

**FACTORS AFFECTING IMPLEMENTATION OF WHO  
RECOMMENDATIONS ON INFANT FEEDING AMONG HIV/AIDS  
INFECTED MOTHERS IN DAR ES SALAAM REGION, TANZANIA**

**FATMA ALLY MWASORA**

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN  
HUMAN NUTRITION OF SOKOINE UNIVERSITY OF AGRICULTURE.  
MOROGORO, TANZANIA.**

**2015**

## ABSTRACT

The study was conducted to characterize factors affecting implementation of WHO recommendations on infant feeding among HIV/AIDS infected mothers in Dar-es-Salaam region. Specifically the study intended to assess knowledge on infant feeding in the context of HIV and AIDS among HIV positive mothers to assess constraints that hinders the implementation of recommendations of WHO on infant feeding, to examine attitude on infant feeding in the context of HIV and to assess the nutritional status of HIV exposed children aged 6 -12 months. A cross-sectional design was used to collect data from 99 HIV infected mothers and 17 health care workers in Dar es Salaam. Descriptive non parametric Chi square and inferential principle analysis were used to analyse the data. The results have shown 60% and 42.9% of women in urban and rural areas respectively were knowledgeable about timely initiation of breastfeeding after delivery ( $p = 0.000$ ); 52.8% and 86% in urban and rural areas respectively were aware that mastitis and breast engorgement increases the likelihood of MTCT of HIV during breastfeeding ( $p = 0.024$ ). The prevalence of stunting among HIV exposed children was 25.2%; wasting was 10.9%; and underweight was 25%. Barriers to implementation of new WHO guidelines on infant feeding in the context of HIV and AIDS include: fear of infecting the baby, and lack of disclosure of mother's HIV status. The study concluded that inadequate knowledge of health care workers on issues of infant feeding in the context of HIV, fear for stigma, early initiation and giving colostrums were among the contributing factors of poor implementation of new WHO guidelines and the prevalence of malnutrition among HIV exposed children in the study area was higher. Basing on the findings of the study it is recommended to

harmonise the health education package in terms of messages and content and undertake health promotion by using mass and traditional media.

**DECLARATION**

I, **FATMA A. MWASORA**, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

---

**Fatma Ally Mwasora**  
**(MSc. Candidate)**

---

**Date**

The above declaration is confirmed

---

**Prof .C. N. Nyaruhucha**  
**(Supervisor)**

---

**Date**

---

**Hadijah. A. Mbwana**  
**(Co - Supervisor)**

---

**Date**

**COPYRIGHT**

No part of this dissertation may be reproduced, stored in any retrieval system or transmitted in any form or by any means without prior permission of the author or Sokoine University of Agriculture in that behalf.

## **ACKNOWLEDGEMENTS**

Deep appreciation and sincere gratitude should go to my supervisors, Professor Cornelio Nyaruhucha and Hadija Mbwana from the Department of Food Science and Technology for their tireless instructions and constructive criticisms throughout the research process. Special thanks to Professor Nyaruhucha who took trouble to read, advise and give corrections in the various stages of the work up to the end, and for his highly moral qualified support, inspiration and understanding towards the production of this document.

I would like also to thank Mr L. Nnally of TFNC, Ms Zahara. S. Majili of SUA and Prof. C. Msuya of SUA for providing technical support during data analysis. My gratitude go also to Ms Kissa Kulwa of SUA, for providing me with some reference materials and publications that enriched this report.

I gratefully acknowledge the Irish Aid Fellowship Training Programme through Irish Aid at the Embassy of Ireland in Tanzania for the full financial support provided during the whole period of my studies. I would also like to express my gratitude to my employer, The Tanzania Food and Nutrition Centre (TFNC) for granting me a leave of absence to carry out my studies.

Many thanks also go to the District Medical Officers of Temeke and Ilala Municipalities in Dar es Salaam Region. Others are the health care providers especially in PMTCT and CTC clinics and administrators of Mnazi Mmoja Hospital, Buguruni Health Centre, Kigamboni Health Centre, Kitunda Dispensary, Kimbiji Dispensary, Kivule Dispensary, Mongolamboto Dispensary, and Gezaulole

Dispensary. Special appreciation goes to Dr. H. Ndanga of Kitunda Dispensary for spending most of her time to extend a helping hand during data collection.

I also, extend my sincere specific thanks to Dr. Dustan Kabelwa and his wife for being busy with my family and make sure they were physically and mentally health and safe while I was away at SUA. I also extend sincere thanks to all individuals who were involved in one way or another in providing social and moral support during this study.

I also wish to extend my sincere thanks to all mothers and their lovely infants who participated in the study, as they are essential part of this study for being very open to me and made my study easy during data collection.

My sincere thanks also go to my lovely parents the late Ally K. Mwasora and Mariam Daudi. I really thank them for laying a good foundation of my education, providing me amazing parental care, encouragement, love as well as prayers. I thank also my dear sister Rahma and her husband David Makanza and all my children; Mariam, Lisa, Nukhu, Ally, Abubakar, Deogratius, and Msabila. I thank you all for your prayers and encouragement.

Above all, I express my greatest gratitude to the Almighty God for granting me physical and mental health as well as enabling me to undertake this study successfully, indeed it was His blessings which made my studies possible; “By the Allah” Thanks be to God.

## **DEDICATION**

I dedicate this work to my beloved mother and late father for laying the foundation of my education. Their tireless efforts laid the foundation of who I am today. I also declare the work to my beloved family, specifically to my daughters Mariam and Mamisa (also known as Lisa) for their inspiration, support and wishes to me, while I climbed this surmountable but imperious mount of knowledge in search of the truth in this wide world.



## TABLE OF CONTENTS

<b>ABSTRACT.....</b>	<b>ii</b>
<b>DECLARATION.....</b>	<b>iv</b>
<b>COPYRIGHT .....</b>	<b>v</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>vi</b>
<b>DEDICATION.....</b>	<b>viii</b>
<b>TABLE OF CONTENTS .....</b>	<b>ix</b>
<b>LIST OF TABLES .....</b>	<b>xv</b>
<b>LIST OF FIGURES .....</b>	<b>xviii</b>
<b>LIST OF APPENDICES .....</b>	<b>xix</b>
<b>LIST OF ABBREVIATIONS AND SYMBOLS.....</b>	<b>xx</b>
 <b>CHAPTER ONE .....</b>	 <b>1</b>
<b>1.0 INTRODUCTION .....</b>	<b>1</b>
1.1 Background Information .....	1
1.2 Problem Statement.....	2
1.3 Justification.....	4
1.4 Objectives of the Study .....	4
1.4.1 Overall objective .....	4
1.4.2 Specific objectives .....	5
1.5 Research Questions .....	5
 <b>CHAPTER TWO .....</b>	 <b>7</b>
<b>2.0 LITERATURE REVIEW .....</b>	<b>7</b>
2.1 Definition of Terms .....	7

2.2	The Situation of HIV .....	8
2.2.1	Global HIV situation .....	8
2.2.2	HIV situation in Tanzania .....	9
2.2.3	Infant feeding situation in Tanzania .....	10
2.2.4	Infant feeding and prevention of MTCT of HIV .....	12
2.2.5	National and international guidelines in the context of HIV .....	14
2.2.5.1	Recommended infant feeding practices .....	14
2.2.5.2	Recommended infant feeding practices in the context of HIV .....	15
2.2.5.3	Recommended infant feeding options .....	15
2.2.5.3.1	Option “A” breast feeding and receiving ARV ...	15
2.2.5.3.2	Option “B” avoid all breastfeeding .....	16
2.2.5.4	When ARVs are not yet available .....	17
2.2.5.5	Rationale for continued breastfeeding up to 12 months .....	18
2.2.6	Breastfeeding mechanisms .....	19
2.2.7	HIV antibody testing in infants and young children .....	19
2.2.8	Early diagnosis for infants and children .....	20
2.2.9	CD4 cell counts .....	22
2.2.10	Infant ARV prophylaxis .....	23
2.2.11	Infants on Antiretroviral treatment .....	24
2.2.12	Co-trimoxazole prophylaxis .....	27
2.2.13	Breastfeeding and work .....	28
2.2.14	Health care workers .....	28
2.2.15	Knowledge of the mother .....	30

2.3	Barriers for Practising Exclusive Breastfeeding.....	30
2.3.1	Mother's age.....	31
2.3.2	Education of the mother .....	31
2.3.3	Perception of mothers.....	32
2.3.4	Stigmatization.....	32
2.3.5	Disclosure of HIV status .....	33
2.3.6	Viral load .....	34
2.3.7	Socio-cultural influence .....	35
2.3.8	Economic factors.....	36
2.3.9	Mixed feeding .....	37
2.4	Assessment of Nutritional Status.....	37
<b>CHAPTER THREE .....</b>		<b>39</b>
<b>3.0</b>	<b>METHODOLOGY .....</b>	<b>39</b>
3.1	Description of the Area .....	39
3.2	Study Design .....	40
3.3	Study Population .....	40
3.3.1	Inclusion criteria.....	41
3.3.2	Exclusion criteria.....	41
3.3.3	Sampling procedures and sample size.....	41
3.4	Tools for Data Collection .....	42
3.5	Data Collection.....	43
3.5.1	Primary data .....	43
3.5.2	Secondary data .....	43
3.5.3	Anthropometric measurements .....	43

3.6	Data Processing and Statistical Analysis.....	45
3.6.1	Data processing .....	45
3.6.2	Descriptive data analysis .....	45
3.6.3	Inferential data analysis .....	46
3.7	Ethical Consideration.....	46
<b>CHAPTER FOUR.....</b>		<b>48</b>
<b>4.0</b>	<b>RESULTS AND DISCUSSION .....</b>	<b>48</b>
4.1	Characteristics of the Respondents .....	48
4.2	Knowledge of Mothers about Exclusive Breastfeeding.....	50
4.3	Exclusive Breastfeeding.....	53
4.4	Knowledge of Mother about the Right time to Stop Breastfeeding.....	53
4.5	Knowledge of Mothers on Prolactal Feeds.....	54
4.6	Knowledge on Exclusive Breastfeeding Practices in the Context of HIV/AIDS .....	55
4.7	Knowledge on Factors that Increase the Risk of MTCT of HIV During Breastfeeding.....	55
4.8	Knowledge on Strategies to Reduce MTCT of HIV During Breastfeeding .....	57
4.9	Breastfeeding on Demand .....	59
4.10	Reasons for Early Introduction of Complementary Foods .....	60
4.11	Infant Feeding Options.....	61
4.12	Mothers' CD4 cell Counts at the first ANC Clinic .....	62
4.13	Knowledge on Appropriate time to Initiate Complementary Feeding.....	64
4.14	Frequency of Feeding.....	65
4.15	Social Attitude Towards Infant Feeding .....	67

4.15.1	Attitude of mothers towards exclusive feeding practices .....	67
4.15.2	Attitude towards breastfeeding in the context of HIV/AIDS .....	70
4.15.3	Reliability of attitudes results on infant feeding in the context of HIV and AIDS .....	78
4.15.4	Attitude towards complementary feeding.....	81
4.16	Practice on General Infant Feeding.....	83
4.16.1	Infant feeding practices of women .....	83
4.16.2	Skin to skin contact, colostrum and prelacteal feeds.....	83
4.16.3	Relationship between mother's area of residence and the use of colostrum .....	84
4.17	Complementary Feeding Practices.....	84
4.17.1	Food used for complementary feeding .....	84
4.17.2	Frequency of feeding complementary foods .....	85
4.18	Barriers for Adoption of WHO Recommendations on Infant Feeding .....	86
4.19	Management of Breastfeeding for a Woman who is HIV-Positive .....	93
4.19.1	Breast conditions .....	93
4.19.2	Expressing breast milk.....	93
4.20	Health Care Workers .....	95
4.20.1	Number of interviewed health care workers.....	95
4.20.2	Knowledge about recommended infant feeding practices.....	96
4.20.3	Knowledge about infant feeding in the context of HIV and AIDS.....	97
4.20.4	Drop-out in PMCTC programs.....	105
4.21	Nutritional Status of the Children.....	107

4.21.1	Prevalence of wasting .....	107
4.21.2	Prevalence of underweight .....	108
4.21.3	Prevalence of stunting .....	109
<b>CHAPTER FIVE .....</b>		<b>112</b>
<b>5.0</b>	<b>CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>112</b>
5.1	Conclusions .....	112
5.1.1	Knowledge on infant feeding in the context of HIV and AIDS .....	112
5.1.1.1	Inconsistent messages in health education.....	112
5.1.1.2	Determinants of MTCT of HIV .....	113
5.1.1.3	Strategies to reduce MTCT of HIV .....	113
5.1.1.4	Complementary feeding.....	114
5.1.2	Attitude towards infant feeding in the context of HIV and AIDS .....	114
5.1.3	Barriers for adoption WHO recommendations on infant feeding.....	114
5.1.4	Nutrition situation of children.....	115
5.2	Recommendations .....	115
<b>REFERENCES.....</b>		<b>118</b>
<b>APPENDICES.....</b>		<b>139</b>

## LIST OF TABLES

Table 1:	Use of HIV test in infants and children.....	21
Table 2:	Cut-offs for definition of wasting, stunting and underweight.....	44
Table 3:	Distribution of socio-demographic characteristics of respondents .....	50
Table 4:	Association of mothers by their knowledge on breastfeeding practices .....	52
Table 5:	Duration of exclusive breastfeeding .....	53
Table 6:	Mothers knowledge about the right time to stop breastfeeding .....	54
Table 7:	Attitudes towards prelacteal feeds and their time of initiating breastfeeding .....	55
Table 8:	Association of HIV positive mothers by their knowledge on risk of MTCT of HIV .....	55
Table 9:	Knowledge of mothers on factors that increase the risk of MTCT of HIV during breastfeeding .....	57
Table 10:	Relationship between knowledge on strategies of reducing MTCT and area of residence of mothers.....	58
Table 11:	Mothers who practice demand breastfeeding.....	59
Table 12:	Reasons for early introduction of complementary foods .....	60
Table 13:	Mothers with knowledge of emptying the breast during breastfeeding .....	61
Table 14:	Knowledge on infant feeding among HIV-infected mothers.....	62
Table 15:	Association of mothers by CD4 cell counts at the first ANC clinic .....	62
Table 16:	Mothers knowledge on appropriate age for complementary feeding .....	64
Table 17:	Attitude of mothers towards exclusive breastfeeding .....	69
Table 18:	Attitude towards breastfeeding in the context of HIV/AIDS.....	73

Table 19: Extracted components explaining social attitudes of HIV infected mothers.....	74
Table 20: Measure of sample adequacy .....	75
Table 21: Communalities of extracted statements .....	76
Table 22: Component matrix for structure of factor loadings for extracted statements.....	77
Table 23: Reliability analysis of attitudinal results by means of Cronbach's Alpha statistic.....	79
Table 24: Attitude towards optimal complementary feeding.....	82
Table 25: The time initiated breastfeeding after delivery complementary .....	83
Table 26: Type of complementary foods given to children .....	85
Table 27: Frequency of feeding for children who born with HIV positive mothers.....	86
Table 28: Proportion of HIV mothers knowledgeable on HIV status.....	89
Table 29: Association of mothers knowledgeable on Breastfeeding Problems .....	93
Table 30: Management of breastfeeding problems .....	94
Table 31: Infant feeding options for HIV infected mothers.....	95
Table 32: Title and level of education of health care workers .....	96
Table 33: Health care workers knowledge on infant feeding issues .....	97
Table 34: Health care workers knowledge about infant feeding in the context of HIV .....	99
Table 35: Health care workers knowledge about ways of reducing MTCT of HIV .....	100



Table 36: Health care workers knowledge about new WHO guidelines on MTCT of HIV .....	101
Table 37: Attitude of HCW towards breastfeeding in the context of HIV and AIDS .....	104
Table 38: Number of PMTCT client drop outs per health facility.....	106
Table 39: Prevalence of wasting among HIV exposed children 0 – 12 months .....	107
Table 40: Prevalence of underweight among HIV exposed children 0 – 12 months.....	108
Table 41: Prevalence of stunting among HIV exposed children 0 – 12 months.....	110

## LIST OF FIGURES

Figure 1:	Frequency of feeding complementary foods.....	66
Figure 2:	Gaussian curve for Weight-for-Height Z scores of sampled HIV exposed children .....	108
Figure 3:	Gaussian curve for Weight-for-Age Z scores of sampled HIV exposed children .....	109
Figure 4:	Gaussian curve for height-for-age Z scores of sampled HIV exposed children .....	110

## **LIST OF APPENDICES**

Appendix 1: WA, HA and WH Z-score classification.....	139
Appendix 2: Questionnaire for HIV Positive Mothers .....	140
Appendix 3: Questionnaire for Health Workers .....	149

## LIST OF ABBREVIATIONS AND SYMBOLS

AFASS	Acceptable, Feasible, Affordable, Sustainable, and Safe
AIDS	Acquired Immunity Deficiency Syndrome
ANC	Antenatal Care
ARV	Antiretroviral Drugs
ART	Antiretroviral Therapies
BF	Breastfeeding
CDC	U.S Centres for Disease Control and Prevention
CD4 T cell	Helper T Lymphocyte
CTC	Care and Treatment Clinic
DBS	Dried Blood Spots
DNA-PCR	Deoxyribonucleic acid-polymerase chain reaction
DSM	Dar es Salaam
EBF	Exclusive Breastfeeding
FBOs	Faith Based Organizations
FGD	Focused Group Discussion
HAZ	Height –for-age-z-Scores
HIV	Human Immunodeficiency Virus
HCW	Health Care Workers
HBS	Home Based Cares
IYCN	Infant and Young Child Nutrition
KAP	Knowledge Attitudes and Practice
KDHS	Kenya Demographic and Health Survey
KMO	Kaiser-Meyer-Olkin

L/A	Length-for-age
MOHSW	Ministry of Health and Social Welfare
MTCT	Mother-to-Child Transmission
MDHS	Malawi Demographic and Health Survey
NACP	National AIDS Control program
NGOs	Non - Governmental Organizations
NBS	National Bureau of Statistics
NVP	Nevirapine
PMTCT	Prevention of Mother-to-Child Transmission of HIV
RCH	Reproductive and Child Health
RNA-PCR	Ribonucleic acid – polymerase Chain reaction
SPSS	Statistical Package for Social Sciences
TDHS	Tanzania Demographic and Health Survey
TFNC	Tanzania Food and Nutrition Centre
TBA	Traditional Birth Attendant
THMIS	Tanzania HIV/AIDS and Malaria Indicator Survey
UDHS	Uganda Demographic and Health Survey
UNICEF	United Nations Children’s Fund
USAIDS	United Nations AIDS
W/A	Weight-for-age
WHO	World Health Organization
WHZ	Weight -for-height –z-Scores
W/L	Weight-for-length
ZDV	Zidovudine

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background Information**

Exclusive breastfeeding (EBF) is important for the first 6 months of an infant's life for nutritional and health benefits. However, EBF is not widely practiced in Tanzania; for it is done at the national level by only 50% of infants aged from 0 – 6 months, 81% of 0 - 2 months, and 51% at age of 2 - 3 months, regardless of mother's Human Immunodeficiency Virus (HIV) status. Prevention of mother-to-child transmission (PMTCT) in the context of HIV/AIDS is an approach used to reduce the risk of vertical transmission of the virus to the infant. Vertical transmission of HIV occurs when an HIV-infected mother passes the virus to her child during pregnancy, labour and delivery, or breastfeeding (URT, 2009a; TFNC, 2012).

The global research findings reveal that 2.5 million children under 15 years of age were living with HIV/AIDS, and among them 2.3 million were in Sub – Saharan Africa (UNAIDS/WHO, 2005). The available evidence from NBS and ICF Macro (2010) revealed that, the majority of HIV infected children die earlier at their infancy, thus contributing to high infant mortality rate, which is 51 per 1000 live births.

The national guideline for PMTCT of HIV recommends counseling for HIV infected mothers on the appropriate way of reducing mother-to-child transmission (MTCT). Mothers need to make the final choice concerning the appropriate way of feeding their babies and be supported to ensure optimal nutrition for themselves and their children. However, most pregnant women in rural areas do not have access to PMTCT services, including quality counseling on HIV and infant feeding (URT, 2007). Strategies are

therefore needed to improve the coverage and quality of counseling services on PMTCT and dissemination of these guidelines to prevent avoidable new HIV infections of infants, despite the fact that effective uptake of PMTCT guidelines has been shown to be extremely challenging in this setting (URT, 2007)

## **1.2 Problem Statement**

Mother-to-child transmission of HIV is higher among mixed fed infant than exclusively breastfed, but this transmission can be reduced to less than 2% if the woman is on antiretroviral drugs. If an infant is over 6 months, the transmission can be reduced by 4% in 12 months (Erica *et al.*, 2002; WHO, 2012). Globally, data shows that over half of infants 6 to 9 months are breastfed and given complementary foods but the amount of complementary food per each feed is inadequate, frequencies are low, foods given are low in nutrient density and there is low utilization of food in the body due to infections and infestations from contaminated foods. In developing countries, the rate of MTCT of HIV can be as high as 40% (UNICEF, 2005). In Africa, Sierra Leone has the highest rate of children deaths and 35% of deaths are in children less than five years of age. With EBF the rate of deaths ranges from 13% to 15% (USAID/PATH/IYCN, 2009).

According to NBS (2010), in Tanzania HIV prevalence among pregnant women was 5.5% and HIV testing, increased from 14% in 2005 to 86% in 2010. In Dar-es-Salaam prevalence of HIV infected mothers is 6.3% (USAID/NBS/CDC/TACAIDS, 2013). The chance of MTCT among HIV positive women who are not receiving ARVs prophylaxis is 25% during pregnancy, labour and delivery and 12% through breastfed (Erica *et al.*, 2002).

In Tanzania non-pregnant women who tested positive for HIV and received ARV prophylaxis were 84% and pregnant women who received ARV were 68%. Also 50% of HIV exposed infants received ARVs (Tiras and Sia, 2011). WHO (2010a) recommends two options for infant feeding when the mother is HIV positive. Option “A” recommends breastfeeding and receiving ARV interventions. Option “B” recommends that mothers known to be HIV-infected should avoid all breastfeeding and should only give commercial infant formula milk as a replacement feed to their HIV-uninfected infants, if the mother meets the Acceptable, Feasible, Affordable, Sustainable, and Safe (AFASS) criteria. Tanzania has adopted option “A” for the national PMTCT scale-up plan. When option “A” is implemented in the absence of other interventions, the MTCT rates will range from 15 to 45% (WHO, 2013) and when it is implemented with other interventions, the MTCT rates will be 18% in Tanzania (URT, 2009b).

Dropouts during the PMCTC programs remain to be unsolved challenge in this era of HIV/AIDS. When tested positive, many pregnant women drop out of PMTCT programmes, due to fear of discrimination and rejection by their male partners and families (Global AIDS Alliance, 2009). In a review of studies examining patient retention in antiretroviral therapy programs in Africa, only 60% of patients remained in the program after two years, the rest (40%) were lost due to different reasons. In a longitudinal study done by Matthew and Sydney (2010) in Botswana it was revealed that the drop out was due to difficulties to follow-up (5.4%); and deaths (16.8%), thus total attrition from ART was 22.2% in ten months. In Tanzania data revealed that drop out was 12.1% with death of clients contributing 2.5% of this (Global AIDS Alliance, 2009). Globally, total attrition from ART was 14.6% within 7 months (Global AIDS



Alliance, 2009). To reduce the rates of drop-out or attrition, retention and death from antiretroviral treatment programmes it is necessary to equip health care workers knowledge on counseling in areas with shortage of staff. This will contribute to retention of mothers with their children in care after they are tested positive for HIV and to resume medication after counseling. This can help to reduce the risk of infection of an infant of a mother who is HIV infected.

### **1.3 Justification**

This study was intended to add the knowledge on the observed gap in this area by assessing factors affecting EBF and infant and young child feeding practices among HIV positive mothers. Also the findings of this study were meant to inform policy makers to make decisions in the development of appropriate interventions to promote better infant feeding practices among HIV positive women especially for those living in resource weak communities in Tanzania. Findings will also help to reduce the risks of MTCT of HIV through breastfeeding, hence improvement of child health in Dar-es-Salaam and in other similar settings in Tanzania.

### **1.4 Objectives of the Study**

#### **1.4.1 Overall objective**

The overall objective of this study was to determine factors that influence breastfeeding practices among HIV infected mothers in order to improve health of infants aged 0 - 12 months attending PMCTC clinics in Dar es Salaam Region.

#### **1.4.2 Specific objectives**

1. To assess knowledge on infant feeding in the context of HIV and AIDS among HIV positive mothers with children 0 - 6 months regardless of the infant's HIV status.
2. To examine attitude on infant feeding in the context of HIV and AIDS among HIV positive mothers with children 0 - 6 months regardless of the infant's HIV status.
3. To assess knowledge on infant feeding practices among health care workers in the context of HIV.
4. To identify constraints that hinder the implementation of WHO recommendations on infant feeding among HIV positive mothers.
5. To determine HIV testing condition of the children 0 - 12 months regardless the infant's HIV status.
6. To assess the nutritional status of the children aged 6 -12 months born to HIV- infected mothers.

#### **1.5 Research Questions**

1. What HIV positive mothers with children 0 - 6 months know about infant feeding in the context of HIV and AIDS?
2. What is the attitude of HIV positive mothers with children 0 - 6 months on infant feeding in the context of HIV and AIDS?
3. What is health care workers knowledge on infant feeding practices in the context of HIV?
4. What are the constraints that hinder the implementation of WHO recommendations on infant feeding among HIV positive mothers?

5. What is the HIV testing condition of the children 0 – 12 months regardless their HIV status?
6. What is the prevalence of wasting, stunting and underweight among children aged 6 -12 months born to HIV- infected mothers?

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Definition of Terms

**Exclusive breastfeeding:** Exclusive Breastfeeding (EBF) means feeding an infant with breast-milk including expressed breast-milk only, without any other food or drink, not even water. However, drops or syrups consisting of vitamins, mineral supplements or medicines can be given when medically prescribed.

**HIV-Positive:** Tested for HIV infection and found with the HIV virus or its antibodies.

**HIV-Negative:** Tested for HIV infection and found without HIV virus or its antibodies.

**Antiretroviral drugs:** Antiretroviral drugs are medications which are used in the treatment and prevention of HIV infection. They work against HIV by stopping or interfering with the replication of virus in the body.

**HAART:** The term 'Highly Active Anti-Retroviral Therapy' (HAART) is another term used to describe a combination of three or more antiretroviral drugs.

**Infant:** A child from birth to 12 months of age.

**Mixed feeding:** Feeding a baby with breast-milk and/or other foods and fluids including infant formula.

**Mother-to-child transmission:** Mother –to-child transmission (MTCT) of HIV refers to the transmission of HIV infected from HIV – infected mothers to their infants. It is synonymously known as vertical transmission of HIV.

**Health care workers:** Any person working in the health care system, whether professional or non-professional, including voluntary and unpaid workers, in public or private practice, is a health worker. Under this definition, ward assistants, sweepers, nurses, midwives, social workers, dieticians, counsellors, in-hospital pharmacists, obstetricians, administrators, and clerks are all health workers.

**Replacement feeding:** The process of feeding a child, who is not receiving any breast-milk, with a diet that provides all the nutrients the child needs until the child is fully fed on family food.

**Pre-lacteal feeding:** Administration of any food or drink to a newborn baby before the first breastfeed.

## **2.2 The Situation of HIV**

### **2.2.1 Global HIV situation**

The HIV/AIDS epidemic is one of the most critical health crises of modern times, destroying families and communities throughout the world (UNAIDS, 2011). Globally, there were an estimated 34 million people (31.6 million – 35.2 million) living with HIV in 2010. This reflects the continued large number of new HIV infection; and also among of all, there were 2.7 million (2.4 million – 2.9 million) new HIV infections in 2010, including an estimated 340 000 – 450 000 children. Further data estimated that

1.8 million (1.6 million – 1.9 million) people died of AIDS – related illnesses, respectively. The epidemic continues to be most severe in Africa. For instance South Africa alone have more people living with HIV (estimated to be 5.6 million) than any other country in the world. Almost half of the deaths from AIDS – related illnesses in 2010 occurred in South Africa (UNAIDS, 2011).

It is estimated that a total of 2.5 million children under 15 years of age were living with HIV/AIDS (2.3 million in Sub – Saharan Africa) and 370 000 children were newly infected with HIV through MTCT. Over 1 000 children are newly infected with HIV every day, and of these more than half will die as a result of AIDS because of lack of access to HIV treatment (WHO, 2012).

### **2.2.2 HIV situation in Tanzania**

During the year 2007 and 2008 it was reported that 5.8% of Tanzanian living on the mainland were HIV positive. In 2009 it was estimated that the prevalence of HIV among adults (15-49 years of age) was 5.6%. The prevalence of HIV in urban areas is 8.7% while in rural areas is 4.7%. Overall HIV prevalence among pregnant women attending antenatal visit clinic is 6.9% (NACP, 2008).

