTHORITY TO CARRY OUT RESEARCH

The above mentioned has been authorized to carry out research on
Nutritional Status and Feeding practices of infants born of HIV
positive mothers.

The research will end on 30th May, 2000, when she submits her report
to the University of Nairobi where she is learning.

Your are therefore requested to accord her the necessary assistance in
line with the research.

[Signature]

[Name: J.M. KUTAI]

[Title: DISTRICT COMMISSIONER]

HOMA BAY

cc.

District Officer

D.M.O.

HOMA BAY

M.O.H.

HOMA BAY
Appendix V: Map of Homabay District

Figure 2: Administrative boundaries of Homa Bay district