According to nationally – representative survey data, most pregnant women in Tanzania (88%) attended at least one antenatal care visits in 2010 while 43% attended at least four visits, as recommended by WHO. Women in urban areas were more likely than women in rural areas to attend four antenatal care clinic visits (55% versus 39%) respectively. In 2011, 74% of pregnant women living with HIV received more effective ARV regiments for PMTCT increasing up from 34% in 2009. Among

pregnant women living with HIV who received ARVs for PMTCT, 17% received ART for their own health and 28% received single dose nevirapine (a regimen no longer recommended by WHO (2010a), while 55% received more efficacious ARV regimens.

Coverage of early infant diagnosis increased from 13% in 2009 to 22% in 2010; it is still very low, although it increased slightly from 12% in 2009 to 14% in 2011 respectively. MTCT contribute highly to the majority of HIV transmission (URT, 2005).

Furthermore, according to URT (2009) report, about 59 000 children below the age of 15 years were living with HIV in Tanzania. About 90% of them might have acquired the infection through MTCT. Majority of HIV infected children die earlier at their infancy adding to the already high infant mortality rate, which is 51 per 1 000 live births (NBS and ICF Macro, 2010).

A total of 22 033 exposed infants who were tested for HIV, about 9.8% of them were HIV positive (NACP, 2010). Therefore, need for intervention to overcome this crisis is vital to reverse the trend. Moreover, one million children have been orphaned by HIV (TACAIDS, 2007 - 08).

### **2.2.3 Infant feeding situation in Tanzania**

In Tanzania exclusive breastfeeding for the first six months of infant's life is not widely practiced, the national rate being 50%, regardless of mother's HIV status. The accessible information shows that 97% of children in Tanzania are breastfed but exclusive breastfeeding for the first six months is not common (NBS and ICF Macro,

2011). Early initiation of breastfeeding is important for both the mother and the child. Early suckling stimulates the release of prolactin, which helps in the production of milk and oxytocin, which is responsible for the ejection of milk. Less than half of children (47%) are breastfed within one hour after birth. Initiation within one hour of birth was 62% among urban women while in the rural areas it was only 45%. Ninety four percent of children are breastfed within one day after birth. Less than three in ten children were breastfed within one hour after birth while 32.4% of children who received a prelacteal feed in Mwanza. Also 69% of children started breastfeeding within one hour of birth; while 21.9% of children received prelacteal feed in Dar es Salaam (NBS and ICF Macro, 2010). According to the same report, exclusive breast feeding among children aged 0 - 6 months was 50%, while it was 81% in children aged 0 - 2 months, and 51% in children aged 2 - 3 months. By age of 4 - 5 months only 23% of infants were on exclusive breast feeding. Median duration of exclusive breast feeding was therefore 2.4 months. The use of pre-lacteal feeds for infants born in the rural areas was 31% as compared to 24% in urban areas. Median duration of any breastfeeding was 21 months.

In addition, studies conducted in Dar es Salaam found out that exclusive breast feeding among HIV positive mothers to be high from birth to 2 months (80%), then, decreasing rapidly at age 3 to 4 months 34% and lowest among infants of six months 13.3% with a median duration of 3 months. Exclusive breast feeding beyond three months was found not regular or feasible due to perception that breast milk is not sufficient for child growth and resumption of work by mothers which necessitates leaving infants at home (Leshabari *et al.*, 2006).



Complementary foods are recommended to be started at the age 6 months because, at this age, breast milk alone is no longer sufficient to maintain the child's optimal growth. Available evidence shows that children are fed small quantities of solid and semisolid foods while continuing to breastfeed up to 2 years or beyond. About 11% of infants are being complemented at the age of 0 - 2 months and 33% at 2 - 3 months and 64% at 4 - 5 months respectively. The data also shows that about 7% of infants are not complemented at the age of 6 - 8 month and 5% of infants are fed from bottles with nipples. Generally, amount of food per each feed is inadequate, frequencies are low, foods given are low in nutrient density and there is low utilization of food in the body due to infections and infestations from contaminated foods (Leshabari *et al.*, 2006).

#### **2.2.4 Infant feeding and prevention of MTCT of HIV**

Prevention of mother-to-child transmission (PMTCT) of HIV/AIDS is a method to reduce the risk of infection of an infant of a mother who is HIV infected. HIV is transmitted from a mother to an infant before, during and after labour. The presence of HIV in the society poses a unique challenge in promotion of breastfeeding among affected and unaffected families. About 6.9 % of pregnant women attending antenatal clinics are infected by HIV. This indicates that in Tanzania head quarter majority of pregnant women (more than 90 %) are not HIV infected therefore it is still important to promote, protect and support breastfeeding in the general population (NACP, 2008).

Although the risk of mother-to-child transmission of HIV at national level is not yet established, the global research findings have shown that, in the absence of any intervention the total MTCT of HIV stands at 40% whereby breastfeeding carries 10.1% risk. When interventions are taken like the use of ARVs and other preventive

measures HIV transmission to the child is reduced to less than 5% (WHO, 2010a). On the other hand, the number of pregnant women who use antenatal services at least once increased to 76%, although 80% of them start to attend clinic after the third month of pregnancy. Also the percentage of pregnant women who undergoes HIV testing has increased over three- fold since 2006, reaching 66% of women in 2009. These trends show high acceptance of testing at ANC sites that offer HIV – testing services (WHO, 2010a).

Based on the study in context of HIV, the infant is recommended to be breastfed, unless alternative feeding is affordable, sustainable, safe, feasible, and acceptable, whereby clean water supply, hygienic conditions, sanitation, good health care and management of infectious diseases are available. Along with this, the stigma associated with not breastfeeding may be tremendous (Manji, 2011). Data shows about 70% of pregnant women living with HIV received ARVs for PMTCT in 2009. With continued efforts to reach women with PMTCT, ARVs, and renewed commitment to closing the gap in access between the mothers and the infants, national targets for PMTCT can be met (Manji, 2011).

Failure to breast feed in the first six months of life is associated with a six fold increase in incidence of infectious morbidity among infants in developing countries. Despite the importance of PMTCT in reducing the risk of transmission of HIV from mother to child, the coverage of this program is very low in Tanzania. For instance in 2005, only 558 (10.4%) out of 5 379 health facilities in the country provided PMTCT services. In the same year, the coverage of PMTCT in dispensaries was only 7.1% (URT, 2007; URT, 2012). Since the vast majority of people in Tanzania live in rural

areas, and dispensaries are an immediate source of health services for them, therefore, it is likely that most pregnant women in rural areas do not have access to PMTCT services, including counselling on HIV and infant feeding. In 2006, only 377 913 (27%) out of 1 400 000 pregnant women received PMTCT services. This is because PMTCT services are offered in very few health facilities in the country (URT, 2007; URT, 2012).

Available interventions that reduce transmission during pregnancy and delivery mean that the relative proportion of infants who are infected through breastfeeding is now lower. If gains in HIV-free survival are to be achieved, implementation of the new recommendations on HIV and infant feeding is therefore urgently needed (WHO, 2010a). If an HIV-positive mother breastfeeds her infant while taking ARVs herself or giving ARVs to her infant each day, the risk of transmission over 6 months of breastfeeding is reduced to about 2%. If she breastfeeds for 12 months while taking ARVs or giving them to the infant, then the risk is about 4%. Without these ARV interventions, about 14% – 17% of breastfed infants of HIV-positive mothers would become HIV infected by 18 months of age (UNAIDS, 2011).

## **2.2.5 National and international guidelines in the context of HIV**

### **2.2.5.1 Recommended infant feeding practices**

WHO recommends that all infants regardless of their HIV status be breastfed exclusively for the first six months of life, although the infant feeding recommendations to mothers for HIV-positive infant differ from recommendations to mothers of HIV uninfected or of unknown HIV-status (WHO, 2010a).

### **2.2.5.2 Recommended infant feeding practices in the context of HIV**

Mothers known to be HIV-infected and whose infants are HIV-uninfected or of unknown HIV status should: exclusively breastfeed infants for the first six months of life, introducing appropriate complementary foods at six months and continue to breastfeed for the first 12 months of life. They should continue breastfeeding until a nutritionally adequate and safe diet without breast milk can be provided for the child. Then breastfeeding should be gradually reduced and stopped over one month. The WHO (2010a) recommends against abrupt or rapid cessation of breastfeeding because of possible negative effects on the mother and infant, including mastitis and breast pain. Over that month, the nutritionally adequate and safe diet should gradually replace breast milk in the diet and completely replace breast milk by the end of one month.

### **2.2.5.3 Recommended infant feeding options**

#### **2.2.5.3.1 Option “A” breast feeding and receiving ARV**

Infant feeding options, in the context of HIV, in where health authorities are given the option ‘A’ of promoting breast feeding and receiving ARV interventions or avoiding all breastfeeding, studies have shown that the former option (option A) is best. The risk of HIV transmission through breastfeeding can be significantly lowered by exclusive breastfeeding because EBF for six months when combined with ARV can reduce mother-to-child transmission to less than 5% from a background of 35%. Introducing partial replacement feeding carries a greater risk of transmission because the other liquids and foods given to the baby alongside the breast milk can damage the already delicate and permeable gut wall of the small infant and allow more viruses to be transmitted (WHO, 2010a). When infants are six months old, they should receive nutritionally adequate and safe complementary foods, while breastfeeding continues

for up to two years of age or beyond. Mothers whose status is unknown should be offered HIV testing.

Mothers who are known to be HIV-infected should be provided either: (a) Lifelong antiretroviral therapy (ART); or (b) ARV prophylaxis interventions to reduce HIV transmission continued until one week after breastfeeding stops. It should be kept in mind that stopping breastfeeding is not always simple and it may be taken up again, for example, if the infant becomes ill. Stopping breastfeeding abruptly is not recommended. Mothers whose status is uninfected should be counseled on ways to prevent HIV infection and about services that are available (such as family planning) to help them remain uninfected. In cases where child is HIV-infected, breastfeeding is to be continued up to 2 years or longer, mean while complementary foods are introduced at 6 months (WHO, 2010a).

Introducing replacement feeding also poses risks of contamination and diarrhoea which diminish the chances of HIV free survival. Breast milk provides protection against other infections and reduces infant mortality. Risk of death among children who are not breastfed is high. In general, infants who are not breastfed are six times more likely to die from diarrhoea or respiratory infections than those who are breastfed (WHO, 2000; WHO, 2010a).

#### **2.2.5.3.2 Option “B” avoid all breastfeeding**

Mothers known to be HIV-infected should only give commercial infant formula milk as a replacement feed to their HIV-uninfected infants or infants of unknown HIV status, when all of the conditions for replacement feeding are met. Infants should be

given adequate foods or replacements for breast milk if younger than six months. Home-modified animal milk is not recommended as a replacement food in the first six months of life but undiluted animal milk can be given to a child starting at 6 months. Meals, including milk-only feeds, other foods and combination of milk feeds and other foods, should be provided four or five times per day. When a mother known to be HIV-infected decides to stop breastfeeding at any time, she needs to be followed up by someone trained in lactation management to handle this in a way that is safe for both her and the infant. Stopping breastfeeding is complex and challenging. It is common, and quite dangerous for an HIV-infected mother, to suffer from mastitis at this time (WHO, 2010a).

#### **2.2.5.4 When ARVs are not yet available**

ARV interventions to prevent postnatal transmission of HIV make breastfeeding even more advantageous for child development and survival. However, in the absence of ARVs, HIV-infected mothers should still breastfeed when all conditions for formula feeding are not met. It is important to prevent the misconception that HIV-infected mothers should only breastfeed if they or their infants are taking ARVs. Even without ARV treatment, breastfeeding may still provide infants born to HIV-infected mothers with a greater chance of HIV-free survival. While efforts should be made to improve access to ARVs, national authorities should not be deterred from recommending that HIV-infected mothers breastfeed as the most appropriate infant feeding practice in their context (WHO, 2010a).

#### **2.2.5.5 Rationale for continued breastfeeding up to 12 months**

Human milk is a bodily fluid which, apart from being an excellent nutritional source for the growing infant, also contains a variety of immune components such as antibodies, growth factors, cytokines, antimicrobial compounds, and specific immune cells. These help to support the immature immune system of the newborn baby, and protect it against infectious risks during the postnatal period while its own immune system matures (Goldman *et al.*, 1993) Furthermore, human milk has been found to promote intestinal growth and maturation and to have immune-modulating effects beyond infancy, later on in life (Xanthou, 1998; Paramasivam *et al.*, 2006).

The mechanism of immune system of human milk is very important for HIV exposed and non exposed infants. Studies of the immune benefits of human milk provide indisputable evidence that it is the optimal food for the infant and that there really is no such thing as a substitute. Goldman (1993) showed that the immune system of human milk provides for a continuum of the maternal immune protection that extends from transplacental transfer of immunoglobulin G (IgG) in utero until the second year of life (Goldman, 1993; Wendelin and Nancy, 1997). Human milk furnishes the necessary immunologic protection while the infant's immune system is maturing. Production of immunoglobulin A (IgA) in the infant begins at about 4 months and is not fully established until 12 months of age. Production of the full antibody repertoire is not fully mature until about 24 months of age, lysozyme production is not fully mature until 1 to 2 years of age, and production of memory T cells in the infant is not mature until about 2 years. Although numerous other immunologic components have been identified, their maturation patterns are not well established. It is no wonder that

breastfed infants are at lower risk for infections, with the human milk immune system compensating for their own immature immune systems (Wendelin and Nancy, 1997).

#### **2.2.6 Breastfeeding mechanisms**

HIV vertical transmission after the child's birth is to be through breast milk, whereby the virus in breast milk gets through the mucosal lining of the gastrointestinal tract of infants. The gastrointestinal tract of a young baby is immature and more easily penetrated than that of adults. It is believed that damage to the intestinal tract of the baby may be caused by the early introduction of other foods, particularly solid foods and thus increase the risk of infection (WHO, 2008). Feeding with cow's milk, allergic reactions to complementary foods and infectious illness can all result in internal damage of the gastrointestinal tract of a young baby, which could also be a risk factor for transmission. It has also been hypothesized that intestinal permeability of the young infant may be affected by mode of feeding, with infants who receive only breast milk having a less permeable and therefore healthier lining of the gut than those who also receive other foods (WHO, 2008). Oral thrush may be associated with an increased risk of transmission through breastfeeding. Thus, breastfed infants who also received solids were significantly more likely to acquire infection than those who were exclusively breastfed. Under the MTCT process, it is worth noting, that the most important thing is not how it happens, but how we can prevent it from happening. ARVs have demonstrated that this is feasible (WHO, 2008).

#### **2.2.7 HIV antibody testing in infants and young children**

Most children living with HIV acquire the infection through MTCT, which can occur during pregnancy, labour and delivery or during breastfeeding. Data suggests that the



first six to eight weeks of breastfeeding could be a high risk period for transmission of HIV. However it is difficult to investigate for technical reasons (Van de Perre *et al.*, 1993; Lewis *et al.*, 1998). Diagnosis services for HIV exposed infants and young children are a very crucial part of follow-up care, however, exposure through breastfeeding is still continuous. All infants born to mothers living with HIV receive maternal antibodies and will test antibody positive at birth, regardless of their own infection status. Maternal antibodies persist in the infant's system for 15–18 months, therefore a positive antibody test results for an infant less than 18 months of age may not reflect the infant's true HIV infection status (URT, 2013b). If the infant or child is breastfeeding, HIV testing should be repeated 6 weeks after the complete cessation of breastfeeding. When viral testing is not available, symptomatic children aged less than 18 months should receive antibody testing to confirm HIV exposure. Health care workers can make a presumptive diagnosis of HIV infection based on a positive antibody test, the child's clinical symptoms and, if available, the child's CD4 percentage. Any child aged less than 18 months can be tested with antibody tests. A positive HIV test result at 18 months usually indicates infection (URT, 2013b).

### **2.2.8 Early diagnosis for infants and children**

WHO recommends that national programmes should establish the capacity to provide early virological testing of infants for HIV (WHO, 2006a). Viral tests detect the actual virus (not the antibody) and can be used for a definitive diagnosis in HIV-exposed infants at 4 weeks of age. The most commonly used tests are Deoxyribonucleic acid-polymerase chain reaction (DNA-PCR) or Ribonucleic acid-polymerase chain (RNA-PCR) tests (Table 1). In general, each test has advantages and disadvantages. However, DNA-PCR is considered the gold standard and is the preferred test for diagnosing HIV

infection in infants and children less than 18 months of age (URT, 2013a). HIV-exposed infants and children should receive viral testing at 4 – 6 weeks of age to determine their HIV status (URT, 2013b). Early diagnosis of HIV allows health-care workers to offer optimal care and treatment of HIV- infected children, assists in decision-making on infant feeding, and avoids unnecessary stress in mothers and families. In Tanzania, Reproductive and Child Health (RCH) facilities which have access to viral testing should use the tests when available and appropriate (URT, 2013a).

**Table 1: Use of HIV test in infants and children**

<b>Test</b>	<b>Use for &lt;18 months</b>	<b>Use for &gt;18 months</b>
<b>Rapid antibody test</b>	Determine if infant is HIV exposed.	Determine if child is HIV infected.
<b>DNA-PCR</b>	Determine if HIV-exposed infant is HIV-infected.	Not used for this age group.

Source: PMCTC National Guidelines (2013a)

Recently, a new technology has materialized that allows small spots of dried blood to be used in HIV testing. The Dried Blood Spots (DBS) are whole blood collected on filter paper and dried. They are made directly from the client's whole blood. The DBS are easy to prepare in a resource-limited setting and has been proven to be as effective. DBS testing allows for diagnosis of HIV as early as six weeks of age. Use of DBS collection and transport system can further improve access to and utilization of virological testing (Pathfinder International Kenya, 2007).

Blood is collected by means of a heel-prick in infants or a finger-stick in older children. The blood is dropped on filter paper as dried blood spots (DBS). The collection of specimen uses only a small volume of blood and is less traumatic than

vein puncture. Specimens for DBS carries less biohazard risk than liquid samples and can be stored at room temperature making them easier to transport to central testing laboratory (Pathfinder International Kenya, 2007).

According to the study done at Haydom Lutheran Hospital in eastern of Tanzania, it was found out that DBS performed well in HIV viral loads for patients who received ART (Asgeir *et al.*, 2009). Furthermore, in the study done at different Government hospitals of rural and urban parts of Tamil Nadu, South India, results proved the sensitivity was hundred percent, and the specificity was also hundred percent when DBS was compared with the whole blood (Anitha *et al.*, 2011). However, in a study done by Teri *et al.* (2012) it was showed that with small sample volume (50 to 100 $\mu$ l) DBS results gives poor sensitivity at lower viral loads below 3000 viral copies/ml making it difficult to use. The limits of DBS-based virological testing may be overcome by raising the threshold for virological failure to 3000 copies/ml and using RNA-specific techniques that select for viral RNA so that pro-viral DNA contamination may be avoided. Beside the challenges studies still shows that using DBS samples have proved sensitive, reliable and affordable (Fidelis and Rita, 2008). Table 1 shows when and purpose of using the rapid antibody test and DNA-PCR test.

### **2.2.9 CD4 cell counts**

CD4 cells are a type of lymphocyte (white blood cell) forming an important part of the immune system. CD4 cells are sometimes called T-cells or CD4 positive (CD4+). CD4 cell tests are normally reported as the number of cells in a cubic millimeter of blood ( $\text{mm}^3$ ). There is some disagreement about the normal range for CD4 cell counts, but normal CD4 counts are between 500 and 1600, and CD8 counts are between 375 and

1100. The CD4 cell count is a key measure of the health of the immune system. CD4 counts drop dramatically in people with HIV, in some cases down to zero. This is due to acute illnesses such as pneumonia, influenza, or herpes simplex virus infection can cause CD4 counts to go down for a while, and is a sign that the immune system is being weakened. The lower the CD4 cell count and the higher the viral load, is the higher the risk of AIDS. Anyone who has less than 200 CD4 cells, or a CD4 percentage less than 14 %, is considered to have AIDS. When the CD4 count goes below 350, most health care providers begin ART. More conservative health care providers might wait until the CD4 count drops to near 200 before starting treatment. In Tanzania testing cell count for HIV mothers starting for ART is when the CD4 cell counts is below 200, this is due to poor resource - limited settings (WHO, 2010b).

HIV infection leads to low levels of CD4+ T cells through three main mechanisms: First, direct viral killing of infected cells; second, increased rates of apoptosis in infected cells; and third, killing of infected CD4+ T cells by CD8+ cytotoxic lymphocytes that recognize infected cells. When CD4 + T cell counts decline below a critical level, cell – mediated immunity is lost, and the body becomes progressively more susceptible to opportunistic infections (Lawn, 2004).

#### **2.2.10 Infant ARV prophylaxis**

It is important to identify infants who are infected with HIV as early as possible in order to prevent growth and developmental delays, illness and death. Infants with HIV infection should receive ARV prophylaxis from birth (or as soon as possible thereafter) until 6 weeks of age, depends on the age and weight of the infant. Current WHO guidelines based on infant feeding prophylaxis trials advise the infants of breastfeeding

mothers who received zidovudine (ZDV) prophylaxis in pregnancy should receive nevirapine (NVP) monotherapy until one week after the cessation of up to a year of breastfeeding. All other HIV-exposed infants should receive a minimum of 6 weeks NVP with ZDV as an alternative for formula fed infants (URT, 2013b). Evidence from WHO illustrated that prophylaxis (up to 6 weeks) for neonates, with various combinations of maternal ARV prophylaxis, does not result in significantly increased rates of severe side-effects, with the exception of mild transient anaemia (WHO, 2010b).

Most infants in Tanzania are breastfed for two years or longer. Because breastfeeding poses an on-going risk of mother to child transmission, a negative DNA-PCR in an HIV exposed infant who is breastfeeding does not rule out HIV infection, as the infant may have been recently infected and is in the window period. Nonetheless, assure parents to continue exclusive breastfeeding for the first six months of life, as early cessation of breastfeeding is associated with higher morbidity and mortality than continued breastfeeding even in the presence of HIV infection. Continue Co-trimoxazole preventive therapy (CPT) for the HIV-exposed breastfed infant until HIV infection can be ruled out. Emphasize the need for follow-up. Initiation of ART should be done while waiting for test results if the infant meets presumptive diagnosis criteria (URT, 2013b).

### **2.2.11 Infants on Antiretroviral treatment**

Antiretroviral drugs (ARV) or Antiretroviral Therapies (ART) are medication used to treat HIV/AIDS related symptoms and opportunistic infections. Treatment of HIV positive mothers and infants using antiretroviral drugs are used to inhibiting viral

replication and decreasing viral load. They significantly reduce the progression of the disease. Emphasis for use of antiretroviral drug is being undertaken in most of developing countries as a result of local, national and international campaigns as one of the strategies in reducing the pandemic intensity. However, Gillespie and Kidayala (2005) show that nutrition when properly used can be more relevant in treatment of HIV/AIDS than antiretroviral therapy. All infants under 12 months (0 - 12 months) of age with confirmed HIV infection should be started on ART, irrespective of clinical or immunological stage.

Managing the interactions between ART and food and nutrition is critical factor especially in resource-poor settings. It needs to maintain time for taking medicine, eating specific different types of food groups either before or after taking the drugs, to check CD4 counts almost every month for any adjustment or improving the effectiveness of ARVs and minimizing their negative nutritional impact and increasing adherence to drug regimens (WHO, 2010b). Nutritional assessment, counseling, and support, are important to identify the negative effects of ART and food and nutrition interactions (World Bank, 2007).

Some ART can cause side effects after many months of taking the drug, however, dietary changes can help to manage such side effects and reduce their impact on nutritional status (World Bank, 2007). Some should be taken with food, others on an empty stomach, and others with or without specific types of foods. However, some of them affect nutrient absorption, metabolism, distribution, and excretion. On the other side, some of them can cause side effects, such as nausea, taste changes, and loss of

appetite that can reduce food consumption. Further, side effects such as diarrhea and vomiting may increase nutrient losses (WHO, 2010b).

Most commonly side effects like nausea or vomiting which are usually temporary. Another side effect is lipodystrophy. It is characterised by changes of the shape of a child's body due to loss of fat or fat being redistributed and stored in unusual places. Children on ART can become thin in their face, limbs or buttocks and larger around the tummy or upper part of their back with more fat than usual being stored there. This problem is sometimes also associated with increased levels of fats (lipids and cholesterol) in the blood and occasionally a child on ART can even develop diabetes (World Bank, 2007).

Much more commonly children starting on ART become very hungry and regain weight over a period of several months - as long as they have access to a range of good food. This happens because they feel so much better; their appetite becomes stable and recovery from diarrhoea and other infections. It takes about 6 months for the CD4 counts to return to normal and the amount of HIV virus (viral load) to fall to very low levels. During that recovery time the malnourished child will need up to 50 - 100 percent additional energy (WHO, 2010b).

Adequate amounts of fat, protein and carbohydrate, vitamins and minerals are all needed to enable them to start growing again and recover weight and length. Infected infants require very high additional energy intake for 6 - 10 weeks. Once the infant has regained weight, they need the normal energy and protein requirements for their age

and the extra 10 % because they have HIV infection. Additionally, any traditional therapies being used should be taken into account (World Bank, 2007).

#### **2.2.12 Co-trimoxazole prophylaxis**

Co-trimoxazole is a combination of two antibiotics – sulfamethoxazole and trimethoprim and classified as a medications called sulfonamides (WHO/UNICEF, 2009). Co-trimoxazole is used to treat certain bacterial infections, such as pneumonia (a lung infection), bronchitis (infection of the tubes leading to the lungs), and infections of the urinary tract, ears, and intestines. Co-trimoxazole prophylaxis is reducing mortality and morbidity among HIV –infected, despite high levels of bacterial resistance. It is effectiveness for HIV – infected children, adolescents, and adults across varying levels of bacterial resistance (WHO/UNICEF, 2009). Co-trimoxazole is available in syrup and solid formulations at low- cost in most settings, including resource limited settings. It is highly effective for the treatment and prevention of pneumonia. Because of difficulty in diagnosing HIV infection in infants, WHO recommended that all HIV-exposed infants should be started on co-trimoxazole prophylaxis at four to six weeks of age, in order to provide adequate prevention against early opportunistic infection and to the improve the quality of life of HIV-infected infants as well as the burden of care on health-care systems (WHO/UNICEF, 2009). In situation where (ART) is not ready available, the use of co-trimoxazole prophylaxis will increase the chances of survival of HIV –infected infants. Furthermore, if the baby receives prophylactic antibiotics, such as co-trimoxazole soon after birth and antiretroviral therapy as soon as is medically indicated, there are good chance of serving childhood and living a long health life (WHO/UNICEF, 2009).



### **2.2.13 Breastfeeding and work**

Working outside the home is related to a shorter duration of breastfeeding, and intentions to work full time are significantly associated with lower rates of breastfeeding initiation and shorter duration. A woman who works outside the home may value breastfeeding because of the opportunity to spend time with the baby and continue the closeness to the baby and less illness in the baby. The benefit to employers who support women to continue breastfeeding is the mother can concentrate on their work because they have less concern about their babies' health (URT, 2011). Tanzania employment and labour relations acts No. 6 of 2004 provides maternity leave of 84 days for mothers employed in the formal sector who give birth to one child and 100 days for those with more than one child. The maternity leave is given after every three years without forfeiting the annual leave. Biological fathers of the new born child are given 3 days of paternity leave (to be taken within 7 days of the child's birth) to assist their spouses with early caring of the newborns. Working women are given 2 hours of breastfeeding breaks and (URT, 2011). However, some working women fail to achieve EBF for six because they are forced to leave their babies and go to work to supplement family income (Leshabari *et al.*, 2006).

### **2.2.14 Health care workers**

Shortage of health care workers is one of the critical challenges for the Tanzanian government's ability to provide quality health services and to improve the social and economic well-being of its population. Health care workers play a major role in advocating recommended infant feeding practices. The available information shows that the majority of health care workers in Tanzania do lack knowledge and skills in

infant and young child feeding counseling in the context of HIV/AIDS. Lack of inadequate support from health care workers causes women to change from their intended feeding option hence jeopardising the ability of HIV positive women in sustaining exclusive breastfeeding (Doherty *et al.*, 2006).

According to Leshabari *et al.* (2007) due to a high level of stress and frustration among the health care workers, they are unable to give qualified and relevant advice to HIV positive women on how best to feed their infants. Most health care workers were confused regarding the appropriateness of the feeding options they were expected to advice HIV positive women to employ. Also most of health care workers perceived both exclusive breastfeeding and exclusive replacement feeding as culturally and socially unsuitable (Leshabari *et al.*, 2007). However, most health care providers believed that formula feeding was the right way for an HIV positive woman to feed her infant. They expressed a lack of confidence in their own knowledge of HIV and infant feeding, as well as in their own skills in assessing a woman's possibilities of adhering to a particular method of feeding. WHO (2005b) shows that counsellors on PMTCT are often pressed for time and have too little insight into the mother's personal circumstances to provide appropriate comments and recommendations on the basis of the AFASS criteria. Overall, about 65% of 4 660 health facilities providing RCH services are currently providing PMTCT services. Currently the PMTCT services are being operated only at facility level; nothing has been done as far as community is concerned (WHO, 2005b).

### **2.2.15 Knowledge of the mother**

Knowledge of mothers on breastfeeding plays a big role for the mothers to be able to make an informed decision on infant feeding option for their infants. However, the mother's level of knowledge in terms of education and employment status were found to be significantly related to infant feeding practices. Mothers with higher educational and those who were employed rarely practiced exclusively breastfeeding made it clear that working mothers are less likely to maintain breastfeeding (Bick *et al.*, 1998). This implies that educated mothers who are mostly employed and hence they are more likely to practice mixed feeding in the first six months of their child's life. In addition, mothers with inadequate knowledge on factors that increases the likelihood of transmitting HIV to the child through breastfeeding (such as wounds on the breast) pose higher risk of infecting infant through breast milk. It is further reported that due to the knowledge imparted to them by health workers, some women think that adherence to exclusive breastfeeding eliminate the chance of transmitting HIV to the infant while others believe that breastfeeding always leads to HIV transmission to an infant (Mamman *et al.*, 2012).

## **2.3 Barriers for Practising Exclusive Breastfeeding**

A range of studies have found a number of factors that have been known to hinder exclusive breastfeeding. Some of these are mother's age, education, perception on sufficiency of breast milk, disclosure of HIV status, stigmatization, economic factors, viral load and social cultural influence.

### **2.3.1 Mother's age**

Some studies have found that it is hard to practice exclusive breastfeeding unless the importance of it is known to community members, especially family members. The difficulty is worse among young or adolescent mothers who frequently depend on advice from family members to practice infant feeding. In addition, for adolescent mothers the opinions on infant feeding from families is highly valued especially in circumstances where they depend on the families for financial and emotional support (Thairu *et al.*, 2005; Della *et al.*, 2006). The duration of exclusive breastfeeding increased as the age of the mother increased thus women with older age were more experienced and could practice exclusive breastfeeding compared to the ones with younger age (Hornell *et al.*, 2001; Amadhila, 2005; Della *et al.*, 2006; Adejuyigbe *et al.*, 2008; Violet, 2008).

Longer durations of exclusive breastfeeding are associated with increasing age and first time motherhood. Furthermore, Thairu *et al.* (2005) in their study assert that, it is difficult for adolescent mothers to decide on her own how to feed the baby. Accommodating the family's wishes may be an adaptive coping strategy as adolescent mothers fight with the vast challenge of parenting in the midst of their own development.

### **2.3.2 Education of the mother**

Education is an important social factor. Maternal education can break traditions, enhance or facilitate adoption of the alternative practices in child feeding, thus increasing the capacity of the mothers to manipulate their environment. Some studies illustrated that, education of the mother was negatively associated with duration of

exclusive breastfeeding because mothers with higher education exclusive breastfed their children for shorter periods than mothers with lower or no education at all (Bick *et al.*, 1998). Mothers with higher educational and those who were employed rarely practiced exclusively breastfeeding made it clear that working mothers are less likely to maintain breastfeeding (Bick *et al.*, 1998). This implies that educated mothers who are mostly employed and hence they are more likely to practice mixed feeding in the first six months of their child's life.

### **2.3.3 Perception of mothers**

In a study done by Bentley *et al.* (2005) on perception of the role of maternal nutrition in HIV positive breast feeding women, it was reported that most women perceived exclusive breastfeeding as a factor that may increase the sequence of HIV (Sheehan *et al.*, 2001; Bentley *et al.*, 2005). Other studies have reported that switching to formula feeding as early as one month after birth was a result of mother's perception that they have inadequate milk supply (Marina *et al.*, 2003). Young childless women to a large degree perceived their breasts in terms of their attractiveness rather than their function. This contrasts with the traditional perception of breasts, which gives greater emphasis to their functional attribute such as producing milk for the infant (Marina *et al.*, 2003).

### **2.3.4 Stigmatization**

Some studies show that stigma is one of the major barriers to appropriate infant feeding choice for HIV positive mothers. HIV infected women who are using formula milk sometimes faces stigmatization which can lead them to practice mixed feeding. A randomized clinical trial conducted in Botswana demonstrates that most HIV positive mothers do not have confidence in using formula because of stigma and

discrimination. Such women often opt to breastfeed to avoid disclosure of their HIV status (Shapiro *et al.*, 2003). On the other hand, Doherty *et al.* (2006) have observed that when mothers were provided with formula milk, it was perceived as an indication of the positive HIV status of mothers. This resulted into mothers hiding tins of milk to avoid social stress (Doherty *et al.*, 2006). Nduati *et al.* (2000) and Doherty *et al.* (2006) have shown that HIV positive mothers who opt to formula feed faced a big challenge from family members. Moreover, poverty and erratic supplies of infant formula can also lead to the early introduction of weaning foods.

### **2.3.5 Disclosure of HIV status**

Many studies specifically examined disclosure experiences of HIV-positive mothers to their spouses. Their findings were consistent with studies on other populations, which include: improved health, and reductions in stress, depression and anxiety for the mother, and improved family cohesion (Tompkins, 2007; Murphy *et al.*, 2011). In a study done by Leshabari *et al.* (2007) demonstrated that HIV-positive mothers feared to disclose their HIV-positive status during breast feeding due to stigmatization. Fear of disclosing one's HIV status to spouse comes as a result of what other women have seen to their fellows as a result of disclosure since it sometimes lead to bad outcomes like abandonment, which is closely tied to loss of economic support from partners. Low economic status of women and their economic dependence on husbands make the life of women worse if divorced which results in raising the child alone and this leads to non disclosure which in turn leads to detrimental feeding practices of infants (Maru, 2009).

Another reason for inability to disclose one's HIV status was the strong cultural position that breastfeeding is the only acceptable infant feeding method and the only way to fulfil ideals of being good mothers (Leshabari *et al.*, 2007). In circumstances when the husbands are not aware of the HIV status of their wives, they have been reported to impose on inappropriate infant feeding practices including mixed feeding (Maru, 2009). Moreover, non-disclosure of HIV status to partners and close members of the family lead to non-adherence to exclusive breastfeeding. This is because spouses and other family members have the big role to decide on how infant is to be fed. In addition, women who disclose their HIV status to their spouses are less likely to practice mixed feeding (Leshabari *et al.*, 2007; Maru, 2009).

### **2.3.6 Viral load**

The viral load test measures the amount of HIV in the blood. Viral loads are usually reported as copies of HIV in one millilitre of blood. The tests count up to about 1 million copies, and are always being improved to be more sensitive. Many people with no symptoms of AIDS and high CD4 cell counts also had high viral loads. If the virus was latent, the test wouldn't have found any HIV in the blood. The most important risk factor for mother-to-child transmission is the amount of viral load. The risk of transmission to the baby is greatest when the viral load is high. Women who have recently been infected with HIV or have late-stage HIV or AIDS often have high viral loads. Maternal factors shown to increase the risk of HIV transmission through breast milk include: high plasma viral load; low CD4 count; breast pathology (including abscesses and mastitis); mode of infant feeding; and prolonged duration of breastfeeding - more than six months (WHO, 2007).

The infant factors include damage to mucous membranes (such as oral thrush), damage to the intestinal mucosa by cow's milk or allergic reactions to complementary foods and impaired intestinal permeability due to mixed feeding. Some of the risk factors for transmission are the same and some are different during pregnancy, labour, delivery, and breastfeeding (Kourtis *et al.*, 2007; WHO, 2007).

ARV treatment can reduce viral load. Studies done in South Africa, Malawi and West Africa have shown that women with high viral loads in plasma and breast milk were more likely to transmit HIV compared to those with undetectable virus (Semba *et al.*, 1999; Leroy *et al.*, 2003; Shapiro *et al.*, 2010). A study in Zimbabwe has shown that mastitis was associated with breast milk HIV load. Maternal plasma and mastitis was associated with postnatal transmission only when maternal plasma HIV load was high. Therefore exclusive breast feeding is associated with reduced postnatal transmission of HIV from mother to child, but this protection is not mediated by reduced mastitis or breast milk HIV load. The deleterious effect of mastitis increases as the mother's plasma HIV load increases (Kevin *et al.*, 2010).

### **2.3.7 Socio-cultural influence**

Culture plays a vital role in determining the level of health of the individual, the family and the community. A series of factors have been reported to delay exclusive breastfeeding. For instance a study by de Paoli *et al.* (2001) reported that there are cultural norms and customs such as in some communities every stranger entering the house is supposed to give a new born infant some concoctions, water or drinks. Other studies have reported belief that after birth the infant becomes exhausted and thirst



hence need to be rehydrated by fluids (Aidam *et al.*, 2005; Leshabari *et al.*, 2007; Laar and Govender, 2011). However; there is a common practice of giving the infants some water sometimes early before breastfeeding with a belief that the baby feels thirsty and breast milk does not quench thirst. This belief is contrary to observational studies that have ascertained the adequacy of breastmilk to hydrate infants even in tropical setting (de Paoli *et al.*, 2002; Matji *et al.*, 2009). Study from Zimbabwe reports cultural norm of introducing liquids and solid foods very early to an infant which poses the infant to the great risk of getting HIV (Iliff *et al.*, 2005).

Sometimes solid foods are introduced too early because the family or the mother believes the baby is not getting enough from the breast. The practice of mixed feeding poses risks to an infant's health by increasing the chance of getting diarrhoea and other infectious diseases. It can lead to a decline in breast milk supply as the baby sucks less at the breast (UNICEF, 2008).

### **2.3.8 Economic factors**

HIV positive women experience many problems, including the absence of savings and other assets. Resource poor HIV positive women may not be able to meet the costs of drugs needed to treat opportunistic infections, transport costs to health centres. This in turn may contribute to reduced household productivity through illness and diversion of labour to caring roles, loss of employment through illness and job discrimination, funeral and related costs among others. On the other hand, for working women, a compassionate undertaking for an affected family member can serve as a burden that can limit their economic opportunities (UNAIDS, 2006).

In order to cope with family demand, at some instances mothers had to look for job or do household chores such as collecting water (Doherty *et al.*, 2007). Mothers are expected to leave their children and go to work in order to supplement family income due to life being expensive. This leads to non adherence to EBF (Leshabari *et al.*, 2007; Doherty, 2007). Lack of funds to purchase infant formula feeds, poor hygienic conditions and risk of social repercussions were more commonly reported as reasons for mothers to opt for breastfeeding rather than exclusive replacement feeding (Sheehan, 2007).

### **2.3.9 Mixed feeding**

Mixed feeding, or giving other liquids and/or foods together with breast milk to infants under 6 months of age, is widespread in many countries. This practice poses risks to an infant's health because it can increase the chance of getting diarrhoea and other infectious diseases. Mixed feeding can cause the supply of breast milk to decrease as the baby sucks less at the breast. Breast milk in the first 6 months, contains all the nutrients and water a baby needs, even in very hot climates. Mixed feeding increases the risk of mother to child transmission of HIV. Exclusive BF for up to six months was associated with a three to four decreased risk of transmission of HIV compared to mix feeding. Studies have shown that most of the mothers who tend to opt exclusively breastfeeding contrary to their intention end up by practicing mixed feeding (Leshabari *et al.*, 2006).

## **2.4 Assessment of Nutritional Status**

Nutritional status can be defined as the interpretation of information obtained from the methods of nutritional assessment. The information is used to determine the health

status of individuals or groups as influenced by the body (Gibson, 1990). Nutritional status of children under five years of age is an important outcome measure of children's health. The anthropometric data on length and weight are used in calculating three indices; length-for-age, weight-for-length and weight-for-age (NBS, 2010).

The length-for-age index provides an indicator of growth retardation. Children whose length-for-age Z-score is below minus two standard deviations (-2 SD) to (-3 SD) from the median of the WHO reference population are considered short for their age meaning that they are stunted or chronically malnourished. Children who are below minus three standard deviations (-3 SD) are considered severely stunted. Stunting reflects failure to receive adequate nutrition over a long period of time. The weight-for-length index measures body mass in relation to body length. Children with Z-scores below minus three standard deviations (-3 SD) are considered severely thin (wasted) and those between less than (-2 SD) to (-3 SD) are considered thin (wasted) or acutely malnourished. It represents the result of inadequate food intake. Children with weight-for-length index below minus three standard deviations (-3 SD) are considered severely wasted. Weight-for-age is a composite index of length-for-age and weight-for-length. It takes into account both chronic and acute malnutrition. Children with weight-for-age below minus three standard deviations (-3 SD) are considered severely underweight and those below (-2 SD) to (-3 SD) are considered moderately underweight (NBS, 2010).

## **CHAPTER THREE**

### **3.0 METHODOLOGY**

#### **3.1 Description of the Area**

The study was conducted in Dar es Salaam region particularly in urban and rural areas. Dar es Salaam is located between 6°48' South, and 39°17' East. It shares borders with the Indian Ocean to the East and with the Coast Region on the other sides. The region was originally dominantly inhabited by Zaramo and a few other tribes especially Ndengereko and Kwere. However, due to urbanization many people of different ethnicities and origins have immigrated to the city in big numbers. This has caused the undefined cultural change. Administratively, Dar es Salaam is divided into 3 districts, Kinondoni, Ilala and Temeke Municipalities. In addition, Dar es Salaam region in total has 11 divisions, 73 wards, 276 urban streets, 38 rural villages and 113 hamlets respectively URT (2013d).

Of the three Municipalities, Kinondoni had the highest population with a total of 1 775 049 inhabitants, followed by Temeke with 1 368 881 and Ilala with 1 220 611 inhabitants. According to the URT (2013d) the total population of one year aged children in the Ilala rural and urban areas were 28 182 of which 14 183 were males and the remaining 13 999 were females. The total population of children aged one year in rural and urban areas of Temeke district was 31 911 of which 16 058 were males and 15 853 females. Also the total population of children aged one year in rural and urban areas of Kinondoni district was 39 834 of which 20 204 males and 19 630 females (URT, 2013d).

The main economic activities of Dar es Salaam region include trade, formal employment, petty trading, and agricultural production. Being located along the Indian Ocean coast, fishing is one of the major economic activities. The fishing business in the City is either for subsistence or commercial purposes and uses traditional fishing equipment like canoes and nets (URT, 2004).

Dar es Salaam City have 1 660 894 ANC attendees in health facilities implementing PMTCT services (NACP, 2011). The PMTCT clinics are in urban and rural communities and are owned by the government, Faith Based Organizations (FBO) and Non-governmental Organizations (NGOs). Dar es Salaam Health Department follows the written infant feeding policy that is routinely communicated to all trained health care staff who work in ARV and PMTCT clinics. Among them are doctors, nurses, midwives, nutritionists and home based care attendants.

### **3.2 Study Design**

The study employed a cross-sectional design that allows data to be collected at a single point in a time and establishes relationship between variables for the purpose of testing the hypotheses (Babbie, 1990). This design also allows data collection on all relevant variables at one time, and together information on people's attitudes and behaviors. It is a useful design when there are limitations in resources.

### **3.3 Study Population**

The primary target was HIV infected mothers with children aged 0 - 12 months, who have opted either for exclusive breastfeeding or replacement feeding, and attending

antenatal clinics in PMTCT sites. The second group was health care workers, who provide PMTCT services.

### **3.3.1 Inclusion criteria**

All HIV positive mothers having infants aged 0-12 months and have chosen to breast feed their infants exclusively for the first six months then continue breastfeeding up to 12 months and willing to participate, were included in the study.

### **3.3.2 Exclusion criteria**

HIV infected women who do not breastfeed their babies exclusively for the first six months thereafter up to 12 months and HIV positive women who were not willing to participate in the study.

### **3.3.3 Sampling procedures and sample size**

Purposive sampling technique was used to select eight PMTCT sites in Dar es Salaam rural and urban areas. The selected PMTCT sites were those with a higher number of HIV-infected mothers compared to other PMTCT sites in the Council. The government health facilities were given the first priority. The sample size was determined by using the formula by Fox *et al.* (2009):

$$n = \frac{p - (1 - p)}{SE^2} \dots \dots \dots (1)$$

Whereby:

$n$  = the desired sample size

SE = Standard Error (with 95 percent Confidence Interval = 2.55)

$p$  = Estimated proportion of HIV infected mothers in Dar es Salaam (6.3%)

After applying this formula the calculated sample size obtained was 90 subjects. However, in order to take care of non response or drop outs at the end of the study, the sample size was increased by 10% of total, hence making the final sample of 99 HIV infected mothers of which 50 were from urban areas and the remaining 49 were from rural areas. Finally, a total number of 99 HIV positive mothers with infants aged 0 - 12 months and 17 health care workers required were interviewed.

### **3.4 Tools for Data Collection**

A structured questionnaire was used to collect quantitative data from mothers. The structured questionnaires were comprised of pre – coded close ended and non-coded open ended questions. In addition, semi-structured questionnaires for qualitative data were applied to health care workers. Pre-testing of the survey tool was done in Mongolandege dispensary in Ilala District. Fifteen (15) HIV-infected women were purposively selected and were not included in the final sample of the actual study. The main objective of the pre-testing exercise was to check the suitability of the questions and validity of the data collection tools basing on language consistency, the ability of the respondents to understand the posed questions and timing of the interviews. Following the pre-test of the data collection tools, necessary modifications and fine tuning were made to get the final tools that were used in the field. Data collection tools were translated and administered in Swahili.

### **3.5 Data Collection**

#### **3.5.1 Primary data**

Primary data was collected by means of face to face interview with mothers using questionnaires with closed and open - ended questions. The tool were adopted from qualitative design of infant feeding tools and modified to collect detailed information (Mamman *et al.*, 2012).

#### **3.5.2 Secondary data**

Secondary data on infant feeding, focusing on knowledge, attitudes and practices regarding breastfeeding in the context of HIV/AIDS was collected from different sources including books, theses, journals, websites, several published and unpublished government reports and health reports.

#### **3.5.3 Anthropometric measurements**

A trained research assistant with experience in community surveys was recruited for taking anthropometry measurements. The anthropometric variables measured were weight and length. Weight of an infant aged 0-12 months was measured and recorded to the nearest 0.1kg (accuracy of 100g) using Salter scale for measurement. The scale was adjusted to read zero before starting the measurements. The child was slipped into a weighing sling one at a time and hung on the scale. The weight was recorded as soon as the pointer on the scale had stabilized. Recumbent lengths of the infants were measured using an infant measuring board. The length was measured with the subject lying in a supine position on a length measuring board, which have a fixed head rest and a movable foot piece. The length board was placed on a flat surface. Age was obtained from the neonatal cards.



Anthropometric indices that were analysed were length-for-age (L/A), weight-for-age (W/A), and weight-for-length (W/L). The new growth standards generated using data collected in the WHO Multicentre Growth Reference Study (WHO, 2006a) were used to establish the nutritional status of children. Three indices derived from weight and length variables (Length-for-Age, Weight-for-Length and Weight-for-Age) were expressed in standard deviation (SD) units. The cut-offs were used to determine the prevalence of wasting, stunting and underweight (Z-scores) using the WHO (2006a) growth references as shown in Table 2.

**Table 2: Cut-offs for definition of wasting, stunting and underweight**

<b>Classification</b>	<b>Acute Malnutrition or Wasting (WLZ)</b>	<b>Chronic Malnutrition or Stunting (LAZ)</b>	<b>Underweight (WAZ)</b>
Global	<-2SD and /or bilateral edema	<-2 SD	<-2 SD
Moderate	≥-3 SD to <-2 SD	≥-3 SD to <-2 SD	≥-3 SD to <-2 SD
Severe	<-3 SD and /or bilateral edema	<-3 SD	<-3 SD

Source: WHO (2006a)

Stunting or low Length-for-Age is an indicator of linear growth retardation and cumulative growth deficits. Stunting reflects the failure to receive adequate nutrition over a long period of time and is also affected by recurrent and chronic illness. Length-for-age represents the long-term effects of malnutrition in a population and is not sensitive to recent, short-term changes in dietary intake (WHO, 2014b).

Wasting or low Weight-for-Length measures body mass in relation to body height or length to describe the current or acute nutritional status. Wasting represents the failure to receive adequate nutrition in the period immediately before the measurements and may be the result of inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition (WHO, 2014b).

Low Weight-for-Age is a composite index of low Length-for-Age and low Weight-for-Height. It takes into account both acute and chronic malnutrition. While underweight or low Weight-for-Age is used for monitoring the Millennium Development Goals, it is no longer in use for monitoring individual children as it cannot detect children who are stunted but of normal weight (WHO, 2014b).

### **3.6 Data Processing and Statistical Analysis**

#### **3.6.1 Data processing**

The researcher was responsible for daily cross checking of data quality including overseeing the correctness of anthropometric data collection procedures. Deliberate measures were taken to improve perfection in data collection, measurement taking and recording in the field. Data captured spreadsheets were prepared in SPSS version 18 computer software. Data was then cleaned and later on analyzed by using SPSS version 18 computer software in the Windows 2007 environment. All figures were drawn by using advanced Microsoft Office Excel 2007 computer software.

#### **3.6.2 Descriptive data analysis**

Descriptive analysis of the data was done by computation of frequency distributions of socio-economic characteristics of the households and the subjects. Further descriptive data analysis involved the computation of frequency distributions and some selected measures of central tendency and dispersion. The Likert scale was used to measure respondents' attitudes towards various infant feeding practices.

### **3.6.3 Inferential data analysis**

Attitudinal data was further analysed by using the principal component analysis (or popularly known as factor analysis). The principal component analysis was done so as to identify underlying factors that explain the pattern of correlations within a set of observed attitudes. The analysis involved data reduction technique to identify a small number of factors that explain the attitude of respondents towards some issues relevant to infant feeding in the context of HIV and AIDS (Gorsuch, 1983; Norusis, 2004.). In addition, Chi-square test was used to analyze and test associations between some categorical data of interest. The significance for these tests was set at 5 percent  $\alpha$  level.

### **3.7 Ethical Consideration**

Ethical clearance for conducting the research was obtained from the National Institute for Medical Research, Coordinating Committee of the Ministry of Health and Social Welfare with reference no. NIMR/HQ/R.8a/Vol.IX/1683. Permission to conduct the study was also obtained from the Regional Administrative Secretary in Dar es Salaam; respective district authorities; and District Medical Officers in both districts.

All respondents were informed about the nature of the study, its risks and benefits, rights to terminate interview at any time, refusal to answer any question that they deemed sensitive and confidential. A verbal consent was obtained from each respondent before they were interviewed after explaining clearly the aims and objectives of the study.

This study carried no risk to participating mothers, health service providers and other respondents. Privacy of respondents and other participants of the study were not put at

stake. To ensure privacy and confidentiality all interviews were undertaken in a convenient place where other people were unable to listen or follow the proceedings. Questionnaires were given unique identification number and confidentiality was observed during the interviews. Names of respondents or any identification such as codes were not revealed or used in any reports, presentations, or communication emanating from this study. All participating mothers with infant feeding problem, signs of malnutrition were counselled and assisted accordingly.

## CHAPTER FOUR

### 4.0 RESULTS AND DISCUSSION

This chapter presents the findings of this study. The findings include, mother's age, marital status, level of education, occupation, number of children, and child gender. These characteristics of a given respondent have the crucial implication to the knowledge attitudes and practice (KAP) on infant feeding in the context of HIV. This socio-demographic characterization of the respondents facilitates interpretation of key variables.

#### 4.1 Characteristics of the Respondents

In this study, a total of 116 respondents were interviewed. The respondents include 99 HIV positive mothers with infants aged 0 - 12 months. Among the interviewed HIV positive mothers 49 were living in rural areas of Dar es Salaam region and 50 were living in urban areas. Other respondents were 17 key informant's namely health care workers (HCW) who were working in health facilities and community Home Based Care providers (HBCs).

Table 3 results show that majority (42.9%) of HIV positive mothers in rural areas and 72% in urban areas were at the age range of (25 – 34) years. Mothers aged 19 – 24 years were 24.5 and 8% in rural and urban areas respectively. Those in the age group of 35 – 45 years were 32.7 and 20% in rural and urban areas respectively. Some studies have shown that the older mothers are more experienced and could practice exclusive breastfeeding for a longer duration as compared to younger mothers (Della *et al.*, 2006; Violet, 2008).

The summary of findings presented in Table 3 show that 44.9% of the HIV positive mothers interviewed in rural area were single. Those who were single in urban area were only 22%. Few mothers (2 and 1%) in rural and urban areas were divorced respectively. On the other hand, those who were married and cohabiting in rural areas were 24.5 and 28.8% respectively. At least 12 and 14% mothers interviewed in urban areas were married and cohabiting respectively.

Among the interviewed 63.3% rural women and 74% of urban women had completed standard seven. Among the women who were interviewed those who had no education were 20.4% in rural and only 6% in urban areas (Table 3). Occupation of respondents is important not only in sustaining their livelihood but also making choices and decisions about various issues including infant feeding and nutrition in general. Majority of HIV positive women in rural areas (73.5%) were businesswomen as compared to only 44% in urban areas. Also results showed that 46% of women in urban areas were housewives while only 16.3% of women in rural areas were housewives. Small proportions of the interviewed mother in rural areas (6.1%) were farmers, while urban area those who were farmers were only 2%. On the other side, only 4.1 and 8% women in rural and urban areas respectively were employed in this study.

Results show that 44.9 and 34% of infants in rural and urban respectively were males. The majority (55.1 and 66%) of infants in rural and urban were females respectively. This implies that majority of infants in rural and urban areas in this study were females. Results also show that, the majority of children born to HIV positive mothers in rural and urban areas (77.5 and 76%) respectively, had range between 1 – 3

children. On the other hand, few (2%) were at the range of 6 or more in both rural and urban. Thus, women should be educated to practice fertility control in order to improve their quality of life. Also men should be informed to the importance of having fewer children to enable them enjoy better quality of life (Table 3).

**Table 3: Distribution of socio-demographic characteristics of respondents**

Variable		Rural		Urban	
		n	percent	n	percent
Age (years)	19 – 24	12	24.5	4	8
	25 – 34	21	42.9	36	72
	35 – 45	16	32.7	10	20
	<b>Total</b>	<b>49</b>	<b>100</b>	<b>50</b>	<b>100</b>
Marital Status	Single	22	44.9	12	24
	Married	12	24.5	22	44
	Divorced	1	2	1	2
	Cohabiting	14	28.6	15	30
	<b>Total</b>	<b>49</b>	<b>100</b>	<b>50</b>	<b>100</b>
Education Level	None	10	20.4	3	6
	Some primary school	4	8.2	1	2
	Completed standard seven	31	63.3	37	74
	Some secondary education	4	8.2	9	18
	<b>Total</b>	<b>49</b>	<b>100</b>	<b>50</b>	<b>100</b>
Occupation	House wife	8	16.3	23	46
	Employed	2	4.1	4	8
	Farmer	3	6.1	1	2
	Business	36	73.5	22	44
	<b>Total</b>	<b>49</b>	<b>100</b>	<b>50</b>	<b>100</b>
Number of children	1 – 3	38	77.5	38	76
	4 – 5	10	20.4	11	22
	6 or more	1	2	1	2
	<b>Total</b>	<b>49</b>	<b>100</b>	<b>50</b>	<b>100</b>
Child sex	Male	22	44.9	17	34
	Female	27	55.1	33	66
	<b>Total</b>	<b>49</b>	<b>100</b>	<b>50</b>	<b>100</b>

#### 4.2 Knowledge of Mothers about Exclusive Breastfeeding

Women, men and families need to have correct knowledge on exclusive breastfeeding, so that they can adopt recommended practices for the improvement and the benefit of their children. The knowledge on exclusive feeding among HIV infected women is an

important step to avoid infecting their babies. Table 4 shows the proportion of the interviewed mothers who were aware on exclusive breastfeeding.

Table 4 reveals that 54.8% of interviewed mothers in rural areas were aware of the fact that colostrum is nutritious to a baby as compared to 45.2% of mothers in urban areas. On the other hand, 52.9% of interviewed mothers in urban areas did not know that colostrum is nutritious to the babies, as compared with 47.1% in rural areas. The results indicate there was a significant relationship between areas of residence and knowledge on importance of colostrums ( $p = 0.032$ ).

Table 4 illustrates that the association of rural HIV positive mothers who were aware of the fact that colostrum protects the child against diseases was 66.7% as compared to only 33.3% in urban area. Generally, these results reveal that the majority HIV positive mothers from rural areas were aware that colostrum protects the child against diseases as compared with those in urban area. Results show there was significant relationship between location and knowledge of protective nature of colostrums ( $p = 0.000$ ).

Table 4 also illustrates that the association of mothers who perceived that colostrum is important to the babies was 66.7% in rural areas as compared to only 33.3% in urban areas. Only 49% of mothers in rural area perceive that colostrum has no any importance to the babies as compared to about 51% of mothers in urban area. There was a significant relationship between location and perception of the importance of colostrum to babies ( $p = 0.000$ ).



Results have shown that HIV infected mothers in rural areas were more knowledgeable about infant feeding in the context of HIV and AIDS as compared to their urban counterparts. For instance, while more than half of HIV infected mothers in rural areas (54.8%) were aware of the nutritive values of colostrum as compared to less than half (45.2%) of mothers in urban areas; yet high proportion of rural women (66.7%) were aware that it protects the child against diseases as compared to only (33.3%) in urban area. This could be either due to inconsistencies and lack of harmonized health and nutrition education messages delivered at the health facilities in rural and urban areas. In a study done by TFNC (2012) in Ruangwa district results show that, the majority of positive infected mothers in these areas were more knowledgeable about infant feeding in the context of HIV and AIDS (90%) as compared to this study. This implies that mothers from Ruangwa areas were more knowledgeable than mothers from rural areas (Dar es Salaam) compared to that in urban counterparts.

**Table 4: Association of mothers by their knowledge on breastfeeding practices**

	Urban		Rural		$\chi^2$	<i>df</i>	<i>p</i>
	N	%	N	%			
<b>Knows if colostrum is nutritious to a baby</b>							
Knows	14	45.2	17	54.8	4.592	1	0.032*
Don't know	36	52.9	32	47.1			
<b>Knows if colostrum protects the child against diseases</b>							
Knows	2	33.3	4	66.7	42.32	1	0.000*
Don't know	48	51.6	45	48.4			
<b>Perceives that colostrum has no importance to a baby</b>							
Knows	1	33.3	2	66.7	46.08	1	0.000*
Don't know	49	51	47	49			

**Note:** \* = Shows significant association at  $p < 0.05$

### 4.3 Exclusive Breastfeeding

Table 5 shows the duration of which the children were exclusively breastfed in rural and urban. These results show that the proportion of mothers who exclusively breastfed their infants for the 1st to 3<sup>rd</sup> months in rural and urban areas were 12.2 and 26% respectively. Those who managed to exclusively breastfed their infants for 6 months were 61.2 and 56% in rural and urban areas respectively. The association between area of residence and duration of exclusive breastfeeding was statistically significant ( $p = 0.000$ ). This signifies that more HIV positive mothers in rural followed the WHO guidelines of by practising exclusive breastfeeding for 6 months as compared to those in urban areas. Short duration of EBF is likely to be due to fear of infecting the babies, or lack of disclosure of their HIV status (Nankunda *et al.*, 2006). Based on this study, the reasons for short duration of EBF duration for HIV infected mother, majority mentioned fear of infecting their babies, lack of disclosure their HIV status for fear that doing so will subject them to unfair treatment and stigma. Fear to bad outcomes like abandonment, which is closely tied to loss of economic support from partners.

**Table 5: Duration of exclusive breastfeeding**

	Urban		Rural		$\chi^2$	<i>Df</i>	<i>p</i>
	n	%	n	%			
1 - 3months	13	26	6	12.2	52.73	4	0.000*
4 - 5months	2	4	6	12.2			
6 months	28	56	30	61.2			
I don't know	4	8	4	6.1			
Others	3	6	4	8.2			

**Note:** \* = Shows significant association at  $p < 0.05$

### 4.4 Knowledge of Mother about the Right time to Stop Breastfeeding

Results show that only 22% of the HIV positive mothers in rural areas mentioned that the right time for them to stop breastfeeding was when the child is less than 6 months

as compared to 40% in urban areas (Table 6). These results shows significant relationship between location and knowledge of the right time for breastfeeding cessation ( $p = 0.000$ ). Available evidence shows that knowledge and adequate support regarding optimal duration of breastfeeding and its benefits has been considered as one of the factors that contribute to early cessation breastfeeding (Bovell-Benjamin *et al.*, 2001).

**Table 6: Mothers knowledge about the right time to stop breastfeeding**

	Urban		Rural		$\chi^2$	<i>Df</i>	<i>p</i>
	<i>n</i>	%	<i>N</i>	%			
Less than 6 months	20	40	11	22	23	4	0.000*
6 to 11 months	16	32	15	30.6			
12 to 18 months	4	8	4	8.2			
At 24 months above	7	14	18	36.7			
Don't know	3	6	1	2			

**Note:** \* = Shows significant relationship at  $p < 0.05$

#### 4.5 Knowledge of Mothers on Prelacteal Feeds

The proportion of mothers who disagreed that it is important to give new born babies prelacteal feeds prior to breastfeeding in rural areas was 65.3% while in urban areas it was 60% (Table 7). However, about 40 and 34.7% of mothers in urban and rural respectively, agreed that giving infants some prelacteal feeds is important. In addition, the majority of HIV positive mothers in urban and rural areas (84 and 81.6% respectively) timely initiated breastfeeding within one hour of delivery. The Chi square analysis of the results indicated a significant association between area of residence and attitudes towards prelacteal feeds and initiation of breastfeeding ( $p = 0.000$ ).

**Table 7: Attitudes towards prelacteal feeds and their time of initiating breastfeeding**

	Urban		Rural		$\chi^2$	<i>df</i>	<i>p</i>
	n	%	n	%			
<b>Prelacteal feeds are important</b>							
Agree	20	40	17	34.7	25.24	1	0.000*
Disagree	30	60	32	65.3			
<b>Initiation of BF</b>							
Timely	42	84	40	81.6	39.8	1	0.000*
Late	8	16	9	18.4			

**Note:** \* = Shows significant association at  $p < 0.05$

#### 4.6 Knowledge on Exclusive Breastfeeding Practices in the Context of HIV/AIDS

Results on Table 8 show the association of HIV positive mothers according to their knowledge about the risk of MTCT of HIV. Results show that the majority (94%) in urban areas agreed that there is a risk of MTCT of HIV as compared to 86% in rural areas. The results show significant association between location and knowledge of risk of MTCT ( $p = 0.000$ ).

**Table 8: Association of HIV positive mothers by their knowledge on risk of MTCT of HIV**

	Urban		Rural		$\chi^2$	<i>Df</i>	<i>p</i>
	<i>n</i>	%	<i>n</i>	%			
Yes	47	94.0	42	85.7	23	2	0.000*
No	1	2.00	3	6.10			
I don't know	2	4.00	4	8.20			

**Note:** \* = Shows significant association at  $p < 0.05$

#### 4.7 Knowledge on Factors that Increase the Risk of MTCT of HIV During Breastfeeding

Table 9 results show the knowledge of mothers on factors that increase the risk of MTCT of HIV during breastfeeding. Results showed that 24.5 and 66% of HIV positive mothers in rural and urban areas respectively identified breast conditions as

one of the factors that increase the risk of MTCT of HIV. The results show significant relationship between location and knowledge of the risk of breast conditions in MTCT ( $p = 0.024$ ). Majority of mothers (98 and 98.1%), in rural and urban areas respectively did not know that viral load is one of the factor which increases the risk of MTCT of HIV. Also majority (89.8 and 92%) of HIV positive mothers in rural and urban areas respectively agreed that mixed feeding increases the risk of MTCT of HIV during breastfeeding. On the other hand, most of interviewed mothers (98 and 94%) in rural and urban areas respectively did not agree that getting new infection of HIV is one of the factors that increase the risk of MTCT of HIV during breastfeed. The results show a significant relationship between area of residence and knowledge of risk posed by viral load on MTCT ( $p = 0.000$ ).

Generally, these results imply that the majority of HIV positive mothers in rural areas disagreed about breast conditions is one of the factors that increase the risk of MTCT of HIV during breastfeeding compared to that in urban areas. And also in rural and urban areas, the majority of mothers did not agree that re-infection with HIV is one of the factor that increases the risk of MTCT of HIV during breastfeed. The results show a significant relationship between area of residence and knowledge of the risk posed by re-infection on MTCT ( $p = 0.000$ ). The implication in this study basing to the findings, HIV infected mother in Dar es Salaam needs to be harmonized the health education package in terms of messages and content and undertake health promotion using mass and also traditional media.

**Table 9: Knowledge of mothers on factors that increase the risk of MTCT of HIV during breastfeeding**

	Urban		Rural		$\chi^2$	<i>Df</i>	<i>p</i>
	N	%	n	%			
<b>Breast conditions</b>							
Agree	33	66	12	24.5	5.12	1	0.024*
Don't agree	17	34	37	75.5			
<b>Viral load</b>							
Agree	1.0	1.9	1.0	2.0	45.08	1	0.000*
Don't agree	50	98.1	48	98			
<b>Mixed feeding</b>							
Agree	46	92	44	89.8	35.28	1	0.000*
Don't agree	4.0	8.0	5.0	10.2			
<b>Re-infection</b>							
Agree	3.0	6.0	1.0	2.0	38.72	1	0.000*
Don't agree	47	94	48	98			

**Note:** \* = Shows significant relationship at  $p < 0.05$

In studies done in South Africa, Malawi and West Africa showed that women with high viral loads in plasma and breast milk were more likely to transmit HIV compared to those with undetectable virus (Semba *et al.*, 1999a; Leroy *et al.*, 2003 and Shapiro *et al.*, 2010). According to Kevin *et al.* (2010) mastitis was associated with high breast milk HIV load and this together with increasing maternal plasma was associated with postnatal transmission.

#### **4.8 Knowledge on Strategies to Reduce MTCT of HIV During Breastfeeding**

Table 10 shows that 14% of HIV positive mothers in urban areas were aware of the fact that avoiding mixed feeding decreases the risk of MTCT of HIV only 6.1% of women in rural had this knowledge. In addition 24% of HIV positive mothers in urban area were aware that the use of ARVs can decrease the risk of MTCT as compared to 16.3% rural counterparts. Those who knew that exclusive breastfeeding can reduce MTCT were 6% in urban areas and 8.2% in rural areas. Those who didn't know ways of reducing MTCT of HIV during breastfeeding were 46% in urban areas and 67.3% in

rural areas. These results shows significant relationship between area of residence and knowledge of strategies to reduce MTCT ( $p = 0.000$ ). The only explanation to these results is the presence of a stronger health education component addressing infant feeding in the context of HIV in urban areas than in rural areas. This means that there is a need of increasing awareness to both urban and rural areas.

**Table 10: Relationship between knowledge on strategies of reducing MTCT and area of residence of mothers**

	Urban		Rural		$\chi^2$	$df$	$p$
	N	%	N	%			
Avoid mixed feeding	7	14	3	6.1	39.280	5	0.000*
Replacement feeding	3	6	1	2			
Exclusive Breastfeeding	3	6	4	8.2			
Use of ARVs	12	24	8	16.3			
Receiving counselling- on infant feeding in the Context of HIV	2	4	0	0			
I don't know	23	46	33	67.3			

**Note:** \* = Shows significant relationship at  $p < 0.05$

Mixed feeding is the practice of giving other liquids and/or foods together with breast milk to infants under 6 months of age. This practice poses risks to an infant's health because it can increase the chance of their getting diarrhea and other infectious diseases (Ilif *et al.*, 2005). Mixed feeding especially giving water or other liquids, can also cause the supply of breast milk to decrease as the baby sucks less at the breast. Babies do not need liquids in the first 6 months as breast milk contains all the water a baby needs, even in hot climates.

Generally, the knowledge about the ways of reducing MTCT of HIV was still low in both rural and urban areas. HIV positive mothers should be helped to receive appropriate counselling that includes the way of reducing MTCT of HIV, avoiding

mixed feeding, the use of ARVs and information about both the risks and benefits of various infant feeding options. Improved education will help them avoid risky practices of mixed feeding due to social pressure. A study conducted in Malawi showed that early complementary feeding was significantly associated with increased risk for respiratory infection; while timely initiation of complementary feeding at six months of child's age was associated with reduced infant morbidity and improved growth (Kalanga *et al.*, 2006).

#### 4.9 Breastfeeding on Demand

Table 11 shows the proportion of HIV positive mothers who breastfeed on demand during day and night. Results reveal that 20.8 and 22.4% of interviewed HIV positive mothers in rural and urban areas respectively were breastfeeding their infants less than 5 times in a day. Those who were breastfeeding on demand were 56.2 and 65.3% in rural and urban areas respectively. There is evidence that there is significant relationship between area of residence and practice of breastfeeding on demand ( $p = 0.000$ ). This could be attributed to cultural factors such as maternal work demands, family pressures and timing of complementary feeding. According to NBS and ICF Macro (2010) 98% of children under age 6 months were breastfed at least six times during the 24 hours, which meets the WHO/UNICEF recommendations for optimal breastfeeding.

**Table 11: Mothers who practice demand breastfeeding**

	Urban		Rural		$\chi^2$	Df	p
	n	%	n	%			
Less than 5 times	11	22.4	10	20.8	37.24	3	0.000*
6 times	2	4.1	6	12.5			
“On demand”	32	65.3	27	56.2			
I don't know	4	8.2	5	10.5			

**Note:** \* = Shows significant relationship at  $p < 0.05$



#### 4.10 Reasons for Early Introduction of Complementary Foods

Table 12 reveals that 69.4 and 82% of interviewed mothers in rural and urban areas respectively said that crying of a baby is a major reason of introducing complementary foods. Also 22.4 and 16% of interviewed HIV positive mothers in rural and urban areas respectively cited rooting (restlessness sign shown by new born babies when they want to be breastfed such as licking of fingers, opening the mouth, and moving the tongues) as the reason for introducing complementary foods to baby. In addition, only 8.2% of mothers from rural areas and 2% of them in urban areas said that sucking fingers is a reason for introducing complementary foods. The results indicate a significant relationship between location of mothers residence and reason of early introduction of complementary foods ( $p = 0.000$ ).

**Table 12: Reasons for early introduction of complementary foods**

	Urban		Rural		$\chi^2$	Df	P
	n	%	n	%			
Crying	41	82	34	69.4	54.76	2	0.000*
Rooting	8	16	11	22.4			
Sucking of fingers	1	2	4	8.2			

**Note:** \* = Shows significant relationship at  $p < 0.05$

The baby's reflexes are important for appropriate breastfeeding. When something touches a baby's lips or cheek, the baby turns to find the stimulus, and opens his or her mouth, putting his or her tongue down and forward, this means a sucking reflex. When a baby is suckling effectively the milk will be easily flowing into the baby's mouth. The study had consistently shown that HIV infected mothers in rural and urban Dar-es-salaam still embrace awkward reasons such as crying of a baby; rooting and sucking fingers as the basis for introducing complementary foods before six months of child age.

Table 13 shows the response of HIV positive mothers about benefits of emptying one breast before changing to another breast when breastfeeding a baby. It shows that, about 10% of HIV positive mothers in urban areas agree that it is important to empty one breast before changing to another breast when breastfeeding a baby while those who agree in rural areas were only 6.1%. Majority of HIV positive mothers in rural and urban areas (87 and 88% respectively) disagree that it is important to empty one breast before changing to another breast when breastfeeding a baby. The results shows a significant relationship between location and knowledge of emptying the breast during breastfeeding ( $p = 0.000$ ).

**Table 13: Mothers with knowledge of emptying the breast during breastfeeding**

	Urban		Rural		$\chi^2$	<i>Df</i>	<i>p</i>
	<i>n</i>	%	<i>n</i>	%			
Yes	5	10	3	6.1	67.72	2	0.000*
No	44	88	43	87			
I don't know	1	2	3	6.1			

**Note:** \* = Shows significant relationship at  $p < 0.05$

#### 4.11 Infant Feeding Options

Table 14 results show the proportion of mothers who know various infant feeding options that are feasible for HIV-infected mothers. About 7.5% of interviewed HIV positive mothers in urban area know that EBF and early cessation before 3 months is feasible infant feeding option to prevent MTCT of HIV. Those who were aware of this fact in rural area were only 22.2%. Exclusive breastfeeding for 6 months was cited as a feasible infant feeding option for HIV infected mothers by 26.6% of rural women as compared to only 10% of urban women. Other feeding options are shown in Table 14. These results indicate a significant relationship between area of residence and knowledge on infant feeding options for HIV infected mothers ( $p = 0.030$ ).

**Table 14: Knowledge on infant feeding among HIV-infected mothers**

	Urban		Rural		$\chi^2$	df	p
	n	%	n	%			
EBF& Early Cessation before 3 months	3	7.5	10	22.2	25.4	3	0.030*
EBF for 6 months	4	10	12	26.6			
Commercial Infant Formula	10	25	6	13.3			
Animal Milk	23	57.3	17	37.9			

**Note:** \* = Shows significant relationship at  $p < 0.05$

#### 4.12 Mothers' CD4 cell Counts at the first ANC Clinic

Table 15 shows that about 32% of interviewed mothers had 1 – 199 CD4 cell counts in urban area as compared to only 28.6% in rural area. Also 20 and 38.8% of HIV positive mothers had 200 – 350 CD4 cell counts in urban and areas rural respectively. Those with 351 – 500 CD4 cell counts were 34% in urban areas and only 16.3% in rural area. In addition 10% had 501 – 650 CD4 cell counts in urban areas as compared to 14.3% in rural area. Also 4% of mothers in urban areas had 651 – 800) DC4 cell counts, as compared to 2% in rural areas. The results were show a significant association between area of residence and CD4 cell counts of respondents at the first day when attending antenatal clinic (before receiving ARVs) ( $p = 0.002$ ).

**Table 15: Association of mothers by CD4 cell counts at the first ANC clinic**

CD4 Cell counts	Urban		Rural		$\chi^2$	df	p
	N	%	N	%			
1 - 199	16	32	14	28.6	17.4	4	0.002*
200 - 350	10	20	19	38.8			
351 - 500	17	34	8	16.3			
501 - 650	5	10	7	14.3			
651 - 800	2	4	1	2			
<b>TOTAL</b>	50	100	49	100			

**Note:** \* = Shows significant association at  $p < 0.05$

In addition, majority of positive mothers in this study shows that were CD4 cell counts below 350, therefore when CD4 cell counts decline below a critical level of 200 cells per  $\text{mm}^3$ , it means cell-mediated immunity is lost, and infections with a variety of

opportunistic microbes appear. In the vertical transmission study in South Africa, infants born to mothers with CD4 cell counts less than 200 cells per mm<sup>3</sup> were almost four times more likely to acquire HIV or die than were those born to mothers with CD4 cell counts greater than 500 cells per mm<sup>3</sup> (Coovadia *et al.*, 2007).

According to a study done by Kuhn *et al.* (2010) women with CD4 counts < 200 cells/mm<sup>3</sup> (the previous WHO cut-off for ART eligibility) and between 200 and 350 cells/mm<sup>3</sup> (the current WHO cut-off) had MTCT rates of 44 and 28%, respectively, whereas MTCT rates among women with CD4 counts between 350 and 500 cells/mm<sup>3</sup> and >500 cells/mm<sup>3</sup> were only 13 and 10% respectively (Kuhn, 2010).

Research evidence shows that infants who exclusively breastfed by mothers with CD4 cell counts less than 200 per µL were twice as likely to become infected and almost four times more likely to die before 6 months of age than exclusively breastfed infants by mothers with CD4 cell counts above 500 per µL (Hoosen *et al.*, 2007). More data are now available on the association between maternal immune status (CD4 cell counts) and MTCT through breastfeeding. Maternal CD4 counts below 500 cells per mm<sup>3</sup> in plasma close to time of delivery was associated with a threefold increase in risk of late postnatal transmission compared to women with DC4 cell counts equal to or greater than 500 per mm<sup>3</sup> (Leroy *et al.*, 2003). In a study done in a rural HIV clinic in Uganda it was found that between 95 and 98 % of their patients with a CD4 cell count above 350 (cells/mm<sup>3</sup>) achieved excellent adherence and viral suppression within 48 months (Petitjeane *et al.*, 2006).

#### 4.13 Knowledge on Appropriate time to Initiate Complementary Feeding

This study collected data on various practices of complementary feeding in the study area the results of which are presented in this part. This part gives a full description of the actual infant feeding practices adopted by HIV positive mother of children aged 0 – 12 months in urban and rural. The knowledge categorized includes those related to breastfeeding and complementary feeding.

Table 16 results show that 16% of mothers in urban areas said that complementary feeding should start at the age of below 4 months as compared to 12% of their rural counterparts. Majority of mothers in rural and urban areas (61.7 and 68% respectively) reported that the correct age for introducing complementary feeds is at 6 months. This implies that majority of HIV positive mothers in urban have better knowledge about appropriate age of introducing complementary foods than rural women. The risk of introducing foods too early includes higher likelihood of inability to meet the child's nutritional needs; giving children foods which are poor in terms of nutrients density; and increasing the risk of diarrhoea and allergic conditions (URT, 2013c).

**Table 16: Mothers knowledge on appropriate age for complementary feeding**

	Urban		Rural		$\chi^2$	df	p
	n	%	N	%			
Below 4 months	8	16	8	12	51.6	3	0.000*
4 – 6 months	7	14	9	19.1			
At 6 months	34	68	29	61.7			
I don't know	1	2	3	7.2			

**Note:** \* = Shows significant association at  $p < 0.05$

According to NBS and ICF Marco (2010) findings complementary feeding in Tanzania starts early. It was shown that 11% of children below 2 months of age, 33% of children aged 2 -3 months and 64% of children aged 4 -5 months are given complementary

foods in addition to the breast milk. On the other hand, children aged 6 – 12 months are vulnerable to malnutrition; this age group constitutes a large proportion of malnourished children worldwide and the deficits acquired at this age are difficult to compensate for later in childhood (PATH International Kenya, 2010).

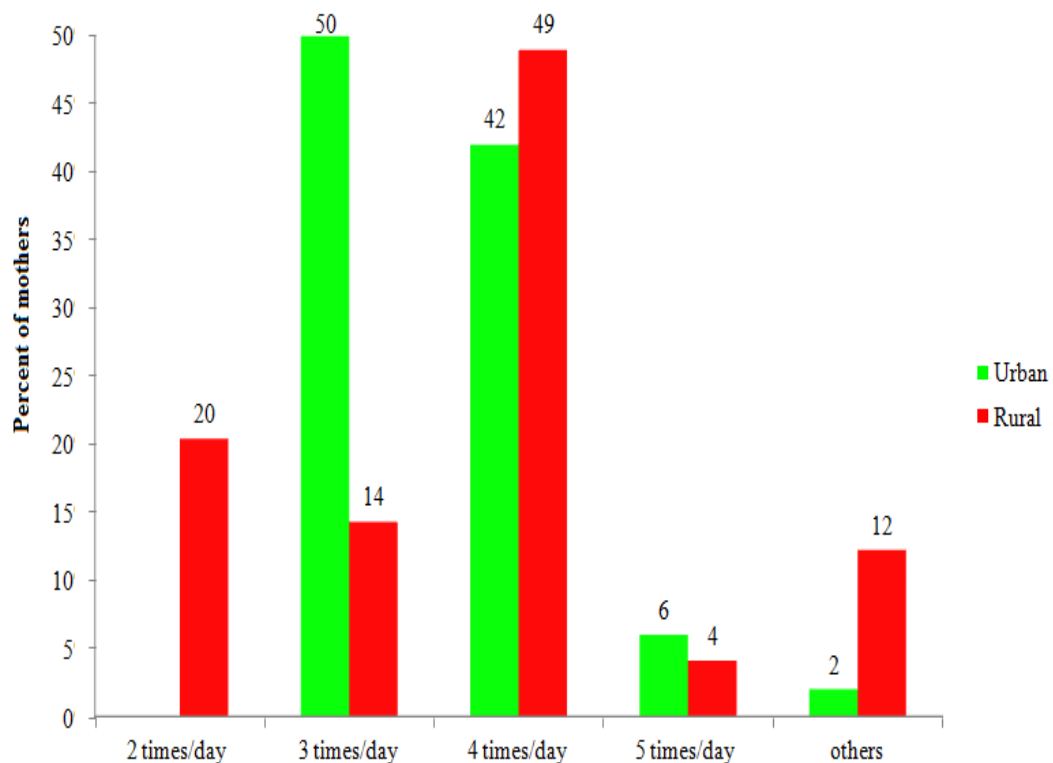
According to WHO (2002) repeated infections reduce appetite and increase the risk of inadequate food intakes. A study conducted in Malawi showed that early complementary feeding was significantly associated with increased risk for respiratory infection; while timely initiation of complementary feeding at six months of child's age was associated with reduced infant morbidity and improved growth (Kalanda *et al.*, 2006). At 6 months it is important for an HIV-positive mother to introduce complementary foods and continue breastfeeding to 12 months of age so that the baby can continue to get the benefits of breast milk. It is important for children aged 6 months or more born to mothers who are HIV infected to be given the right types and amounts of safely prepared foods in addition to breastfeeding. Recent information illustrates that inadequate complementary feeding at age 6 months was associated with impaired growth during the next 12 months, with a 37 percent increased probability of stunting. Information about complementary feeding in general can be shared with women who are HIV positive (PATH International Kenya, 2010).

#### **4.14 Frequency of Feeding**

The need to increase the frequency of feeding among children who are receiving complementary foods as their age increases is paramount. According to experts recommendations on infant feeding a child aged 6 months should be given complementary foods at least 2 times in a day. As the child grows to the age of

between 7 - 8 months the frequency of meals should be increased to at least 3 times in a day whereas by the age of between 9 - 11 months the number of meals should be at least 4 times in a day. By the age of 12 - 24 months the child should be given complementary foods at least 5 times in a day (PATH International Kenya, 2010).

In this study the sufficiency of feeding frequency among HIV positive mothers in urban and rural were measured basing on the above decisive factor. Result indicates that at least 50% of the children in urban areas were fed three times per day as compared to only 14% in rural areas. In total 42% of children in urban areas were fed four times per day as compared to 49 % in rural areas. Those who were fed 5 times per day in rural and urban areas were 4 and 6% respectively. In addition, the proportion of rural children who received complementary foods 2 times per day was 20% (Figure 1).



**Figure 1: Frequency of feeding complementary foods**

#### **4.15 Social Attitude Towards Infant Feeding**

To assess attitudes towards exclusive breastfeeding, complementary feeding and breastfeeding in the context of HIV, respondent mothers were asked to agree, disagree or remain neutral on three sets of attitudinal statements. The first set of statements was about general breastfeeding whereas the second set was about complementary feeding. The last set of questions was about breastfeeding in the context of HIV and AIDS.

##### **4.15.1 Attitude of mothers towards exclusive feeding practices**

This sub-section presents a summary of results of mother's attitude basing on the three set of questions. The results presented in Table 17 show that positive attitude was noted in several statements. These include a statement which asserts that it is important to give a child any drink or medications/herbs before breastfeeding soon after delivery whereby the proportion of respondents who disagreed to this statement was 77.6 and 82% in rural and urban areas respectively. The results show a significant relationship between area of residence and attitudes towards prelacteal feeds ( $p = 0.000$ ).

Another statement which corresponded to positive attitude was about timely initiation of breastfeeding; appropriate age of stopping breastfeeding; and importance of breastfeeding. This is because there was positive attitude in the statement which asserts that a baby should be put on BF as many times as he wants; whereby the proportion of respondents who agreed to this statement was 81.6 and 82%. The results show no significant relationship between area of residence and attitudes towards time of initiating breastfeeding ( $p = 0.420$ ). As regards to a statement which asserts that appropriate age to stop BF is when a baby reach two years and above; whereby Table 17 show that the proportion of respondents who agreed to this statement was 63.3 and



60%. The results show a significant relationship between area of residence and attitudes towards age of stopping breastfeeding ( $p = 0.000$ ).

In addition another statement is the one which asserts that the mother is supposed to initiate BF within one hour after delivery whereby the proportion of respondents who agreed to this statement was 73.5 and 64%. The results show a significant relationship between area of residence and attitudes towards time of initiating breastfeeding after delivery ( $p = 0.000$ ). Furthermore, Table 17 show the positive attitude in response to statement which asserts that breastfeeding is the most important method of feeding a baby whereby the proportion of respondents who agreed to this statement was 75.5 and 90% in rural and urban areas respectively. The results show a significant relationship between area of residence and attitudes towards the unique and superior importance of breastfeeding ( $p = 0.000$ ).

**Table 17: Attitude of mothers towards exclusive breastfeeding**

		Urban		Rural		$\chi^2$	<i>df</i>	<i>p</i>
		n	%	n	%			
BF is the most important Method of feeding a baby	Agree	45	90	37	75.5	32	2	0.000*
	Disagree	0	0	3	6.1			
	Undecided	5	10	9	18.4			
There is no need of giving a Baby colostrums	Agree	15	30	18	36.7	1.72	2	0.420*
	Disagree	21	42	20	40.8			
	Undecided	14	28	11	22.4			
The mother is supposed to initiate BF within one hour after delivery	Agree	15	30	18	36.7	28.08	2	0.000*
	Disagree	5	10	6	77.6			
	Undecided	13	26	7	6			
It is important to give a child Any drink or medications/herbs Before BF soon after delivery	Agree	5	10	5	10.2	53.32	2	0.000*
	Disagree	41	82	38	77.6			
	Undecided	4	8	6	6.1			
A baby should be on EBF for 6 months	Agree	18	36	20	40.8	3.17	2	0.150*
	Disagree	23	46	19	38.8			
	Undecided	9	18	10	20.4			
There is no advantage of EBF for 6 months	Agree	15	30	20	40.8	7	2	0.300*
	Disagree	30	60	20	40.8			
	Undecided	5	10	9	18.4			
Appropriate age to stop BF is when a baby reach 2 years and above	Agree	30	60	31	63.3	16.4	2	0.000*
	Disagree	12	24	12	24.5			
	Undecided	8	16	6	12.2			
A baby should be put on BF as many times as he wants	Agree	41	82	40	81.6	81.6	2	0.000*
	Disagree	6	12	5	10.2			
	Undecided	3	6	4	8.2			
There is no harm to a baby if a mother puts him to another breast before emptying the first one	Agree	21	42	14	28.6	2.44	2	0.295*
	Disagree	17	34	22	44.9			
	Undecided	12	24	13	26.5			
It is not necessary for a mother to bath before BF her baby	Agree	25	50	24	49	8.6	2	0.013*
	Disagree	17	34	19	38.8			
	Undecided	8	16	6	12.2			
It is not recommended to BF baby when a mother is pregnant	Agree	26	52	17	34.7	8.3	2	0.016*
	Disagree	14	28	24	49			
	Undecided	10	20	8	16.3			

**Note:** \* = Shows significant association at  $p < 0.05$

In addition another statement is the one which asserts that the mother is supposed to initiate BF within one hour after delivery whereby the proportion of respondents who agreed to this statement was 73.5 and 64%. The results show a significant relationship between area of residence and attitudes towards time of initiating breastfeeding after delivery ( $p = 0.000$ ). Furthermore, Table 17 show the positive attitude in response to statement which asserts that breastfeeding is the most important method of feeding a baby whereby the proportion of respondents who agreed to this statement was 75.5 and

90% in rural and urban areas respectively. The results show a significant relationship between area of residence and attitudes towards the unique and superior importance of breastfeeding ( $p = 0.000$ ).

#### **4.15.2 Attitude towards breastfeeding in the context of HIV/AIDS**

Table 18 show that 65.3 and 60% of respondents in rural and urban areas respectively agree that all HIV positive mothers can transmit HIV to their babies. The results show a significant relationship between area of residence and attitudes towards the risk of MTCT of HIV ( $p = 0.000$ ). Also 54% of respondents in urban areas and 53.1% of their rural counterparts agree that all HIV positive mothers can transmit HIV to their babies if they choose to breastfeed. This indicates a significant relationship between area of residence and attitudes towards the risk of MTCT of HIV through breastfeeding ( $p = 0.001$ ). Similarly, 63.3 and 60% of respondents in rural and urban areas respectively agree that HIV positive mothers can transmit HIV to their babies during pregnancy.

Also many mothers acknowledged that HIV infected mothers can transmit HIV to their babies during labour and delivery. This is because 72% of the respondents in urban areas agreed to the statement that HIV infected mothers can transmit HIV to their babies during labour and delivery while 75.5% in rural areas also agree to this statement. This indicates a significant relationship between area of residence and attitudes towards the risk of MTCT of HIV during labour and delivery ( $p = 0.000$ ).

Most respondents agreed that breastfeeding poses a risk of MTCT of HIV due to the fact that 83.7% and 66% of respondents in rural and urban areas counterparts agree with this statement. The results show a significant relationship between area of

residence and attitudes towards risk of MTCT of HIV through breastfeeding ( $p = 0.000$ ).

Large proportion of mothers acknowledged that mixed feeding increases the risk of MTCT of HIV. This is because 66% of the respondents in urban areas agree with the statement that EBF is one of the ways of reducing MTCT of HIV while 59.3% in rural areas also agree to this statement. This indicates a significant relationship between area of residence and attitudes towards the risk of MTCT of HIV posed by mixed feeding ( $p = 0.000$ ).

Also many mothers acknowledged that commercial infant formula is one of infant feeding option for HIV infected mothers with 62% of the respondents in urban areas agree with the statement that EBF is one of the ways of reducing MTCT of HIV while 55.1% in rural areas also agreed to this statement. This indicates a significant relationship between area of residence and attitudes towards the use of commercial infant formula as a feeding option for reducing the risk of MTCT of HIV ( $p = 0.000$ ).

Majority of mothers recognized that exclusive breastfeeding is one of the ways of reducing MTCT of HIV. This is because 70% of the respondents in urban areas agree to the statement that EBF is one of the ways of reducing MTCT of HIV while 67.3% in rural areas also agree to this statement. This indicates a significant relationship between area of residence and attitudes towards the power of EBF in reducing the risk of MTCT of HIV through breastfeeding ( $p = 0.000$ ).

According to the results majority of mothers acknowledged that exclusive breastfeeding is one of the infant feeding options for HIV infected mothers. This is because 58% of the respondents in urban areas agree to the statement that exclusive breastfeeding is one of the infant feeding options for HIV infected mothers while 61.2% in rural areas also agree to this statement. This indicates no significant relationship between area of residence and attitudes towards EBF as a feasible infant feeding option for HIV infected women ( $p = 0.295$ ).

Majority of women acknowledged the possibility of continuing breastfeeding when a woman conceived before her infant reaches 2 years. This is confirmed by 74 and 75.5% of respondents in urban and rural areas respectively agree with the statement that if a breastfeeding mother conceive before her baby reaches 2 years she should stop breastfeeding. This indicates a significant relationship between area of residence and attitudes towards continuing breastfeeding during pregnancy ( $p = 0.013$ ).

Positive attitude was noted on the issue of re-establishing breastfeeding after the separation of mother /baby pair. This is confirmed by 75.5 and 74% of respondents in urban and rural areas respectively agree with the statement that if the mother travels for few days she cannot breastfeed again after coming back because her milk will be sour. This indicates a significant relationship between area of residence and attitudes towards re-establishment of breastfeeding after the separation of mother/baby pair ( $p = 0.000$ ).

**Table 18: Attitude towards breastfeeding in the context of HIV/AIDS**

		Urban		Rural		$\chi^2$	df	p
		N	%	n	%			
All HIV +ve mothers can transmit HIV to their babies	Agree	30	60	32	65.3	32	2	0.000*
	Disagree	16	32	9	18.4			
	Undecided	4	8	8	16.3			
All HIV +ve mothers can transmit HIV to their babies if they choose to breastfeed	Agree	27	54	26	53.1	14.68	2	0.001*
	Disagree	18	36	13	26.5			
	Undecided	5	10	10	20.4			
A HIV +ve mothers can transmit HIV to their babies during pregnancy	Agree	30	60	31	63.3	16.12	2	0.000*
	Disagree	11	22	3	6.1			
	Undecided	9	18	14	28.6			
A HIV +ve mothers can transmit HIV to their babies during labor and delivery	Agree	35	72	37	75.5	33.76	2	0.000*
	Disagree	6	12	3	6.1			
	Undecided	8	16	9	18.4			
A HIV +ve mothers can transmit HIV to their babies through BF	Agree	33	66	41	83.7	24.28	2	0.000*
	Disagree	10	20	0	0			
	Undecided	7	14	8	16.3			
Mixed feeding is one of the factors that increase the risk of MTCT of HIV	Agree	33	66	29	59.2	24.04	2	0.000 <sup>s</sup>
	Disagree	8	16	6	12.2			
	Undecided	9	18	14	28.6			
Feeding using commercial Infant Formula for the first 6 months is the best infant feeding option for HIV+ve infected mothers.	Agree	31	62	27	55.1	19.96	2	0.000*
	Disagree	6	12	7	14.3			
	Undecided	13	26	15	30.6			
EBF is one of the ways of reducing MTCT of HIV	Agree	35	70	33	67.3	30.52	2	0.000*
	Disagree	6	12	5	10.2			
	Undecided	9	18	11	22.4			
EBF for the first 6 months is one of infant feeding options for HIV infected mothers.	Agree	29	58	30	61.2	2.44	2	0.295*
	Disagree	9	18	6	12.2			
	Undecided	12	24	13	26.5			
If a breastfeeding mother conceive before her baby reaches 2 years she should stop BF	Agree	37	74	37	75.5	8.6	2	0.013*
	Disagree	10	20	4	8.2			
	Undecided	3	6	8	16.3			
If the mother travels for few days she cannot breastfeed again after coming back because her milk will be sour.	Agree	37	74	37	75.5	38.68	2	0.000*
	Disagree	10	20	4	8.2			
	Undecided	3	6	8	16.3			
A HIV +ve mother needs to take ARV on daily basis.	Agree	45	90	43	89	10.6	2	0.000*
	Disagree	3	6	3	6.1			
	Undecided	3	6	3	6.1			

**Note:** \* = Shows significant association at  $p < 0.05$

In addition majority of mothers acknowledged the importance of adherence to ARV regimen due to fact that 90 and 89% of urban and rural women respectively agree with the statement that A HIV positive mother need to take ARV on daily basis (Table 18).

This indicates a significant relationship between area of residence and attitudes towards adherence to ARV regimen ( $p = 0.000$ ).

Results of Principal Component Analysis show that only six attitudinal statements consistently explained the variation in client's responses. In fact, the six attitudinal questions were extracted into three major categories (herein after referred to as extracted components or attitudinal constructs). The extracted attitudinal constructs are the one which loaded Eigen values not less than 1 (Table 19). With this reduction of attitudinal statement data, the three extracted components were able to explain 72.49% of the total variance in client's responses to those questions. Since the results explain 72.49% of the total variance in responses (far above the recommended 50% cut off value) then the use of principle component analysis technique to explain the social attitude of HIV mothers was useful. This is ascertained by the results of cumulative percent of total variance explained by the model for both extraction and rotation models shown in Table 19 below.

**Table 19: Extracted components explaining social attitudes of HIV infected mothers**

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.1	35.5	35.6	2.1	35.6	35.6	2.0	34.0	34.0
2	1.1	19.6	55.2	1.2	19.6	55.2	1.2	20.6	54.7
3	1.0	17.2	72.5	1.0	17.3	72.4	1.1	17.7	72.4
4	0.6	11.3	83.8						
5	0.5	8.6	92.4						
6	0.4	7.5	100.0						

Extraction Method: Principal Component Analysis.

Further evaluation of the usefulness of using factor analysis by using the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy indicates the suitability of results for explaining social attitudes of HIV positive mothers towards breastfeeding in the context of HIV (Table 20). The rule of the thumb for judging if the sample is adequate is when the KMO statistic is  $> 0.5$  and a significant  $p$ -value for Bartlett's test of sphericity ( $p < 0.1$ ). The results presented in Table 20 show that data was suitable for this analysis because it passed the test of sample adequacy (KMO = 0.5 as well Bartlett's  $p = 0.000$ ). The KMO measure of sample adequacy and Bartlett's statistic indicated that the results of attitudinal analyses were statistically plausible.

**Table 20: Measure of sample adequacy**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.656
Bartlett's Test of Sphericity	$\chi^2$	83.401
	$Df$	15.0
	$P$	0.000*

**Note:** \* = Shows usefulness of data  $p < 0.05$

Further analysis of the extracted component is based on communalities (Table 21). Communalities represent the proportion of the variance in the original variables that is accounted for by the factor solution. According to the rule of the thumb, the factor solution should explain at least half of each original variable's variance, so the communality value for each variable should be 0.50 or higher. In this case the factor solutions for all 6 statements were above 0.5 cut-off values meaning that the results are tenable (Table 21).



**Table 21: Communalities of extracted statements**

<b>Communalities</b>	<b>Initial</b>	<b>Extraction</b>
There is no need of giving a baby colostrum	1.000	0.736
A baby should be put on the breast to breastfeed as many times as he wants	1.000	0.879
It is not recommended to breastfeed a baby when a mother is pregnant	1.000	0.821
All HIV +Ve mothers can transmit HIV to their babies if they choose to breastfeed	1.000	0.565
All HIV +Ve mothers can transmit HIV to their babies during labour and delivery	1.000	0.694
A HIV +Ve mother can transmit HIV to her baby through breastfeeding	1.000	0.654

Extraction Method: Principal Component Analysis.

Further scrutiny of the extracted components was based on evaluation of those variables with communalities larger than 0.50 to see if their pattern of factor loadings exhibit complex structure or not. Complex structure occurs when one variable has high loadings or correlations (0.40 or greater) on more than one component. In this case any variable which have loading of 0.4 or more in more than one component in the solution is exhibiting a complex structure and should be removed from the analysis. Otherwise variables that loads a correlation of 0.4 or above on only one component is described as having simple structure. Results presented in Table 22 below show that all six questions had factor loadings or correlation of 0.4 or above in only one component. Thus there is no complex structure and therefore the results are tenable. With these tenable results it is rational now to conclude that in fact the attitudes of HIV positive mothers towards infant feeding in the context of HIV and AIDS can be explained by only six questions. The attitudes can also be explained in three components.

The first component has three statements which are “All HIV positive mothers can transmit HIV to their babies if they choose to breastfeed” (factor loading of 0.701); “All HIV positive mothers can transmit HIV to their babies during labour and

delivery” (factor loading of 0.818); and “A HIV positive mother can transmit HIV to her baby through breastfeeding” (factor loading of 0.791). This component named as a *transmission* because all of the extracted statements are related to the possibility of vertical transmission of HIV.

The second component had two statements which are “There is no need of giving a baby colostrums” (factor loading of 0.606); and “It is not recommended to breastfeed a baby when a mother is pregnant” (factor loading of 0.708). This component named as a *colostrums and breastfeeding during pregnancy* because the statements are related to these issues. The third component had two statements which are “There is no advantage of exclusive breastfeeding for 6 months” (factor loadings of 0.524); and “A baby should be put on the breast to breastfeed as many times as he wants” (factor loading of 0.755). This component named as an *optimal breastfeeding practice* because all the statements are related to breastfeeding practices (Table 22).

**Table 22: Component matrix for structure of factor loadings for extracted statements**

<b>Component Matrix</b>			
	<b>Component 1</b>	<b>2</b>	<b>3</b>
All HIV +Ve mothers can transmit HIV to their babies if they choose to breastfeed	0.701	-0.237	-0.133
All HIV +Ve mothers can transmit HIV to their babies during labour and delivery	0.818	-0.096	-0.067
A HIV +Ve mother can transmit HIV to her baby through breastfeeding	0.791	-0.162	-0.076
There is no need of giving a baby colostrum	0.376	0.606	-0.012
It is not recommended to breastfeed a baby when a mother is pregnant	0.171	0.708	-0.428
There is no advantage of exclusive breastfeeding for 6 months	0.192	0.325	0.524
A baby should be put on the breast to breastfeed as many times as he wants	0.272	-0.364	0.755
<b>Extraction Method: Principal Component Analysis.</b>			

#### **4.15.3 Reliability of attitudes results on infant feeding in the context of HIV and AIDS**

Reliability analysis for attitudinal statements by using alpha factoring technique yielded an overall Cronbach's Alpha of 0.725 which is far above 0.6 cut-off value for acceptable results. Cronbach's Alpha for individual attitudinal statements was also above 0.6 cut-off value for reliable results hence confirming the plausibility of the results (Table 23).

**Table 23: Reliability analysis of attitudinal results by means of Cronbach's Alpha statistic**

Attitudinal statement	Item-Total Statistics		Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
	Scale Mean if Item Deleted	Scale Variance if Item Deleted		
There is no need of giving a baby colostrum	24.42	36.614	0.274	0.747
There is no advantage of exclusive breastfeeding for 6 months	24.51	37.212	0.227	0.751
Breastfeeding is the most important method of feeding a baby	25.03	36.336	0.339	0.742
The mother is supposed to initiate breastfeeding within one hour after delivery	24.83	35.327	0.388	0.738
It is important to give a child any drink or medications/herbs before breastfeeding soon after delivery	24.34	37.330	0.399	0.743
A baby on exclusive breastfeeding for 6 months will not get enough nutrients for optimal growth and development	24.54	35.415	0.430	0.735
Appropriate age to stop breastfeeding is when a baby reach 2 years and above	24.82	37.599	0.178	0.754
A baby should be put on the breast to breastfeed as many times as he wants	24.87	32.238	0.263	0.772
There is no harm to a baby if a mother puts him to another breast before emptying the first one	24.44	34.474	0.512	0.728
It is not necessary for a mother to bath before breastfeeding her baby	24.70	35.703	0.410	0.737
It is not recommended to breastfeed a baby when a mother is pregnant	24.60	36.692	0.275	0.747
All HIV +Ve mothers can transmit HIV to their babies	24.85	35.722	0.417	0.737
All HIV +Ve mothers can transmit HIV to their babies if they choose to breastfeed	24.73	36.037	0.356	0.741
All HIV +Ve mothers can transmit HIV to their babies during pregnancy	24.64	32.234	0.412	0.737
All HIV +Ve mothers can transmit HIV to their babies during labour and delivery	24.91	34.328	0.533	0.726
A HIV +Ve mother can transmit HIV to her baby through breastfeeding	24.94	34.731	0.510	0.729

Generally, adoption of appropriate infant feeding practices by mothers and child care takers is among the essentials for good nutrition and health outcomes of young children. As such, suitable infant feeding practices increase the chances of having a child with good nutritional and health status. This will benefit not only the parents but also the entire community and nation at large. The benefits stems from the joy of having a healthy child; reduced costs of health care due to good nutrition which reduces morbidity; good educational outcomes among children; increased productivity and low mortality rates among children (PATH, 2010; URT, 2013).

The results of this survey have consistently shown that the social attitudes of HIV infected mothers in Dar-es-Salaam region can be explained by three components namely *transmission; colostrums and breastfeeding during pregnancy*; and optimal *breastfeeding practice*. With the first component there appeared to be a strong negative attitude towards possibility of averting MTCT of HIV. This is because many HIV infected mothers agree that all HIV positive mothers can transmit HIV to their babies if they choose to breastfeed; all HIV positive mothers can transmit HIV to their babies during labour and delivery; and a HIV positive mother can transmit HIV to her baby through breastfeeding. This signifies that although HIV infected mothers are using PMTCT services they are sceptical and disbelieve about its effectiveness in averting MTCT of HIV. It also suggests worry they have that their infants will be infected (Refer Table 18).

The second component registered weak positive attitudes. This is because although those who disagree to the assertion that there is no need of giving baby colostrums were more than those who agreed, the proportion of those who disagree was less than

fifty percent of the total sample. In addition, this was confirmed by the high prevalence of infants who were given colostrums in both urban and rural areas. Similarly those who agree that it is not recommended to breastfeed a baby when a mother is pregnant were many as compared to those who disagree, however they were less than half of the total sample (Table 18).

The third component resulted into weak positive attitude on the statement that there is no advantage of exclusive breastfeeding for 6 months. This is because although the proportion of HIV infected mothers who disagreed to the statement that there is no advantage of exclusive breastfeeding for 6 months was slightly higher than that of those who agreed, the prevalence of disagree was less than 50%. In addition, the assertion that a baby should be put on the breast to breastfeed as many times as he wants in this construct had registered a strong positive attitude (Table 18). This is because more than three quarter of the interviewed HIV positive mothers agreed to the assertion thereof.

#### **4.15.4 Attitude towards complementary feeding**

Furthermore, Table 24 show that 65.3 and 80% of respondents respectively in rural and urban areas counterparts agreed to the statement which asserts that a child aged 6 months should be given complementary foods at least 2 times in a day. This signifies a positive attitude towards appropriate feeding frequency for children who are initiated to take complementary foods at six months of age. Table 24 also shows that 63.3 and 82% in rural and urban areas respectively, there was also a positive attitude towards assertion that a child aged 7 - 8 months should be given complementary foods at least 3 times in a day.

The respondent's attitude towards appropriate feeding frequency for children aged 12 – 24 months in rural areas was unclear, but was positive in urban areas with 60% of respondents agreeing to the statement there. An assertion that it is not allowed to give a baby any food or drink even water in the first 6 months of life unless prescribed by a qualified health worker registered a positive attitude with the proportion of respondents who agreed to this statement being 77 and 82% respectively in rural and urban areas. An assertion that it is important to add fat/oil/milk in baby's foods was met with positive attitudes whereby 59.2 and 54% of respondents respectively in rural and urban areas agreed to this assertion (Table 24).

**Table 24: Attitude towards optimal complementary feeding**

		Urban		Rural		$\chi^2$	df	p
		n	%	n	%			
When a child reaches six months it is considered to appropriate age for complementation	Agree	48	96	46	93.9	88.3	2	0.000*
	Disagree	1	2	1	2			
	Undecided	1	2	1	2			
Variety of foods which are locally available should be used for making complementary foods.	Agree	45	90	45	91.8	72.52	2	0.000*
	Disagree	4	8	3	6.1			
	Undecided	1	2	1	2			
A child aged 6 months should be given complementary foods at least 2 times in a day.	Agree	40	80	32	65.3	49.1	2	0.000*
	Disagree	6	12	12	24.5			
	Undecided	4	8	5	10.2			
A child aged 7 - 8 months should be given complementary foods at least 3 times in a day.	Agree	41	82	31	63.3	53.56	2	0.000*
	Disagree	6	12	9	18.4			
	Undecided	3	6	9	18.4			
A child aged 9 – 11 months should be given complementary foods at least 4 times in a day	Agree	30	60	24	49	16.48	2	0.000*
	Disagree	12	24	15	30.6			
	Undecided	8	16	10	20.4			
A child aged 12 - 24 months should be given complementary foods at least 5 times in a day	Agree	18	36	16	32.7	24.04	2	0.000*
	Disagree	20	40	21	42.9			
	Undecided	12	24	12	24.4			
It is important to add fat/oil/milk in baby's foods.	Agree	27	54	29	59.2	2.44	2	0.295*
	Disagree	12	24	10	20.4			
	Undecided	11	22	10	10.1			
It is not allowed to give a baby any Food or drink even water in the first 6 months of life unless prescribe by a qualified health worker	Agree	41	82	38	77.6	44.61	2	0.045*
	Disagree	6	12	9	18.4			
	Undecided	3	6	2	4.1			

**Note:** \* = Shows significant relationship at  $p < 0.05$

## 4.16 Practice on General Infant Feeding

### 4.16.1 Infant feeding practices of women

The results presented in Table 25 show that most (60%) of the interviewed HIV positive mothers in urban areas initiated breastfeeding within one hour of birth. The proportion of mothers in rural areas who initiated breastfeeding within one hour of birth was 42.9%. In addition, those who initiated breastfeeding within 2 – 6 hours of birth were 16.3% and 10% respectively in rural and urban areas. These results indicate a significant relationship between area of residence and time of initiating breastfeeding ( $p = 0.000$ ).

Table 25 shows that generally HIV positive mothers in urban was likely to initiate breastfeeding earlier as compared to rural counterparts. The proportion of women who initiate breastfeeding within one hour in urban areas was higher than that of national data which show that only 59% of mothers initiate breastfeeding as recommended (NBS and ICF Macro, 2010).

**Table 25: The time initiated breastfeeding after delivery complementary**

	Urban		Rural		$\chi^2$	<i>Df</i>	<i>p</i>
	N	%	N	%			
Within 1 hour	30	60	21	42.9	34	3	0.000*
2 – 6 hours	5	10	8	16.3			
After 6 hours	5	10	8	16.3			
Others	10	24.5	12	24.5			

**Note:** \* = Shows significant relationship at  $p < 0.05$

### 4.16.2 Skin to skin contact, colostrum and prelacteal feeds

The results of this study reveal that only 4% of HIV positive mothers interviewed in urban areas managed to hold their infants skin to skin as compared to 10.2% of their rural counterparts. This signifies that majority of mothers 89.8 and 96% in rural and



urban areas respectively, held their new born babies while wrapped in cloth. The results show that the practice of holding new born babies skin to skin contact was rarely done in both rural and urban. This implies that most the health care workers either do not support mothers to hold their babies skin to skin. Skin to skin contact of mother-baby pair apart from helping to establish breastfeeding earlier, it also helps a mother to develop a close and loving relationship with her baby (URT, 2013c). These results also indicate a significant relationship between area of residence and practice of skin to skin contact after delivery ( $p = 0.000$ ).

#### **4.16.3 Relationship between mother's area of residence and the use of colostrum**

The result of this study also shows that 92% of respondents in urban areas gave their babies the first milk (colostrum). Also most of mothers in rural areas (73.5%) gave their babies colostrum. These results entail that there are few respondents (8% in urban areas and 26.5% in rural areas) who did not give their infants colostrum. The results indicate a significant relationship between area of residence and colostrums use ( $p = 0.000$ ). Based on this study, the knowledge levels on infant feeding in rural and urban areas of Dar-es-Salaam were slightly match with the practice because early initiation of breastfeeding and giving colostrum to the newborn were found to be practiced as recommended.

### **4.17 Complementary Feeding Practices**

#### **4.17.1 Food used for complementary feeding**

Table 26 below shows data on types of complementary foods consumed by children born to HIV positive mothers. The proportion of urban and rural children who consume cereal grains, roots and tubers were 98 and 84% respectively. In addition,

data reveals that all children born to HIV positive mothers in urban areas (100%) and the majority in rural areas (99%) did not use fruits to prepare complementary foods. Results also illustrate that 98 and 100% of mothers (49.5%) in urban and rural areas respectively did not use legumes to prepare complementary foods. Adding to that, 98 and 99% of mothers in urban and rural areas respectively did not use fats and oils to prepare complementary foods. This is due to the fact that, they either have poor or lack of knowledge. However, it is known that adding fats/oils in complementary foods helps to improve the energy density of foods as well as the absorption of some vitamins such as Vitamin A. All these results showed a significant relationship between where the mother live and the use of different food groups in preparing complementary foods ( $p = 0.000$ ).

**Table 26: Type of complementary foods given to children**

		Urban		Rural		$\chi^2$	<i>df</i>	<i>p</i>
		<i>n</i>	%	<i>n</i>	%			
Did you use cereals, roots and tubers to prepare complementary food for your baby?	Yes	49	98	41	84	46	1	0.000*
	No	1	2	8	6			
Did you use fruits and Vegetables to prepare complementary food for your baby?	Yes	0	0	1	1	46	1	0.000*
	No	50	100	48	99			
Did you use legumes, Meat and meat products to prepare complementary food for your baby?	Yes	1	2	0	0	46	1	0.000*
	No	49	98	49	100			
Did you use fats and oils to prepare complementary food for your baby?	Yes	1	1	2	1	45	1	0.000*
	No	49	98	47	99			

**Note:** \* = Shows significant relationship at  $p < 0.05$

#### 4.17.2 Frequency of feeding complementary foods

Table 27 shows that 16.3 and 50% of HIV positive mothers in rural and urban areas respectively fed their children at least 3 times in a day. In rural areas, only 23.3% of

the interviewed HIV positive mothers fed their children 2 times per day. In addition to that, 55.8% and 44% of respondents in rural and urban counterparts fed their children at least 4 times per day (Table 27). This implies that the feeding frequency for complementary foods is high in rural areas than in urban areas. These results showed a significant relationship between location and daily frequency of feeding a child ( $p = 0.000$ ).

**Table 27: Frequency of feeding for children who born with HIV positive mothers**

Frequency (Times a day)	Urban		Rural		$\chi^2$	df	P
	N	%	n	%			
2	0	0	10	23.3	36.08	3	0.000*
3	25	50	7	16.3			
4	21	44	24	55.8			
5	3	6	2	4.6			

**Note:** \* = Shows significant relationship at  $p < 0.05$

#### 4.18 Barriers for Adoption of WHO Recommendations on Infant Feeding

Mothers who practice exclusive breastfeeding, particularly those with HIV/AIDS meet various barriers. The reported barriers by mothers include; fear of infecting the baby, lack of disclosure of mother's HIV status, breast problem, and lack of information or poor knowledge on infant feeding. These were found to hinder the practice even in circumstances where the mother opts to practice exclusive breastfeeding. The national policy requires all pregnant women to undergo voluntary counseling and testing for HIV. This is done through the national programme on PMTCT in Tanzania which offers various services including testing and counseling to every pregnant woman. ARV provision and counseling on appropriate infant feeding practices based on mother's choice in order to protect the baby from acquiring HIV (URT, 2007).

Table 28 shows that 72 and 81.6 % of HIV infected mothers in urban and rural areas respectively reported to use ARV drugs regularly as per the protocol. Also 65.3 and 80% of HIV positive mothers in rural and urban areas respectively reported that they did not face any challenge that hindered them from accessing ARVs. These results showed a significant relationship between location and use of ARV according to national protocol ( $p = 0.002$ ).

Most of the children born to HIV infected mothers had been tested for HIV. This fact is ascertained by 77.6 and 84% of HIV infected mothers respectively in urban and their rural counterparts who agreed that their babies were tested for HIV (Table 28). Only 16.3 and 28% of HIV infected mothers in rural and rural areas respectively agreed that they received HIV test results of their babies. These results showed a significant relationship between location and access of early infant diagnosis services for HIV ( $p = 0.000$ ). This indicates that despite high coverage of HIV testing services for HIV exposed children, the test results are shared by few mothers of these children. The observation that only 28 and 16.3% of infants in urban and rural areas respectively received their HIV test results indicates low access of HIV test results of infants. These results showed a significant relationship between location and access of HIV test results of infants ( $p = 0.000$ ).

Interviews with health care workers to elucidate why this has been the case revealed that the HIV testing machine which was used for HIV diagnosis of infants was in Muhimbili National Hospital and either was out of order during that time or was being repaired. The only HIV testing machine which was working was in Temeke Hospital.

Due to faulty HIV testing machine there was accumulation of untested samples of infants in most of health facilities in Dar-es-salaam during the survey period.

According to Global AIDS Alliance (2009), 5% of infants within 12 months received infant diagnosis in the health facilities and only 12 822 infants are estimated to be on treatment. However, it seems that most infants in both urban and rural had started taking ARV for PMTCT. Some studies reported that among 65 reporting countries, it was found that only an estimated 28% of children born to HIV-positive mothers received an HIV test results within the first two months of life. According to PMTCT guidelines, number of infants born to HIV positive mothers receiving a virological test for HIV within 12 months of birth in 2009 were only 11 289 (URT, 2010a). Low coverage of infant diagnosis of HIV jeopardises the goal of reducing MTCT of HIV to less than 5% by 2020 (URT, 2013c).

On the other hand, 92 and 87.8% of the children born to HIV infected women in urban and rural areas respectively received ARV drugs as per the PMTCT policy. These results showed a significant relationship between location and access of ARV drugs among infants born to HIV infected women ( $p = 0.000$ ). The Ministry of Health and Social Welfare recommend that children born to HIV infected women should use ARV prophylaxis within six weeks after delivery (URT, 2013c). Children aged 0 – 12 months with confirmed HIV infection should be given ARV therapy irrespective of clinical or immunological stage. PMTCT guidelines insist that, neither women nor their infants should be provided with ARVs unless the women have been tested for HIV and found to be positive (URT, 2013b).

Being open about one's HIV status is one of the most powerful ways to reduce HIV-related stigma. Disclosing one's status also has other benefits: it encourages partners to be tested for HIV and prevent the spread of HIV by allowing those infected to openly take appropriate prevention steps. Disclosure also allows individuals to receive support from partners, family and friends. Table 28 shows that majority (70%) of HIV positive mothers in urban areas and 51% of their rural counterparts disclosed their +ve HIV status to someone. These results showed a significant relationship between location and ability of HIV infected to share their +ve test results ( $p = 0.005$ ). Generally, majority (52%) of HIV positive mothers in urban areas disclosed their HIV status to their spouses as compared to 32.7% of their rural counterparts. Majority of HIV infected mothers in rural areas (53.1%) disclosed their HIV status to other confidants such as friends, sisters, brothers and other relatives (Table 28). These results showed a significant relationship between location and confidants to whom HIV infected decide to share their +ve test results ( $p = 0.000$ ).

**Table 28: Proportion of HIV mothers knowledgeable on HIV status**

				Urban		Rural		$\chi^2$	df	p
				N	%	N	%			
Are you receiving ARV drugs continuously?	Yes			36	72	40	81.6	9.6	1	0.002*
	No			14	28	9	18.4			
Are there any difficulties that hinder you to receive ARVs	Yes			10	20	17	34.7	18	1	0.000*
	No			40	80	32	65.3			
Was your child tested for HIV status?	Yes			42	84	38	77.6	23	1	0.000*
	No			8	16	11	22.4			
Did you receive test results for your baby after screening?	Yes			14	28	8	16.3	9.6	1	0.002*
	No			36	72	41	83.7			
Is your child has taken ART for PMTCT?	Yes			46	92	43	87.8	35.1	1	0.000*
	No			4	8	6	12.2			
Did you disclosed +ve HIV status to anyone?	Yes			35	70	25	51	8	1	0.005*
	No			15	30	24	49			
To whom did you disclosed your HIV status	Spouse			26	52	16	32.7	17.5	1	0.000*
	Mother			3	6	7	14.3			
	Other			21	42	26	53			

**Note:** \* = Shows significant relationship at  $p < 0.05$

The results show that few HIV positive mothers' reported to disclose their HIV status to their mothers. On the other side, this implies that while HIV positive mothers' in urban areas are more likely to disclose their HIV status to their husband/spouse, women in rural area are more likely to disclose their HIV status to other relatives rather than their husbands or spouses.

It was observed that after the disclosure of one's HIV status to husband/spouse thus can come with either positive or negative reaction. Experience shows that some women who disclose their HIV status to their spouses end up experiencing negative consequences including abandonment, divorce and separation. The fear of facing similar fate refrain other HIV infected mothers from sharing their test results with their husbands or spouses. Not disclosing ones HIV status to a husband/spouse can lead to detrimental feeding practices as narrated by one of the respondent mother.

*“When I told my husband that I am HIV positive he left me. I remarried and cannot bring myself to tell my new husband of my HIV status, he might leave me the way my first husband did. Because of this I could not decline him giving my four months baby food when he was eating, I didn't stop breastfeeding and do not know what will become of this baby” ( 22 years old mother).*

However, when HIV positive mothers practice breastfeeding are aware of the dangers of continuing breastfeeding even when their children are more than 12 months old. In cases where a child is not HIV-infected and breastfeeding is being continued up to 2 years or longer the likelihood of MTCT of HIV increases. However, some HIV infected mothers continue to breastfeed their infants up to 24 months because they are

unable to disclose their status. This was evidenced by one respondent who had this to say:

*“It is not that I do not want to stop breastfeed my child who is now over 12 months of age, but sometimes the setting is not encouraging to do so. I know that continued breastfeeding increases the chance of infecting my child, but also to tell my husband, sister – in – law, mother – in – law and the relatives that I have this disease is also risky. They can chase me away what can I do? It is even more difficult when you’re a housewife and not highly educated and unemployed like me. I totally depend on my spouse for survival. For my child and myself to survive I have to decided not tell them of my HIV status and to continue to breastfeed my child”. (19 years old mother).*

In a study done by Muchedzi *et al.* (2009) it was shown that fear is often associated with nondisclosure of HIV status. Also according to Mak *et al.* (2007) stigma also adversely affects mental health and depression and it interferes with consistent drug use. In a South African study it was found out that fear of stigma has led people to grind drugs into powder, which can result in inconsistent doses, and to avoid taking medicine in front of others (Mills, 2006). Another mother from one of the health facility in urban narrated that:

*“I used to hide my medicine (drugs) in the container of full maize flour in the kitchen, at the same time my husband also hide his medicine in his office. He could only take few drugs and hide them in his wallet to use at The truth is that no one between me and my husband disclosed our status,*



*but myself I discovered that he my husband was using ARV like me when I took his wallet to look for money when he went to bathe in the shower”.*  
***(22 years old mother).***

Furthermore, a HIV positive mother visits more than one health facilities for PMTCT services. For example during pregnancy, one respondent was using Kisarawe Hospital (in Kisarawe district) to attend ANC, but during delivery, she gave birth in Amana Hospital (Ilala district). The same respondent was using Temeke Hospital (Temeke district) as the facility for accessing PMTCT services after delivery. The same respondent brings her HIV exposed child to Buguruni Health Centre for CTC clinic. All this according to her was because of the need to hide her HIV status so that none of her relatives can know. This implies that HIV positive mothers are afraid of the stigma from their spouses, family members, friends, relatives and the community surrounding them. Major fear is extreme feelings of isolation and loneliness, as well as the perceived and very real threat of violence: all these may cause women to keep their HIV status a secret. The fear of knowing and eventually disclosing their HIV status deters women from seeking PMTCT services and this results in poor adherence to PMTCT interventions, in particular safer infant-feeding decisions, decisions on taking and adhering to ARV medication, family planning, and preference not to deliver at health care facilities. Currently, through observations during the study process, the practice in counseling together the two couples and testing them together is still a problem because of stigma, discrimination and being isolated by their partners.

## 4.19 Management of Breastfeeding for a Woman who is HIV-Positive

### 4.19.1 Breast conditions

Results presented in Table 29 show that very few respondents in urban areas suffered from breast abscess and mastitis (2 and 4% respectively). In addition, only 6.1% of respondent in rural areas suffered from mastitis and none of them suffered from breast abscess. These results shows a significant association between location and experience of breast conditions among HIV infected mothers ( $p = 0.000$ ).

**Table 29: Association of mothers knowledgeable on Breastfeeding Problems**

	Urban		Rural		$\chi^2$	<i>Df</i>	<i>p</i>
	<i>n</i>	%	<i>n</i>	%			
Abscess	1	2	0	0	82.4	3	0.000*
Mastitis	2	4	3	6.1			
Other	0	0	1	2			
Not Applicable	47	94	45	91.8			

**Note:** \* = Shows significant association at  $p < 0.05$

### 4.19.2 Expressing breast milk

Expressing breast milk is useful and important practice to enable a mother to initiate or to continue breastfeeding if an infant has a low birth weight or is too sick to suckle. It is also done to manage breast condition if the mother has engorged breasts or if the mother has to leave the baby for a while. Breast milk can be stored for about 6 – 8 hours at room temperature, 24 hours in a refrigerator and 72 hours in deep freezer (URT, 2013c). HIV positive mothers who choose to express and heat treat their milk, need guidance on expression, heat treatment, cup feeding and quantities of expressed breast milk (WHO, 2009).

Table 30 shows that 2% of HIV infected mothers in both urban and rural expressed their breast milk during episodes of abnormal breast conditions. The results also show that 4% of HIV infected mothers in urban areas and 4.1% in rural areas visited health facility when they were suffering from breast conditions such as full breasts, engorged breasts and breast abscess. These results shows a significant association between location and management of breast conditions among HIV infected mothers ( $p = 0.000$ ).

Table 30 also shows that at least 32.7 and 40% of HIV mothers in urban and rural areas respectively said that lack of correct information is the major reason for low rate of exclusive breastfeeding for 6 months. Few mothers (2 and 4%) in rural and urban areas respectively said that inability to produce sufficient breast milk is the major reason for low rate of exclusive breastfeeding for 6 months. However, the majority (54 and 65.3%) of mothers in both and urban and rural areas respectively cited many other reasons such as crying, women workload, maintaining breast shape and inadequate of food intake. These results shows a significant association between location and reasons for low duration of exclusive breastfeeding among HIV infected mothers ( $p = 0.000$ ).

**Table 30: Management of breastfeeding problems**

	Urban		Rural		$\chi^2$	df	P
	n	%	n	%			
<b>Ways of managing breastfeeding problems</b>							
Express b/milk	1	2	1	2	119.7	3	0.000*
Went hospital	2	4	2	4.1			
Others	1	2	1	2			
Not Applicable	46	92	45	91			
<b>Reasons for poor exclusive breastfeeding for less than 6 months</b>							
Lack of information	20	40	16	32.7	9.4	3	0.000*
Work demand	1	2	0	0			
Insufficient B/milk	2	4	1	2			
Others	27	54	32	65.3			

**Note:** \* = Shows significant relationship at  $p < 0.05$

Table 31 illustrates that the majority of HIV positive mothers in urban areas (78%) chose breastfeeding option for feeding their babies after counseling. In addition 75.5% of HIV positive mothers in rural areas also chose breastfeeding option for feeding their babies after counseling. However, 14 and 14.3% of respondents in urban and rural areas respectively chose to feed their infants some animal milk such as cow milk. These results shows a significant relationship between location and method of feeding an infant born to HIV infected mothers ( $p = 0.030$ ). Based on the study, if HIV positive mothers chose breastfeeding option for feeding their babies after counseling, they will be adviced to exclusively breastfeed for 6 months, that is to feed only breast milk and nothing else. Breast milk provides all of the fluids and nutrients that a young baby requires, therefore exclusively breastfed means that even water should be avoided and studies have shown this to be successful (Kuhn et al., 2007)

**Table 31: Infant feeding options for HIV infected mothers**

	Urban		Rural		$\chi^2$	Df	p
	N	%	n	%			
Breastfeeding	39	78	37	75.5	10.6	2	0.030*
Replacement Feed (Commercial Inf. Formula)	4	8	5	10.2			
Replacement feeding (Animal Milk e.g. Cow)	7	14	7	14.3			

**Note:** \* = Shows significant relationship at  $p < 0.05$

## 4.20 Health Care Workers

### 4.20.1 Number of interviewed health care workers

In this study a total of 17 health care workers were interviewed, all were females. The title and level of education of interviewed health care workers are shown in Table 32. The description of socio-demographic characteristics of the health care workers (HCWs) is vital because their level of education that may influence their knowledge and attitudes towards infant feeding practices and impacting on their decisions and

choices of actual practices to implement. Table 32 shows that 35.3% of health care workers who were interviewed in both urban and rural areas were registered nurses; 17.6 and 11.8% were MCHA and clinical officers respectively.

**Table 32: Title and level of education of health care workers**

<b>Title</b>	<b>Frequency</b>	<b>Percent</b>
Assistant Medical Officer	1	5.9
Clinical Officer	2	11.8
Registered Nurse	6	35.3
Assistant Registered Nurse	1	5.9
Enrolled Nurse	1	5.9
MCHA	3	17.6
Nurse Midwife	1	5.9
Nurse Officer	1	5.9
RCH	1	5.9
<b>Total</b>	<b>17</b>	<b>100</b>

#### **4.20.2 Knowledge about recommended infant feeding practices**

Table 33 shows HCWs knowledge of recommended infant feeding practices. The interviewed HCWs were asked to mention the right time for mother to initiate BF after delivery. The majority (64.7%) of HCWs correctly mentioned that the right time for initiating breastfeeding is within one hour of birth. Few of them (47.1%) knew that early initiation of breastfeeding prevent postpartum haemorrhage and help to enable milk production to start earlier. Those who knew that early initiation breastfeeding can ensure that a baby gets colostrum were only 23.5%. In addition, few of them (23.5%) were aware that a child should be breastfed on demand. This implies that there is a large number of HCWs who lack adequate knowledge on breastfeeding and infant feeding.

**Table 33: Health care workers knowledge on infant feeding issues**

<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
<b>The right time for mother to initiate BF after delivery</b>		
Within one hour	11	64.7
I don't know	6	35.3
<b>Early initiation of breastfeeding prevent postpartum haemorrhage</b>		
Yes	8	47.1
I don't know	9	52.9
<b>Early initiation of breastfeeding provides colostrum to the baby</b>		
Yes	4	23.5
I don't know	13	76.5
<b>BF on demand is one of the optimal BF practices</b>		
Yes	4	23.5
Not mentioned	1	5.9
I don't know	12	70.6
<b>Giving colostrum is one of the optimal breastfeeding practices</b>		
Yes	1	5.9
I don't know	16	94.1
<b>EBF for 6 months is one of the optimal BF practices</b>		
Yes	4	23.5
Not mentioned	1	5.9
I don't know	12	70.6

#### **4.20.3 Knowledge about infant feeding in the context of HIV and AIDS**

In health facilities where PMTCT and CTC sites works, health care workers are supposed to support, promote and protect optimal infant and young child feeding practices including breastfeeding and requires to have sufficient knowledge and skills necessary to protect, promote and support breastfeeding and appropriate complementary feeding.

Table 34 shows the knowledge of health care workers on significant matters relevant to infant feeding in the context of HIV and AIDS. The issues include knowledge about benefits of breastfeeding a HIV exposed baby; various modes of MTCT of HIV; infant feeding options for HIV positive mothers; the risk factors of MTCT of HIV during breastfeeding. Results presented in Table 34 also shows that 94.1% of HCW know that there is risk of MTCT of HIV; 70.6% of them know that MTCT of HIV can occur during pregnant; and 82.4% of them know that MTCT of HIV can occur during

labour and delivery. In addition 82.4% of them know that MTCT of HIV can occur during breastfeeding. Further results in Table 34 reveals that among the interviewed health care workers 94.1% were aware that breastfeeding is one of infant feeding options available for HIV infected mothers. Other 64.7% know that replacement feeding by using commercial infant formula is one of suitable infant feeding options for HIV infected mothers.

Among the Health Care Workers 88.2% did not know that home modified animal milk can be used as an infant feeding option for HIV infected mothers. Also 70.6% of them did not know that breast conditions can increase the risk of MTCT of HIV; 64.7% did not know that high viral load can increase the risk of HIV infection to a baby; and 94.1% did not know that poor attachment of a baby to the breast during breastfeeding can increase the risk of MTCT of HIV. Those who knew that mixed feeding and re-infection with HIV can increase the risk of MTCT were 58.8 and 23.5% respectively (Table 34).

The new national PMTCT guidelines do not recommend home modified infant formula such as cow's milk to be used as an option for HIV infected mothers (URT, 2007). The high proportion of HCWs who mentioned that home modified infant formula such as cow's milk can be used as an option for HIV infected mothers indicates lack of awareness of the national guidelines by most of them. These facts signifies the need for capacity building of health care workers in the study area so that they can offer and support mothers to adopt recommended practices that are necessary to prevent MTCT of HIV and increase the likelihood of HIV-free survival of HIV exposed children.

**Table 34: Health care workers knowledge about infant feeding in the context of HIV**

<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
<b>Modes of MTCT of HIV</b>		
Is there a possibility of MTCT of HIV		
Yes	16	94.1
No	1	5.9
<b>If yes MTCT of HIV can occur during pregnancy</b>		
Yes	12	70.6
I don't know	5	29.4
<b>If yes MTCT of HIV can occur during labour and delivery</b>		
Yes	14	82.4
I don't know	3	17.6
<b>If yes MTCT of HIV can occur during breastfeeding</b>		
Yes	14	82.4
I don't know		
<b>Infant feeding options for HIV positive mothers</b>		
Breastfeeding is one of the way infant feeding options for HIV positive mothers		
Yes	16	94.1
I don't know	1	5.9
Replacement feeding (using commercial infant formula) is one of the way infant feeding options for HIV positive mothers		
Yes	11	64.7
I don't know	6	35.3
Replacement feeding (using animal milk e.g. cow milk) is one the way infant feeding options for HIV positive mothers		
Yes	1	5.9
No	1	5.9
I don't know	15	88.2
<b>Risk factors of MTCT of HIV during breastfeeding</b>		
Breast conditions is one of the factors that increase the risk of MTC of HIV during breastfeeding		
Yes	5	29.4
I don't know	12	70.6
Viral load is one of the factors that increase the risk of MTCT of HIV during breastfeeding		
Yes	5	29.4
No	1	5.9
I don't know	11	64.7
Poor positioning and attachment is one of the factors that increase the risk of MTCT of HIV during breastfeeding.		
No	1	5.9
I don't know	16	94.1
Mixed feeding is one of the factors that that increase the risk of MTCT of HIV during breastfeeding.		
Yes	10	58.8
I don't know	7	41.2
Re- infection with HIV is one of the factors that that increase the risk of MTCT of HIV during breastfeeding.		
Yes	4	23.5
I don't know	13	76.5



It seems that most HCWs have inadequate knowledge about the ways of reducing MTCT of HIV (Table 35). Only 17.6% of HCWs mentioned the fact that avoiding mixed feeding decreases the risk of MTCT of HIV while the majority of them (70.2%) did not mention this. Further results show that 64.7% of HCWs were aware of the fact that the use of ARVs can decrease the risk of MTCT of HIV while other (52.9%) provides counselling on infant feeding. This implies that HCWs are more aware about the medical care of HIV infected women but have little knowledge on management of infant feeding in the context of HIV and AIDS.

**Table 35: Health care workers knowledge about ways of reducing MTCT of HIV**

<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
<b>Ways of reducing MTC of HIV</b>		
<b>Avoiding mixing feeding</b>		
Yes	3	17.6
No	2	11.8
I don't know	12	70.2
<b>Replacement feeding</b>		
Yes	2	11.8
I don't know	15	88.2
<b>Exclusive breastfeeding</b>		
Yes	3	17.6
No	1	5.9
I don't know	13	76.5
<b>Use of ARVs</b>		
Yes	11	64.7
No	1	5.9
I don't know	5	29.4
<b>Receiving counselling on infant feeding</b>		
Yes	9	52.9
I don't know	8	47.1
<b>Others mentioned</b>		
Avoid breast sores	1	5.9
Early antenatal	3	17.6
Early diagnosis	1	5.9
Education	1	5.9
Good nutrition	1	5.9
Nevirapine	1	5.9
Not mentioned	9	52

Table 36 show the proportion of health care workers who are aware about PMTCT guidelines, in line with WHO (2010) recommendations on infant feeding options in the context of HIV and AIDS. Table 36 reveals that among HCWs, 29.4% were aware about the revised PMTCT guidelines, while the majorities (70.6%) were not informed about its existence. Only 5.9% of HCWs were aware that the guidelines recommend ARVs for mothers and babies, while the majorities 94.1% were not aware about this recommendation. Further, 23.5% of HCWs were aware that guideline recommends that duration of breastfeeding for HIV positive mother should not exceed one year. This implies that majority of HCW (76.5%) were not aware about the new recommended duration of breastfeeding for HIV positive mothers.

**Table 36: Health care workers knowledge about new WHO guidelines on MTCT of HIV**

Variables	Frequency	Percent
Informed about the revised PMTCT guidelines (2010)		
Yes	4	29.4
No	12	70.6
Guideline recommends ARVs for mothers/babies		
Yes	1	5.9
I don't know	16	94.1
Guideline recommends that animal milk is no longer a feeding for infant before 6 months		
Yes	0	0
I don't know	17	100
Guideline recommends that duration of breastfeeding for HIV positive mother should not exceed one year.		
Yes	4	23.5
I don't know	13	76.5

The results in Table 37 show that there was no clear picture of HCWs attitude towards assertion that all HIV positive mothers can transmit HIV to their babies. This is because most of HCW were sceptical on this issue to the extent that less than fifty

percent agreed with this assertion. The results presented in Table 37 show that HCWs had positive attitude towards possibility of averting MTCT of HIV through PMTCT services. This was ascertained by 88.2% who disagreed with the assertion that all HIV positive mothers can transmit HIV to their babies if they choose to breastfeed.

Similarly 76.5% of HCWs disagreed with the assertion that all HIV positive mothers can transmit HIV to her Baby through breastfeeding. These HCWs portrayed positive attitude towards breastfeeding. Also 52.9% did not agree that all HIV positive mothers can transmit HIV to their babies during labour and delivery. These HCWs portrayed positive attitude towards possibility of reducing MTCT during labour and delivery. In addition to that, majority of HCWs had negative attitude towards bottle feeding because 76.5% of them disagreed with the assertion that bottle feeding advised to be used for feeding the baby.

Positive attitude was also noted on assertion that vitamin A is the supplement recommended to be given to a mother after delivery whereby 70.6% of HCW agreed to this statement. Not only that the percentage of HCWs who agreed that confidentiality is one of requirement when counselling a mother on infant feeding was 76.5%, showing a positive attitude towards confidentiality. However, majority (52.9%) of CHWs had positive attitude towards the use of commercial infant formula as a suitable option for HIV infected mother. Early complementation at six months was met with negative attitude whereby 52.9% of HCWs did not agree with the assertion that complementary foods should be introduced to the baby at age of 4 – 6 months. There was negative attitude towards giving infants water and other drinks or foods before six months whereby 76.5% of HCWs agreed that it is not allowed to give a baby any food

or drink even water in the first six months of life unless prescribed by a qualified health worker. Not only that, but also HCWs had positive attitude towards allowing HIV infected mothers to decide on their own the method of feeding their babies. This was shown by 70.6% of HCWs who disagreed with the assertion that it is responsible of health worker to decide Feeding option of HIV +ve mothers. Sadly however, most of HCWs (94.1%) who agreed with the assertion that if a mother travels for few days she cannot Breastfeed again after coming back because her milk will be sour, meaning that they had negative attitude towards re-lactation after separation of mother / baby pair. They had also negative attitude toward continued breastfeeding even if the mother become pregnant. This is because 58.3% of HCWs disagreed with the assertion that if a breastfeeding mother conceives before her baby reaches 2 years she should stop breastfeeding (Table 37).

**Table 37: Attitude of HCW towards breastfeeding in the context of HIV and AIDS**

Attitudinal statement	Agree		Disagreed		Undecided	
	N	%	N	%	n	%
All HIV +ve mothers can transmit HIV to their babies	8	47.1	7	41.2	2	11.8
All HIV +ve mothers can transmit HIV to their babies if they choose to breastfeed	2	11.8	15	88.2	0	0
A HIV +ve mothers can transmit HIV to her Baby through breastfeeding	13	76.5	4	23.5	0	0
All HIV +ve mothers can transmit HIV to their babies during pregnancy	14	82.4	3	17.6	0	0
All HIV +ve mothers can transmit HIV to their babies during labour and delivery	8	47.1	9	52.9	0	0
Bottle feeding advised to be used for feeding the baby.	2	11.8	13	76.5	2	11.8
Vitamin A is the supplement recommended To be given to a mother after delivery.	12	70.6	2	11.8	3	17.6
Confidentiality is one of requirement when counseling a mother on infant feeding.	13	76.5	3	17.6	1	5.9
Feeding using commercial infant formula for the first 6 months is one of the infant feeding options for HIV +ve mother.	9	52.9	7	41.2	1	5.9
Complementary foods should be introduced to the baby at age of 4 – 6 months.	4	23.5	9	52.9	4	23.5
It is not allowed to give a baby any food or drink even water in the first six months of life unless prescribed by a qualified health worker	13	76.5	4	23.5	0	0
It is responsible of health worker to decide Feeding option of HIV +ve mothers	5	29.4	12	70.6	0	0
Support groups in the community are important agents for positive changes in infant feeding	12	70.6	2	11.8	3	17.6
If a mother travels for few days she cannot Breastfeed again after coming back because her milk will be sour	1	5.9	16	94.1	0	0
If a breastfeeding mother conceives before her baby reaches 2 years she should stop breastfeeding	6	35.3	10	58.3	1	5.9

#### **4.20.4 Drop-out in PMCTC programs**

Drop-outs during the PMCTC programs have remained unsolved challenge. To decrease the rates of drop-out from antiretroviral treatment programmes, it is essential to provide health care workers knowledge on counselling in areas with shortage staff, in order to help maintain mothers with their children in care after they are tested positive for HIV and to resume medication after counselling. This can help to reduce the risk of infection of an infant of a mother who is HIV infected (WHO, 2010a).

Results in Table 38 below show that from February 2013 to February 2014 a total of 1024 positive HIV mothers in one of HC in rural areas, discontinued to attend PMTCT and CTC clinics. However, 952 of HIV positive mothers were visited by home based care workers (HBC) and given counselling in order to resume medication. Table 38 also shows that 448 of HIV positive mother who discontinued attending PMTCT and CTC clinics in the same time period resumed attending and they also resumed using the antiretroviral treatment. The table also shows that 35 of HIV positive mothers in one dispensary at urban areas, discontinued attending PMTCT and CTC clinic during the same time period, however, none of them was visited and those who resumed to receive the services were only 7.

Other health facilities had no records on drop-out rates at the time of data collection. But some reasons for drop-outs include death of clients, clients shifting to other areas, and clients purposively attending other health facilities to avoid stigmatization from their family and community. However, during the FGD with Home Based Care workers in one dispensary in rural areas, it was revealed that in some cases lack of privacy during counselling process and lack of good cooperation between HBC

workers and HCW in health facilities contributed to high rate of client drop outs. This is because HCW in health facility do not engage HBC worker in identification of HIV positive mother who do not continue to attend clinic. This is due to the need of maintaining confidentiality of clients. However, some health care workers discriminated their patients, and breached confidentiality of their clients leading to discontinuation of utilization of PMCTC and CTC services by some clients. Further, when there is shortage of ARVs or when mothers are given expired ARVs they discontinue attending PMTCT and CTC centres (73.5 %).

Some studies show that, when tested positive, many pregnant women drop-out of PMTCT programmes due to fear of discrimination and rejection by their male partners and families (Global AIDS Alliance, 2009). In a review of studies examining patient retention in antiretroviral therapy programs in Africa, only 60% of patients remained in the program after two years, the rest (40 %) were lost due to different reasons (Rosen *et al.*, 2007). In a study done by Matthew and Sydney (2010) it was revealed that in Botswana the drop-out was due to difficulties to follow-up (5.4 %) and deaths (16.8 %), and total attrition from ART was 22.2 % in ten months. In Tanzania data revealed that drop-out was 12.1 % whereby 2.5% was due to death and total attrition from ART was 14.6 % within 7 months (Global AIDS Alliance, 2009).

**Table 38: Number of PMTCT client drop outs per health facility**

Health Facility	Total dropouts No	Total visited No	Total resumed No
Kigamboni H/C	1024	952	448
Kimbiji Dispensary	9	0*	0*
Vingunguti Dispensary	35	0*	7

**N.B:** (\*) No data collected indicating number of HIV Positive mothers either missing, dropouts, visited, or resumed.

## 4.21 Nutritional Status of the Children

### 4.21.1 Prevalence of wasting

The results on wasting are presented as Global Acute Malnutrition (GAM) and Severe Acute Malnutrition (SAM). Basing on Weight-for-Height Z score, total prevalence of wasting (Global Acute Malnutrition - GAM) was 9.1% for both sexes, 7.7% for boys and 10% for girls. Those who were moderately wasted (Moderate Acute Malnutrition – MAM) were 8.1% for all gender, 5.1% for boys and 10% for girls. In addition, the prevalence of severe wasting for both sexes was 1%, whereas for boys it was 2.6% and none for the girls. Adding to that, results show that overall 9.1% of the sampled children were overweight. The prevalence of overweight among boys and girls were 12.8% and 6.7% respectively (Table 39).

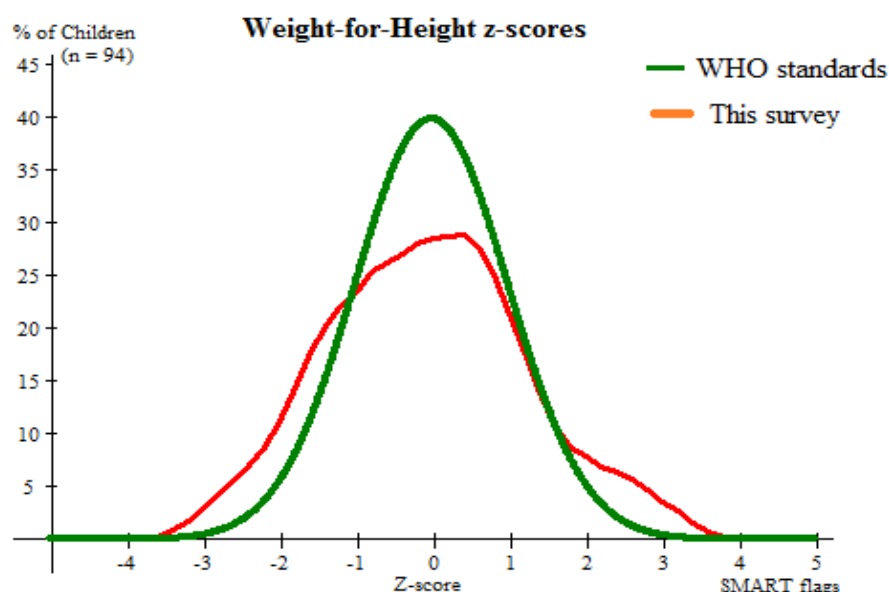
**Table 39: Prevalence of wasting among HIV exposed children 0 – 12 months**

WHZ score	Girls		Boys		All sex	
	Frequency	%	Frequency	%	Frequency	%
< -3 <sup>1</sup>	-	-	1	2.6	1	1.0
- 3 to -2 <sup>2</sup>	6	10.0	2	5.1	8	8.1
> -2 to 2 <sup>3</sup>	50	83.3	31	79.5	81	81.8
> 2 <sup>4</sup>	4	6.7	5	12.8	9	9.1
<b>Total</b>	<b>60</b>	<b>100.0</b>	<b>39</b>	<b>100.0</b>	<b>99</b>	<b>100.0</b>

Note: <sup>1</sup> = Severe wasting; <sup>2</sup> = Moderate wasting; <sup>3</sup> = Normal; <sup>4</sup> = Overweight

The Gaussian curve for WHZ scores of sampled children indicates that some children were out of the curve of the reference WHO standards on both sides (Figure 2).





**Figure 2: Gaussian curve for Weight-for-Height Z scores of sampled HIV exposed children**

#### 4.21.2 Prevalence of underweight

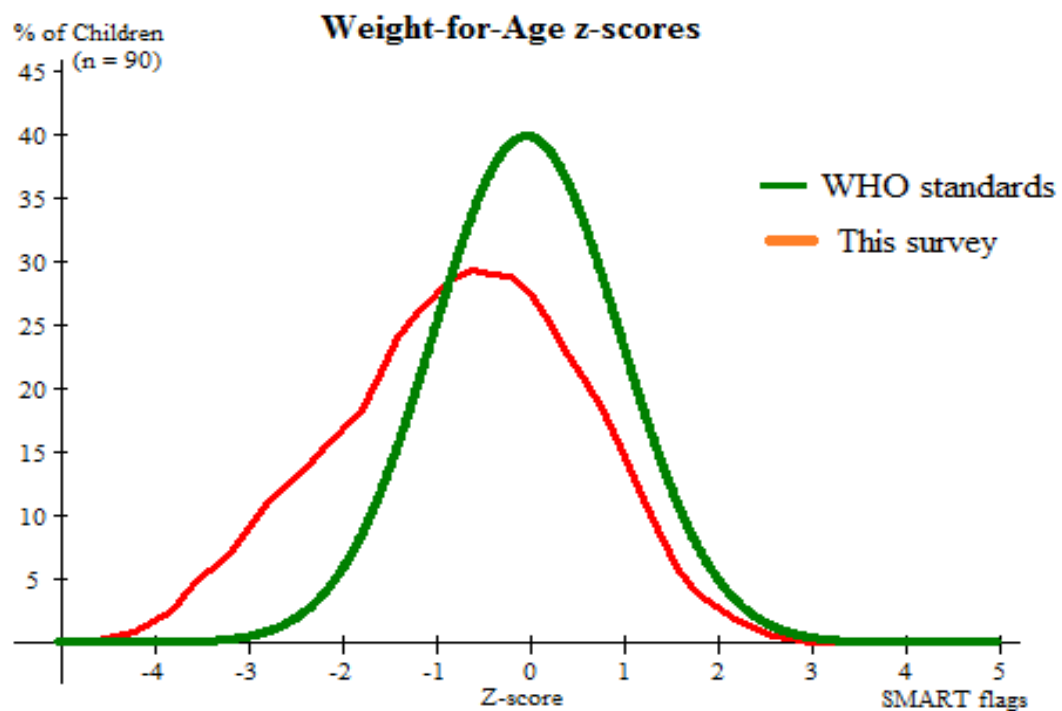
Basing on Weight-for-Age Z score, the prevalence of underweight for both sexes was 20.5% (Table 40). The prevalence of underweight among boys was 18.5% whereas in girls it was 24.1%. Among the total sample of children 14.6% were suffering from moderate underweight. Basing on sex, those with moderate underweight were 13.2% (boys) and 15.5% (girls). In total, 7.3% of the sampled children were suffering from severe underweight. The results show that 5.3% of boys and 8.6% of girls were severely underweight.

**Table 40: Prevalence of underweight among HIV exposed children 0 – 12 months**

WAZ	Girls		Boys		All sex	
	Frequency	%	Frequency	%	Frequency	%
< -3 <sup>1</sup>	5	8.6	2	5.3	7	7.3
- 3 to -2 <sup>2</sup>	9	15.5	5	13.2	14	14.6
> -2 <sup>3</sup>	44	75.9	31	81.6	75	78.1
<b>Total</b>	<b>58</b>	<b>100.0</b>	<b>38</b>	<b>100.0</b>	<b>96</b>	<b>100.0</b>

Note: <sup>1</sup> = Severe underweight; <sup>2</sup> = Moderate underweight; <sup>3</sup> = Normal

The Gaussian curve for WAZ scores of sampled children indicates that some children were on the left side of the reference WHO standards (Figure 3). This suggests that there were a large number of underweight children among the sampled children as compared to WHO reference population.



**Figure 3: Gaussian curve for Weight-for-Age Z scores of sampled HIV exposed children**

#### 4.21.3 Prevalence of stunting

Basing on Height-for-Age Z score, the prevalence of stunting for both sexes was 24% (Table 41). The prevalence of stunting among boys was 21.1% whereas in girls it was 25.9%. Among the total sample of children 11.5% were suffering from moderate stunting. Basing on sex, those with moderate stunting were 7.9% (boys) and 13.8% (girls). In total, 12.5% of the sampled children were suffering from severe stunting. The results show that 13.2% of boys and 12.1% of girls were severely stunted. In

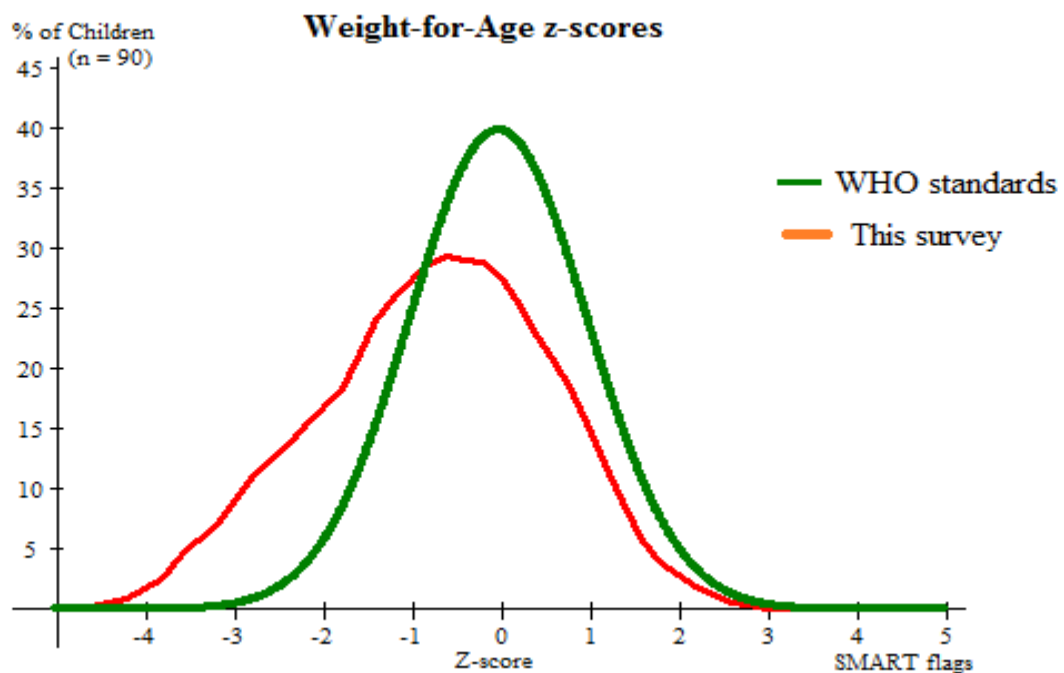
addition these observations suggests that nutritional problems start at very early age and therefore appropriate nutritional efforts need to be focused at much earlier age.

**Table 41: Prevalence of stunting among HIV exposed children 0 – 12 months**

HAZ	Female		Male		All sex	
	Frequency	%	Frequency	%	Frequency	%
< -3 <sup>1</sup>	7	12.1	5	13.2	12	12.5
- 3 to -2 <sup>2</sup>	8	13.8	3	7.9	11	11.5
> -2 to 2 <sup>3</sup>	43	74.1	30	78.9	73	76.0
<b>Total</b>	<b>58</b>	<b>100.0</b>	<b>38</b>	<b>100.0</b>	<b>96</b>	<b>100.0</b>

Note: <sup>1</sup> = Severe stunting; <sup>2</sup> = Moderate stunting; <sup>3</sup> = Normal

The Gaussian curve for HAZ scores of sampled children indicates that some children were on the left side of the reference WHO standards (Figure 4). This suggests that there were a large number of stunted children among the sampled children as compared to WHO reference population.



**Figure 4: Gaussian curve for height-for-age Z scores of sampled HIV exposed children**

Refined analyses on the nutritional problems of public health significance in Tanzania have identified the following conditions: stunting, underweight and wasting (TFNC, 2008). These problems are concentrated among children below 5 years of age. NBS (2010) deduced that approximately 35% of children under 5 years of age are stunting, 4% are wasting and 21% are underweight (NBS, 2010). This is indicating that stunting is an significant public health problem in Tanzania. NBS (2010) further shows that children in rural areas are more likely to be stunted (45%) than those in urban areas (32%). Dar es Salaam has the lowest prevalence of stunting (19%). Based on this study the prevalence of stunting for both sexes was 24% in Dar es Salaam which indicated to be more increased. Furthermore, the prevalence of underweight for both sexes in this study was 20.5% which is slightly lower to that of at national level (21%). The prevalence of wasting at this study for both sexes was 9.1% higher than at national level (4%).

The prevalence of underweight which has been reported by NBS (2004-05) was 22% while NBS (2010) shows that it decreased to 16% out of these 4% were severely underweight, thus indicating reduction in national level compared to the past years. Rural children are more likely to be underweight (17%) than urban children (11%). According to URT (2014), prevalence of underweight in Dar es Salaam is 6.6%. Severe underweight is only 0.9%, and moderate underweight is 5.7%. The prevalence of wasting in Dar es Salaam is 3.7% lower to compare with the current on this study by (Global Acute Malnutrition) was (9.1%) for both sexes. While severe wasting for both sexes was 1%. The percentage of severely wasted children is 1.1% and that of moderately wasted children is 2.6% (URT, 2014).

## **CHAPTER FIVE**

### **5.0 CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Conclusions**

The results of this study indicate characterization of factors affecting implementation of WHO recommendations on infant feeding among HIV/AIDS infected mothers in Dar-es-Salaam region. The specific objectives of the study include an assessment of knowledge on infant feeding in the context of HIV and AIDS among HIV positive mothers with children 0 - 12 months regardless the infant's HIV status and health care workers; constraints that hinders the implementation of recommendations of WHO on infant feeding among HIV positive mothers; examination of attitude on exclusive breastfeeding practices among HIV positive mothers with children 0 - 6 months regardless the infant's HIV status; and an assessment of the nutritional status of the children aged 6 -12 months born to HIV- infected mothers. Exploration of these specific objectives culminated into achieving the overall objective of this survey which was to determine factors that influence breastfeeding practices among HIV infected mothers in order to improve health of infants aged 0 - 12 months attending PMCTC clinics in Dar-es-Salaam Region. The following are the conclusions emanating from the results of this study.

##### **5.1.1 Knowledge on infant feeding in the context of HIV and AIDS**

###### **5.1.1.1 Inconsistent messages in health education**

The results of this study have shown that there are some inconsistencies in terms of knowledge levels on infant feeding in the context of HIV and AIDS among HIV infected mothers in rural and urban areas of Dar-es-Salaam. Early initiation of breastfeeding, skin-to-skin contact and giving colostrum to the newborn were found

not to be practiced as recommended. Majority of the interviewed HIV infected mothers discourage prelacteal feeds and had strong knowledge on importance of timely initiation of breastfeeding within one hour of delivery. It appeared also that the knowledge of possibility of MTCT of HIV was higher in both areas but was even higher in urban areas as compared to rural areas.

#### **5.1.1.2 Determinants of MTCT of HIV**

Inconsistencies in terms of knowledge on risk factors for MTCT of HIV were noted in urban and rural areas. Also health education on infant and young child feeding in the context of HIV and AIDS has achieved adequate knowledge transfer on the issue of risk posed by mixed feeding in increasing the likelihood of MTCT of HIV in exposed children. This is because of very high proportion of HIV positive mothers in urban and rural areas who were aware about the effect of mixed feeding in increasing the risk of MTCT of HIV during breastfeeding. However, health education at ANC and postnatal clinics had not achieved good level of knowledge transfer as regards to risk of re-infection with HIV in increasing the likelihood of MTCT of HIV.

#### **5.1.1.3 Strategies to reduce MTCT of HIV**

The study has shown that many HIV positive mothers in urban area were aware that avoiding mixed feeding decreases the risk of MTCT of HIV as compared to few of their rural counterparts. The only explanation to these knowledge differentials is the presence of a more strong health education component addressing infant feeding in the context of HIV in urban areas than in rural areas. Early infant diagnosis of HIV infection is poorly done because of lack of diagnostic tools.

#### **5.1.1.4 Complementary feeding**

The study had consistently shown that HIV infected mothers in rural and urban Dar-es-Salaam still embrace awkward reasons such as crying of a baby; rooting and sucking fingers as the basis for introducing complementary foods before six months of child age. This was the case despite a high prevalence of knowledge about the correct age of introducing complementary foods at 6 months in both rural and urban areas.

#### **5.1.2 Attitude towards infant feeding in the context of HIV and AIDS**

The social attitudes of HIV infected mothers in Dar-es-Salaam region can be explained by three constructs namely transmission constructs; colostrums and breastfeeding during pregnancy; and optimal breastfeeding practice. With the first construct there appeared to be a strong negative attitude towards possibility of averting MTCT of HIV. The second construct indicated weak positive attitudes towards colostrums and breastfeeding continuation when a mother is pregnant. The third construct indicated weak positive attitude towards exclusive breastfeeding.

#### **5.1.3 Barriers for adoption WHO recommendations on infant feeding**

The results of this survey have shown that critical barriers to implementation of new WHO guidelines on infant feeding in the context of HIV and AIDS include: fear of infecting the baby, lack of disclosure of mother's HIV status, breast problem, and lack of information or poor knowledge on infant feeding. These were found to hinder the practice even in circumstances where the mother opts to practice exclusive breastfeeding.

In addition, although early diagnosis of HIV infection in infant is provided, timely release of test results to mothers is not happening leading to low understanding of diagnosis and prognosis of their infants. There was also fear for stigma which leads to poor adherence to WHO recommendations on infant feeding in the context of HIV. High rate of PMTCT and CTC clinic drop-out and poor traceability of the drop out clients is yet another challenges noted and the lack of ARVS and/or co-trimoxazole in the health facilities.

#### **5.1.4 Nutrition situation of children**

The results have consistently shown that there was higher prevalence of malnutrition among HIV exposed children in the study area.

### **5.2 Recommendations**

The study findings have shed light about a number of physical and knowledge, practices and attitudes that must be addressed if improved child nutrition is to become a reality in HIV infected women in Dar-es-Salaam. Basing on the findings of the study the following recommendations are made.

- (i) The inconsistent level of knowledge about infant feeding in the context of HIV and AIDS among HIV infected mothers in rural and urban areas of Dar-es-salaam sheds light to the need of strengthening health education component in ANC and CTC clinics. This should include among other issues to harmonise the health education package in terms of messages and content.
- (ii) Health promotion efforts should include awareness creation and behaviour change communication on the issues of infant feeding in the context of HIV



and AIDS. To be effective, these efforts should use multiple channels of communication including mass media such as radio, television and newspapers; and also new media such as mobile telephone text messaging, blogs, micro-blogs and internet. Other channels that are more effective are traditional media such as through songs, traditional dances, theatre art.

- (iii) By letting role models, leaders and successful HIV infected couples speak about their successes in implementing the recommended infant feeding options while nurturing their babies can help to tackle the negative social attitudes towards the recommended infant feeding options. This should go hand in hand with show casing the successes of PMTCT program in increasing the number of HIV free survival in Tanzania, East Africa and beyond.
- (iv) Deliberate efforts should be implemented to tackle social stigma related to HIV and AIDS, particularly targeting its negative implications in improving infant feeding for HIV exposed children. Social stigma is one of critical bottleneck to successful implementation of new WHO guidelines on infant feeding in the context of HIV and AIDS.
- (v) It is also necessary to tackle the disparity in terms of knowledge of health service providers on issues of infant feeding in the context of HIV as it contributes to discrepancies in the implementation of new WHO guidelines. Insufficient knowledge about infant feeding in the context of HIV among HCW is a recipe for inconsistent messages and poor attitude towards the recommended infant feeding practices.

- (vi) Education on optimal infant feeding practices including early initiation of breastfeeding; giving children colostrums; exclusive breastfeeding; timely introduction of complementary foods and adequate frequency of complementary foods can contribute to reduction of malnutrition in HIV exposed children.
- (vii) Disclosure of HIV positive mothers to her husband/spouse, family members and relatives is a complex process that has been found to be a function of time and other factors since diagnosis. This should be focused and find the way on how to support them, to be disclosure.
- (viii) Ministry of Health and Social welfare in collaboration with other partners, should strengthened the health facilities on the important of involving HBC in the counseling programmes during visits, to reduce the number of dropouts and to support HIV positive mother with their children to be resumed on antiretroviral treatment.
- (ix) Ministry of Health and Social welfare should ensure continuous supply of ARVs and plan the mentor supervision to all health facilities to equip their knowledge and skills and also to establish the accessibility of the obtainable of medicines, and to ensure no expired medicines enclose the health facilities that might cause dropouts to HIV positive mothers.

## REFERENCES

- Adejuyigbe, E., Orji, E., Onayade, A., Makinde, N. and Anyabolu, H. (2008). Infant feeding intentions and practices of HIV-positive mothers in South western Nigeria. *Journal of Human Lactational* 24(303): 307 – 308.
- Aidam, B. A., Pérez-Escamilla, R., Lartey, A. and Aidam, J. (2005). Factors associated with exclusive breastfeeding in Accra, Ghana. *European Journal of Clinical Nutrition* 59(6): 793 – 794.
- Anitha, D., Mini, J. S. and Mary S. K. (2011). Diagnosis of HIV-1 infection in Infants using dried blood spots in Tamil Nadu, South India. *Indian Journal of Sexually Transmitted Diseases and AIDS* 32(20): 99 – 102.
- Amadhila, J. (2005). Factors that Influence Exclusive Breastfeeding in Windhoek District in Namibia. Dissertation for Award of MSc Degree at University of Western Cape, Namibia, pp. 33-35.
- Asgeir J.,<sup>1</sup> Carolina G., Natalia Z., Leiv S., Ezra N., Sokoine L. K., Mabula J., Svein G. G., Johan N. B. and Carmen de, M. (2009). *Dried Blood Spots Perform Well in Viral Load. Monitoring of Patients Who Receive Antiretroviral Treatment in Rural Tanzania. Clinical infectious diseases: Diseases Society of America* 49(6): 976 – 981.
- Babbie, E. (1990). *Survey Research Methods*. (Second Edition), Wadsworth. Publishing Company, Belmont. 52pp.

Bentley, M., Margaret, E., Corneli, A. M., Amy, L., Piwoz, E., Ellen, G., Moses, A., Moses, A., Nkhoma, J., Tohill, B. C., Beth, C., Ahmed, M., Adair, L., Jamieson, D., Denise, J and van der Horst, C. M. (2005). Perception of the role of maternal nutrition in HIV positive breastfeeding women in Malawi. *Journal of Nutrition* 135(4): 948 – 949.

Bick, D. E., MacArthur, C. and Lancashire, R. J. (1998). What influences the Uptake and Early Cessation of Breastfeeding? *Midwifery* 14(4): 242 – 247.

Bovell-Benjamin, A. C., Benjamin, W., Ivey, M. and Simeon, D. T. (2001). Breastfeeding knowledge and beliefs among adults in eastern Tobago. *Journal of Human Lactation* 17 (4): 298 – 303.

Ciaranello, A. L., Park, J. E., Ramirez-Avila, L., Freedberg, K. A., Walensky, R. P. and Leroy, V. (2011). *Early Infant HIV-1 Diagnosis Programs in Resource-Limited Settings: Opportunities for Improved Outcomes and More Cost-Effective Interventions*. Division of Infectious Disease, Massachusetts General Hospital, and Centre for AIDS Research, Harvard, USA. 24pp.

Coovadia, H. R., Bland, R. K., Coutoudis, A. and Bennish, M. L. (2007). Mother-to-Child Transmission of HIV-1 infection during Exclusive Breastfeeding: The first six months of life: An intervention cohort study. *The Lancet* 369: 1111 - 1113.

- Della, A. F., McLachlan, H. L. and Lumley, J. (2006). Factors associated with breastfeeding at six months postpartum in a group of Australian Women. *International Breastfeeding Journal* 1(1): 1 – 18.
- Doherty, T., Chopra, M., Nkoki, L., Jackson, D. and Greiner, T. (2006). Effect of the HIV epidemic on infant feeding in South Africa: When they see me coming with the tins they laugh at me. *Nutrition News for Africa* 84(2): 90 – 95.
- Doherty, T., Chopra, M., Jackson, D., Goga, A., Colvin, M. and Oerssin, L. A. (2007). Effectiveness of the WHO/UNICEF Guideline on Infant Feeding for HIV positive Women: Results from a prospective cohort study in South Africa. *Journal of AIDS* 21(13): 1793 – 1796.
- de Paoli, M., Manongi, R., Helsing, E. and Klepp, K. (2001). Exclusive breastfeeding in the era of AIDS. *Journal of Human Lactation* 17(313): 315 – 319.
- de Paoli, M. R., Manongi, R. and Klepp, K. I. (2002). Counselors' perspectives on antenatal HIV testing and infant feeding dilemmas facing women with HIV in Northern Tanzania. *Reproductive Health Matters* 10(20): 144 – 156.
- Erica, P., Diane, W., Pamela, D. and Berth, F. (2002). *Is Mother to child HIV Transmission Preventable? Department of Paediatric Immunology*. The National Prevention Information Network, California, San Francisco. 1pp.

- Fidelis, A. M. and Rita, D. (2008). *Dried Blood Sports: Changing HIV DNA Infant Testing in Kenya*. Moi Teaching and Referral Hospital. Eldoret, Kenya. 864 pp.
- Fox, N., Amanda, H. and Nigel, M. (2009). *Sampling and Sample Size Calculation*. National Institute for Health Research, Yorkshire, Humber. 23pp.
- Gibson, R. S. (1990). *Principles of Nutritional Assessment*. Oxford University Press, New York. 928pp.
- Gillespie, S. and Kadiyala, S. (2005). *HIV/AIDS and Food and Nutrition Security from Evidence to Action*. International Food Policy Research Institute, Washington DC. 306pp.
- Goldman, A.S. (1993). The Immune System of Human Milk: Antimicrobial, anti-inflammatory and immunomodulating properties. *Paediatric Infection Diseases* 12(8): 664 – 671.
- Global AIDS Alliance (2009). *Analysis the Way Forwarding for Campaign to End Pediatric AIDS in Tanzania*. Global AIDS Alliance, Dar es Salaam, Tanzania. 28pp.
- Gorsuch, R. L. (1983). *Factor Analysis*. (2<sup>nd</sup> Edition), Publisher Lawrence Erlbaum Associates. L. Erlbaum Associates. Hillsdale, New Jersey - London.

- Hoosen, M. C., Nigel, C. R., Ruth, M. B., Kirsty, L., Anna, C., Michael, L. B. and Marie-Louse, N. (2007). Mother to child transmission of HIV – 1 infection during exclusive breastfeeding in the first 6 months of life: an intervention cohort study. *Lancet* 369: 1107 – 1116.
- Hornell, A., Hofvander, Y. and Kylberg, E. (2001). Solids and formula association with pattern and duration of breastfeeding. *Journal of Paediatrics* 107: 3 – 38.
- Iliff, P. J., Piwoz, E. G., Tavengwa, N. V., Zunguza, C. D., Marinda, E. T., Nathoo, K. J., Moulton, L. H., Ward, B. J. and Humphrey, J. H. (2005). Early exclusive breastfeeding reduces the risk of postnatal HIV-1 transmission and increases HIV-free Survival AIDS. *National Centre for Biotechnology Information* 19(7): 699 – 708.
- Kalanda, B. F., Verhoeff, F. H. and Brabin, B. J. (2006). Breast and complementary feeding practices in relation to morbidity and growth in Malawi Infants. *European Journal of Clinical Nutrition* 60(3): 401 – 407.
- Kevin, M. L., Peter, I., Kuda, M., Robert, N., Laurance, S. M., Lawrance, H. M. and Jean, H. H. (2010). Associations between breast milk viral, mastitis, exclusive breast feeding. *Postnatal Transmission of HIV* 50(5): 762 – 769.

- Kuhn, L., Sinkala, M., Semrau, K., Kasonde, P., Scott, N., Mwiya, M., Vwalika, C., Tsal, W.Y., Tsai, W.Y., Aldrovand, G.M. and Thea, D.M (2007). High Uptake of Exclusive Breastfeeding and Reduced Early Post – Natal HIV Transmission. *Postnatal Transmission of HIV* 26: 2(12)1363
- Kuhn, L. A. G. M., Sinkala, M., Kankasa, C., Mwiya M. and Thea, D. M. (2010). Potential impact of new WHO criteria for antiretroviral treatment for prevention of mother-to- child HIV transmission. *AIDS* 24: 1374 – 1377.
- Laar, A. S. and Govender, V. (2011). Factors Influencing the Choices of Infant Feeding of HIV-positive Mothers in Southern Ghana: The role of counsellors, mothers, families and socio-economic status. *Journal of AIDS and HIV Research* 3(7): 130 – 132.
- Latham, M. C. (1997). *Human Nutrition in the Developing World*. Food and Agricultural Organization, Rome, Italy. 1pp.
- Lawn, S. D. (2004). AIDS in Africa: the impact of coinfections on the pathogenesis of HIV infection. *Journal of Infectious Diseases*. Dis.48 (1): 1-12.
- Leroy, V., Karon, J. M., Alioum, A., Ekpini, E. R., Van de Perre, P., Greenberg, A. E., Msellati, P., Hudgens, M., Dabis, F. and Wiktor, S. Z. (2003). Postnatal transmission of HIV-1 after a maternal short-course zidovudine peripartum regimen in West Africa. *AIDS* 17(10): 1493 – 1501.



- Leshabari, S., Koniz-Booher, P., Astrøm, A., de Paoli, M. and Moland, K. M. (2006). Translating global recommendations on HIV and infant feeding to the Local context: The development of culturally sensitive counselling tools in the Kilimanjaro Region, Tanzania. *Implémentation Science* 1: 22 – 27.
- Leshabari, S. C., Blystad, A., de Paoli, M. and Moland, M. M. (2007). HIV and Infant Feeding Counselling: Challenges faced by nurse-counsellors in Northern Tanzania. *Human Resources for Health* 5(18): 5 – 9.
- Lewis, P., Nduati, R., Kreiss, J. K., John, G. C., Richardson, B. A., Mbori-Ngacha, D., Ndinya-Achola, J. and Overbaugh, J. (1998). Cell – free human immunodeficiency virus type 1 in breast milk. *Journal of Infections Diseases* 177(1): 34 – 39.
- Mak, W. W. S., Poon, C. Y. M., Pun, L. Y. K. and Cheung, S. F. (2007). Meta-analysis of stigma and mental health. *Social Science and Medicine* 65: 245 – 261.
- Mamman, R., Burkhardt, G., Omba, S., Thompson, D. and Behets, F. (2012). The infant feeding choices and experiences of women living with HIV in Kinshasa, Democratic Republic of Congo. *AIDS Care* 24(2): 262 – 265.
- Maru, Y and Haidaru, J (2009). Infant feeding Practice of HIV Positive Mothers and its Determinants in Selected Health Institutions of Addis Ababa, Ethiopia. *Ethiopia Journal of Health Development* 23(2): 107 – 114.

- Manji, K. P. (2011). *Breastfeeding and Mother – to – Child Transmission of HIV: Myths and Realities. Professorial Inaugural Lectures Series*. Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania. 30-33pp.
- Marina, M., De Paoli, R. and Knut-Inge, K. (2003). Are Infant Feeding Options that are recommended for Mothers with HIV Acceptable, Feasible, Affordable, Sustainable and Safe? Pregnant Women's Perspectives. *Institute of Nutrition Research* 7(5): 611 – 619.
- Matji, J. N., Wittenberg, D. F., Makin, J. D., Jeffery, B., MacIntyre, U. E. and Forsyth, W. C. (2009). Factors affecting HIV- infected mothers' ability to adhere to antenatally intended infant feeding choice in Tshwane. *South Africa Journal of Child Health* 3 (1): 21, 23.
- Matthew, F. and Sydney, R. (2010). Patient retention in antiretroviral therapy programmes up to three years on treatment in Sub-Saharan Africa, 2007 – 2009: Systematic review. *Tropical Medical International Health* 15(1): 1 – 15.
- Mills, E. A. (2006). Expressions and effects of HIV-related stigma in South Africa. *Journal of Community and Applied Social Psychology* 16: 498 – 503.

- Muchedzi, A., Chandisarewa, W., Keatinge, J., Stranx-Chibanda, L., Woelk, G. and Shetty, A. (2009). Disclosure and stigma issues among HIV positive women in a PMTCT program in urban. *International AIDS Society. 5<sup>th</sup> IAS Conference on HIV Pathogenesis and Treatment*, Zimbabwe, 2008. 112pp.
- Murphy, D. A., Armistead, L., Merelich, W. D., Payne, D. L. and Herbeck, D. M. (2011). Pilot trial of disclosure intervention for HIV positive mothers. The track programme. *Journal of Consulting and Clinical Psychology* 79(2): 203 – 214.
- Nankunda, J., Tumwine, J. K., Soltvedt, A., Semiyaga, N., Ndeezi, G. and Tylleskar T. (2006). Community based peer counsellors for support of exclusive breastfeeding: experience from rural Uganda. *International Breastfeeding Journal* 1: 1180 – 1186.
- National Bureau of Statistics (NBS) (2004/5). *Tanzania Demographic and Health Survey*. National Bureau of Statistics, Dar es Salaam, Tanzania. 210pp.
- National Bureau of Statistics (NBS) (2010). *Tanzania Demographic and Health Survey*. National Bureau of Statistics, Dar es Salaam, Tanzania. 478pp.
- National Bureau of Statistics and ICF Macro (NBS and ICF Macro) (2010). *Tanzania Demographic and Health Survey*. United Republic of Tanzania, National Bureau of Statistics, Dar es Salaam, Tanzania. 163pp.

National Bureau of Statistics and Tanzania HIV/AIDS and Malaria Indicator Survey  
(NBS/THMIS (2012). *Tanzania HIV/AIDS and Malaria Indicator Survey*.

Dar es Salaam, Tanzania. 313pp.

National AIDS Control Programme (NACP) (2008). *HIV/AIDS Surveillance Report*.

Dar es Salaam, Tanzania. 2pp.

National AIDS Control Programme (NACP) (2011). *HIV/AIDS/STI Surveillance*.

Report No. 22. Dar es Salaam, Tanzania. 5pp.

Nduati, R., John, G., Mbori-Ngacha, D., Richardson, B., Overbaugh, J., Mwatha, A.,  
Ndinya -Achola, J., Bwayo, J. and Onyango, F. E., Hughes, J. and Kreiss,  
J. (2000). Effect of breast-feeding and formula feeding on transmission of  
HIV-1: A randomized clinical trial. *The Journal of the American Medical  
Association* 283(9): 1173 – 1174.

Nicoll, A., Newell, M. L., Peckham, C., Luo, C. and Savage, F. (2000a). Infant feeding  
and HIV-1 infection. *AIDS* 14(3): 57 – 74

Norusis, M. (2004). *SPSS 13.0 Statistical Procedures Companion*. Prentice Hall, Inc.,  
Upper Saddle-River, NJ. 7pp.

Pathfinder International Kenya (PATH) (2010). *Infant Feeding and HIV. Participant's  
Manual for Community- Based Workers and Volunteers*. PATH, Nairobi,  
Kenya. 7pp.

Pathfinder International Kenya (PATH) (2007). Early infant diagnosis of hiv through dried blood spot testing. Pathfinder international/kenya's prevention of mother to child transmission project. [[www.pathfind.org](http://www.pathfind.org)] site visited on 13/5/2014.

Petitjean, G., Yassine, A. I., Tabaa, E. T., Clement, M., Jacques, R. and Jean, P. V. (2006). Compartment - Specific HIV resting T - cell reservoirs. *AIDS* 20(9): 1338 – 1340.

Rosen, S., and Fox, M. P. and Gill. C. J. (2007). Patient retention in antiretroviral therapy programs in sub-Saharan Africa: A systematic review. *PLOS Medicine* 10: 298.

Samson, K., John, L. and Richard, S. (2003). Scaling the frontier - should traditional birth attendants also be used to provide Nevirapine to PMTCT in Uganda? *African Health Sciences* 3(2): 102 – 103.

Semba, R. D., Kumwenda, N., Hoover, D. R., Taha, T. E., Quinn, T. C., Mtimavalye, Biggar, R. J., Broadhead, R., Miotti, P. G., Sokoll, L. J., Len van der Hoeven and Chipangwi, J. D. (1999). Human immunodeficiency virus load in breast milk, mastitis, and mother-to-child transmission of human immunodeficiency virus type 1. *Journal of Infectious Diseases* 180: 93 – 98.

Shapiro, R. L., Lockman, R, Assex. M. and Haymann, A. S. (2003). Low Adherence to Recommended Infant Feeding Strategies among HIV – Infected Women: Results from the Pilot Phase of a randomized Trial to prevent Mother to Child Transmission in Botswana. *AIDS Education and Prevention* 15(3): 221 – 230.

Shapiro, R. L., Hughes, M.D., Ogwu, A., Kitch, D., Lockman, S., Moffat, C., Makhema, J., Moyo, S., Thior, I., McIntsh, k., Van Widenfelt, E., leidner, J., Powis, K., Asmelash, A., Tumbare, Zwierski., Sharma, U., Handelsman, E., Mburu, K., Joyeoba, O., Moko, E., Souda, S., Lubega, E., Akhtar, M., Western, C., Tuomola, R., Snowden, W., Martinez-Tristani, M., Mazhani, L., and Essex, M. (2010). Antiretroviral Regimens in Pregnancy and Breast-feeding in Botswana. *New England Journal of Medicine* 362: 2282-2294

Sheehan, D., Krueger, P., Watt, S., Sword, W. and Bridle, B. (2001). The Ontario Mother and Infant Survey: Breastfeeding outcome. *Journal of Human Lactation* 17 (3): 217 – 218.

Sheehan, D. (2007). Infant feeding in three specific areas: 1. Percent HIV-exposed infants who are exclusively breastfed at three months 2. Percent HIV-exposed infants who are replacement breastfeeding at three months. 3. Percent HIV-exposed infants who are mixed feeding at three months. *Measure Evaluation Carolina Population Centre*. Chapel Hill, North Carolina. 1pp

Tanzania Commission for AIDS (TACAIDS) (2007-08). *Tanzania HIV and Malaria Indicator Survey 2008*. Dar es Salaam, Tanzania. 58pp.

Tanzania Food and Nutrition Centre (TFNC) (1997). *Rapid Assessment of Household Food Security and Nutrition in Drought Affected Areas in Tanzania Mainland*. TFNC Report No. 1386. Dar es Salaam, Tanzania. 19pp.

Tanzania Food and Nutrition Centre (TFNC) (2008). *Profile of the Tanzania Food and Nutrition Centre*. Report No. 2026. Tanzania Food and Nutrition Centre, Dar es salaam, Tanzania. 5pp.

Tanzania Food and Nutrition Centre (TFNC) (2012). *Analysis of Knowledge, Attitudes and Practices of Infant Feeding in the Context of HIV and AIDS in Ruangwa District*. A Report of Baseline Survey for the Capacity Development Project Health Care Providers and Mothers on Infant and Young Child Feeding in the Context of HIV and AIDS, Dar es Salaam. Tanzania. 7pp.

Teri, R., Helen, B., Emmanuel, F. and Nathan, F. (2012). Challenges and opportunities for the implementation of virological testing in resource-limited settings. *Journal of the International AIDS Society*.

Tiras, E. N. and Sia, E. M. (2011). *Prevalence and Predictors of Exclusive Breastfeeding among Women in Kigoma Region, Western Tanzania*. A Community Based Cross – Sectional study. Dar es Salaam, Tanzania. 3pp.

- Thairu, L.N., Pelto, G. H., Rollins, N. C., Bland, R. M. and Ntshangase, N. (2005). Socio- cultural influences on infant feeding decisions among hiv-infected women in Rural Kwa-Zulu Natal, South Africa. *Maternal and Child Nutrition* 1(1): 6 – 8.
- Tompkins, T.L. (2007). Disclosure of maternal HIV status to children. To tell or not tell that is the question. *Journal of Child and Family Studies* 16(6): 773 – 88.
- UNAIDS (2006). The Impact of Aids on People and Societies. 2006 Report on the Global Aids Epidemic.  
[Un aids.org/pub/GlobalReport/2006/2006\_gr\_ch04\_en.pdf] site visited on 26/03/2014.
- UNAIDS/WHO (2005). AIDS Epidemic Update: Sub-Saharan Africa. Publishing by UNAIDS and WHO. UNAIDS, New York. 14pp.
- UNAIDS/ WHO/ UNICEF (2011). *Global HIV/AIDS Response: Epidemic Update and Health Sector Progress Towards Universal Access*, Geneva: UNAIDS New York.
- UNAIDS (2011). Count down to zero. “Global plan towards the elimination of new HIV infections among children by 2025 and keeping their mothers alive.  
[http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublicat ion/2011/20110609] site visited on 12 June 2014.



UNICEF (2005). *Guiding Principles for Feeding Non –Breastfed Children 6 – 24 Months of Age*. UNICEF, Yew York. 4pp.

UNICEF (2008). *Breastfeeding*. UNICEF, Yew York.

[\[www.unicef.org/nutrition/index\\_24824\]](http://www.unicef.org/nutrition/index_24824) site visited on 17/07/2014.

URT (2004). *Dar es Salaam City Profile. Document Prepared by Dar es Salaam City Council with Advice from Cities and Health Programme*. Centre for Development, Kobe Japan. Dar es Salaam, Tanzania. 3pp.

URT (2005). *Ministry of Health National AIDS Control Programme, Surveillance of HIV and Syphilis Infections among Antenatal Clinic Attendees 2003/04*. Ministry of Health, Dar es Salaam, Tanzania. 28pp.

URT (2007). *Ministry of Health and Social Welfare. National Guidelines for Prevention of Mother to Child Transmission of HIV/AIDS*, Dar es Salaam, Tanzania. 2pp.

URT (2009a). *National Scale up Plan for the Prevention of Mother-to-Child Transmission of HIV and Pediatric HIV Care and Treatment*. Dar es Salaam, Tanzania. 7pp.

URT (2009b). *Ministry of Health and Social Welfare National scale up plan for the Prevention of Mother –to Child –Transmission of HIV and Pediatric HIV care and Treatment 2009-2013*. Reproductive and Child Health Section, Dar es Salaam, Tanzania. 4pp.

URT (2009c). *Ministry of Health and Social Welfare Tanzania Commission for Aids.*

Gender Audit on Tanzania National Response to HIV and AIDS, Dar es Salaam, Tanzania. 6pp.

URT (2010a). *Ministry of Health and Social Welfare.* National Guidelines for Prevention of Mother to Child Transmission of HIV/AIDS, Dar es Salaam, Tanzania. 3pp.

URT (2010b). *Health Sector HIV and AIDS Strategic Plan 2008 – 2012.* Ministry of Health and Social Welfare. Dar es Salaam. Tanzania. 5pp.

URT (2011). *National Guidelines on Infant and Young Child Feeding.* Ministry of Health and Social Welfare, Dar es Salaam, Tanzania. 10pp.

URT (2012). *National Guidelines for Comprehensive Care of Prevention of Mother-to-child Transmission of HIV Services.* Ministry of Health and Social Welfare, Dar es Salaam, Tanzania. 7pp.

URT (2013a). *National Guidelines for Comprehensive Care Services for Prevention of Mother-to-Child Transmission of HIV and Keeping Mothers Alive.* Ministry of Health and Social Welfare, Dar es Salaam, Tanzania. 45pp.

URT (2013b). *Prevention of Mother – to- Transmission of HIV. Pocket Guide.* Ministry of Health and Social Welfare, Dar es Salaam, Tanzania. 20 and 21pp

URT (2013c). *Infant and Young Child Feeding. National Guidelines*. Ministry of Health and Social Welfare, Dar es Salaam, Tanzania. 5pp.

URT (2013d). *Population by Age and Sex*. National Bureau of Statistics, Ministry of Finance Dar es Salaam and Office of Chief Government Statistician President's Office, Economic and Development Planning Zanzibar. Dar es Salaam. Tanzania. 179pp.

URT (2014). *Tanzania National Nutrition Survey 2014. Final Report. Tanzania Food and Nutrition Centre*. Ministry of Health and Social Welfare, Dar es Salaam, Tanzania. 2pp.

USAID/EGPAF (2010). *USAID and Elizabeth Glaser Pediatric AIDS Foundation*. Tanzania Foundation Supported PMTCT Program Evaluation, Dar es Salaam, Tanzania. 4pp.

USAID/ PATH/ IYCN (2009). Kenya infant feeding assessment. Eastern and Southern and Providence: Infant and young child nutrition project. [www.unicef.org/esaro/ 5482\_HIV\_AIDS] site visited on 16/09/2013.

USAID/ NBS/CDC/TACAIDS (2013). *Tanzania HIV/AIDS and Malaria Indicator Survey 2011 – 2012*. Dar es Salaam, Tanzania. 58pp.

Van de, P., Simonon, A., Hitimana, D., Dabis, F., Msellati, P., Mukamabano, B., Butera, B., Van Goethem, C., Karita, E. and Lepage, P. (1993). Infective and Anti – infective Properties of Breast milk from HIV – Infected Women. National Centre for Biotechnology Information. *Lancet* 341(8850): 914 – 918.

Violet, N. (2008). Young mothers, first time parenthood and exclusive breastfeeding in Kenya. *African Journal of Reproductive Health* 12(3): 125 – 138.

Wendelin, S. and Nancy, G. (1997). Breastfeeding Update 1: Immunology, Nutrition and Advocacy. *Pediatric in Review* 18(4): 111 – 119.

World Bank (2007). *HIV/AIDS, Nutrition, and Food Security: What We Can Do. A Synthesis Of International Guidance*. The International bank for Reconstruction and Development, Washington DC. 3pp.

WHO (1995). *Health Statistics and Health Information System*. Health Status Statistics Morbidity, Geneva. 5pp.

WHO (2000). Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: A pooled analysis. *The Lancet* 355: 451 – 455.

WHO (2002). *Complementary Feeding: Report of the Global Consultation and Summary of Guiding Principles for Complementary Feeding of the Breastfed Child*. Nutrition for Health and Development, Geneva, Switzerland. 6pp.

WHO (2005a). *Guiding Principles for Feeding Non-Breastfed Children 6–24 Months of Age*. World Health Organization, Geneva, Switzerland. 5pp.

WHO (2005b). *Guiding Principles for Feeding Non-Breastfed Children 6–24 Months of Age*. World Health Organization, Geneva, Switzerland. 2pp.

WHO (2006a). *Antiretroviral Therapy of HIV Infection in Infants and Children. Towards Universal Access. Recommendations for a public health approach. HIV/AIDS Programme-strengthening health services to fight HIV/AIDS*. Geneva, Switzerland. 7pp.

WHO (2006b), Multicentre Growth Reference Study Group. *Child Growth Standards: Length/height for age, weight for age, weight for length, weight for height and body mass index for age*. Geneva, Switzerland. [[http://www.who.int/child\\_adolescent\\_health/documents/a91064/en](http://www.who.int/child_adolescent_health/documents/a91064/en)] site visited on 02/6/2014.

WHO (2007). *HIV and Infant Feeding: New Evidence and Programmatic Experience*. World Health Organization, Geneva, Switzerland. 48pp.

WHO (2008). *HIV Transmission Through Breastfeeding. A Review of Available Evidence: 2007 Update*. World Health Organization, Geneva, Switzerland. 18pp.

WHO (2009). *Infant And Young Child Feeding. Model Chapter for Textbooks for Medical Students and Allied Health Professionals*. World Health Organization, Geneva, Switzerland 14pp.

WHO (2010a). Guidelines on HIV and Infant Feeding. Principles and Recommendations for Infant Feeding in the Context of HIV and A Summary of Evidence. WHO, Geneva. [http://whqlibdoc.who.int/publications/2010/9789241599535\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599535_eng.pdf) site visited on 18/5/2012

WHO (2010b). *Nutrition Landscape Information System. Country Profile Indicators. Interpretation Guide*. World Health Organization, Geneva, Switzerland. 1pp.

WHO (2010c). *Antiretroviral Drugs for Treating Pregnant Women and Preventing HIV Infection in Infants. Recommendations for A Public Health Approach*. World Health Organization, Geneva, Switzerland. 61pp.

WHO (2010d). Indicators for Assessing Infant and Young Child Feeding Practices. Country Profiles. World Health Organization, Geneva, Switzerland. 6pp.

WHO (2012). *Guidelines on HIV and Infant Feeding 2010. An Updated Framework for Priority Action*. World Health Organization, Geneva. 6pp.

WHO (2013). *Global Strategy for Infant and Young Child Feeding*. World Health Organization, Geneva, Switzerland. 3pp.

WHO (2014a). *March 2014 Supplement To The 2013 Consolidated Guidelines on The Use of Antiretroviral Drugs For Treating And Preventing HIV Infection*. World Health Organization, Geneva, Switzerland. 106pp.

WHO (2014b). Global Database on Child Growth and Malnutrition. Child malnutrition estimates by WHO Child Growth Standards.  
[<http://www.who.int/nutgrowthdb/database/countries/tza/en>] site visited on 06/07/2014.

WHO/UNICEF (2009). *Co-trimoxazole Prophylaxis for HIV – exposed and HIV infected Infant and Children*. World Health Organization, Geneva, Switzerland. 6pp.

World Bank (2013). Prevention of mother-to-child transmission profile.  
[<http://www.tradingeconomics.com/Tanzania/exclusive-breastfeeding-percent-of-children-under-6-months-wb-data.html>] site visited on 16/04/2014

Xanthou, M. (1998). Immune protection of human milk. National Centre for Biotechnology Information. *Biology of the Neonate* 74(2): 121 – 33.

## APPENDICES

### Appendix 1: WA, HA and WH Z-score classification

WAZ, HAZ, and WHZ score	Inference
$< -3.0$ SD	Severe Malnutrition
- 3.0 SD to - 2.0 SD	Moderate malnutrition
-1.0 SD to 2.0 SD	Normal
2.0 SD to 3.0 SD	Overweight
$\geq 3.0$ SD	Obese

---

*Source: WHO (2004)*



## Appendix 2: Questionnaire for HIV Positive Mothers

### PART A: BACKGROUND CHARACTERISTICS

**NUMBER OF QUESTIONNAIRE:** .....

**Date of interview:** .....

**Name of mother:** ..... **Age:** .....

**Marital status:**

1. Single 2. Married 3. Divorced 4. Cohabiting 5. Widow

**Level of education:**

1. None 2. Adult education 3. Some primary school 4. Completed Std 7 5. Some secondary education 6. High school and above

**Number of children:** .....

**Occupation:**

1. Housewife 2. Employed 3. Farmer 4. Business 5. Others .....

**Method of delivery:** 1. Normal 2. Caesarean Section

**Place of delivery:** 1. Birth before arrival 2. Health facility 3. TBA

**Name of the child:** ..... **Sex:** 1. Male 2. Female

**Date of Birth** .....(check child card)

### PART B: Questions for HIV positive mothers

Knowledge of mother on exclusive breastfeeding		
1. What is the importance of yellowish milk (colostrums) to a baby	1. Nutritious 2. Protection against diseases 3. I do not know 4. No importance 5. Other mention..... NB: More than one response is possible	( )
2. Do you think breast milk alone is sufficient for the baby for 0-6 months?	1. Yes 2. No	( )
3. If no, for how long is breast milk sufficient for the baby?	1. Month 2. Months 3. Months 4. Months 5. Months 6. Months	( )

	7. Other mention.....	
4. How many times per day should the baby be breastfed?	1. 3- 4 times 2. 5-6 3. On demand 4. Other (mention).....	( )
5. What is the appropriate time to start complementary foods?	1. Less than 1 month 2. 1 to 3 months 3. 4 to 5 months 4. 6 months	( )
6. What are the advantages of breastfeeding a baby? For each answer specify	1. Nutritious _____ 2. Family planning _____ 3. Economic _____ 4. Psychological _____ 5. Environmental _____ 6. Others mention _____ 7. I do not know _____ NB: More than one response is possible	( )
7. What is the right time for a mother to initiate breastfeeding after delivery?	1. Within 1 hour 2. 2-6 hours 3. After 6 hours 4. Others (Specify) ..... 5. I do not know	( )
8. Is it important to give a child any drink or medication/herbs before breastfeeding?	1. Yes 2. No 3. I do not know	( )
9. For how long is the child supposed to be exclusively breastfed?	1. 1-3 months 2. 4-5 months 3. 6 months 4. Others (Specify).....	( )
10. What do you think are the advantages of exclusive breastfeeding?	1. Nutritious 2. Family planning 3. Reduce the risk of MTCT of HIV 4. Reduce cost 5. Reduce risk of infection 6. Others (specify) ..... 7. I do not know NB: More than one response is possible	( )

11. What is the right time for a mother to stop breastfeeding her baby?	1. Less than 6 months 2. 6-11 months 3. 12-18 months 4. At 24 months/above 5. I do not know	( )
<b>Knowledge on exclusive breastfeeding practices in the context of HIV/AIDS</b>		
12. Is there a possibility of MTCT of HIV?	1. Yes 2. No 3. I do not know If No go to Qn 14	( )
13. If yes what are the modes of MTCT of HIV?	1. During pregnancy 2. During labour and delivery 3. During breastfeeding 4. All above 5. I do not know NB: More than one response is possible	( ) ( ) ( ) ( ) ( )
14. What are the factors that increase the risk of MTCT of HIV during breastfeeding?	1. Breast conditions 2. Viral load 3. Poor positioning and attachment 4. Mixed feeding 5. Re infection of HIV 6. I do not know	( )
15. What are the ways of reducing MTCT of HIV?	1. Avoid mixed feeding 2. Replacement feeding 3. EBF 4. Use of ARVs 5. Receiving counselling on infant feeding in the context of HIV/AIDS 6. Others (Specify)..... 7. I do not know NB: More than one response is possible	( ) ( ) ( ) ( ) ( ) ( ) ( )
16. How frequent is the baby supposed to be breastfed in a day?	1. Less than 5 times 2. 6 times 3. On demand(8 times and above) 4. I do not know	( )
17. How do you know that the baby wants to breastfeed?	1. Crying 2. Rooting	( ) ( )

	3. Suckling of fingers 4. I do not know NB: More than one response is possible	( ) ( )
18. Is there any benefit of emptying one breast before changing to another breast during breastfeeding?	1 Yes 2 No If the No go to Qn 20	( )
19. If yes what are the benefits	1.To get fore and hind milk 2.I do not know 3. Others (Specify) .....	( )
20. Which infant feeding option do you think is the most feasible for HIV-infected mothers?	1. EBF & early cessation before 3 months Y/N 2. EBF for six months Y/N 4. Commercial infant feeding formula Y/N 5. Animal milk (Specify)..... Y/N 6. Other (mention).....	( ) ( ) ( ) ( ) ( )
21. How many CD4 cell count at the first day attending at antenatal clinic (before receiving ARV)?	.....	
<b>Knowledge on complementary feeding</b>		
22. What is the appropriate age for complementation?	1. Below 4 months 2. 4-6 months 3. At 6 months 4. Above 6 months 5. I do not know 6. Others (Specify).....	( )
23. What are suitable foods for making complementary foods?	1. Cereals, tubers and roots 2. Fruits and vegetables 3. Legumes, meat and animal products 4. Fat/oil and sugar 5. I do not know 6. Others (Specify)..... NB: More than one response is possible	( ) ( ) ( ) ( ) ( ) ( )
24. How many times a day a child should be given complementary foods?	1. Once 2. Twice 3. Thrice 4. 4 Times	( ) ( ) ( ) ( )

	5.	I do not know				( )
	6.	Others (Specify.....)				( )
<b>Months</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
7. At 6 months						
8. 7 – 8 months						
9. 9 – 11 months						
10. 12 – 24 months						
25. Is it important to add fat/oil/milk in baby's foods?	1. Yes 2. No If the answer is yes go Qn. 26					( )
26. If yes what are the advantages?	1. To increase nutrients 2. To increase energy density 3. I do not know 4. Others (Specify)..... NB: More than one response is possible					( ) ( ) ( ) ( )

#### ATTITUDE TOWARDS EXCLUSIVE BREAST FEEDING

1 = Agree 2 = Disagree 3 = Undecided

		1	2	3
27	Breastfeeding is the most important method of feeding a baby			
28	There is no need of giving a baby colostrum			
29	The mother is supposed to initiate breastfeeding within one hour after delivery			
30	It is important to give a child any drink or medication/herbs before breastfeeding soon after birth			
31	A baby on exclusive breastfeeding for 6 months will not get enough nutrients for optimal growth and development			
32	There is no advantage of exclusive breastfeeding for 6 months			
33	Appropriate age to stop breastfeeding is when a baby reach 2 years or above			
34	A baby should be put on the breast to breastfeeding as many times as he wants			
35	There is no harm to a baby if a mother puts him to another breast before emptying the first one			
36	It is not necessary for mother to bath before breastfeeding her baby			
37	It is not recommended to breastfeed baby when a mother is pregnant			

**ATTITUDE TOWARDS BREASTFEEDING IN THE CONTEXT OF HIV/AIDS****1 = Agree 2 = Disagree 3 = Undecided**

		<b>1</b>	<b>2</b>	<b>3</b>
38	All HIV +ve mothers can transmit HIV to their babies			
39	All HIV +ve mothers can transmit HIV to their babies if they choose to breastfeed			
40	A HIV +ve mother can transmit HIV to their baby during pregnancy			
41	A HIV +ve mother can transmit HIV to her baby during labor and delivery			
42	A HIV +ve mother can transmit HIV to her baby through breastfeeding			
43	Mixed feeding is one of the factors that increase the risk of MTCT of HIV			
44	Feeding using commercial infant formula for the first six months is the best infant feeding option for HIV +ve mother			
45	Exclusive breastfeeding is one of the ways of reducing MTCT of HIV			
46	Exclusive breastfeeding for the first 6 months is one of the infant feeding options for HIV infected mothers			
47	If a breastfeeding mother conceive before her baby reaches 2 years she should stop breastfeeding			
48	If a mother travels for few days she cannot breastfeed again after coming back because her milk will be sour			
49	A HIV +ve mother can administer to ingest ARV regiment every day			

**ATTITUDE TOWARDS COMPLEMENTARY FEEDING****1 = Agree 2 = Disagree 3 = Undecided**

		<b>1</b>	<b>2</b>	<b>3</b>
50	When a child reaches six months it is considered to be appropriate age for complementation			
51	Variety of foods which are locally available should be used for making complementary foods			
52	A child aged 6 months should be given complementary foods at least 2 times in a day			
53	A child aged 7-8 months should be given complementary foods at least 3 times in a day			
54	A child aged 9-11 months should be given complementary foods at least 4 times in a day			
55	A child aged 12-24 months should be given complementary foods at least 5 times in a day			
56	It is not allowed to give a baby any food or drink even water in the first six months of life unless prescribed by a qualified health worker.			
57	It is it important to add fat/oil/milk in baby's foods			

<b>PRACTICE ABOUT INFANT FEEDING IN GENERAL</b>		
58. When did you initiate breastfeeding after delivery	1. Within 1 hour 2. 2-6 hours 3. After 6 hours 4. Others (Specify).....	( )
59. How do you hold your baby for	1. The first time after delivery? 2. Skin to skin contact 3. A baby wrapped in a cloth 4. Others (specify).....	( )
60. Did you give your child colostrums?	4. Yes 5. No	( )
61. Did you give any drink or medication/herbs before breastfeeding?	1. Yes 2. No	( )
62. For how long did you exclusively breastfeed your child?	.....	( )
63 Are you still breastfeeding your child?	1. Yes 2. No If No go to Qn 68	( )
64. When will you expect to stop breastfeeding your child?	Months.....	
65. When did you stopped to breast feed your child? Months.	Months.....	
66. Why?	.....	
67. If the baby age is less than six months how many times in the day do you breastfeed your baby	.....	
68 For how long your baby breastfeed on one breast?	1. Less than 15 minutes 2. 15 - < 25 minutes 3. 25 and above	( )
69. How do you hold your baby for the first time after delivery?	1. Skin to skin contact 2. A baby wrapped in a cloth 2. Others (specify).....	( )
<b>PRACTICE ON COMPLEMENTARY FEEDING</b>		
70. When did you start to give your child complementary foods?	Months.....	
71. Which type of foods did you use to prepare complementary foods for your baby?	1. Cereals, tubers and roots 2. Fruits and vegetables 3. Legumes, meat and meat products	( )

	4. Fat/oil and sugar 5. Others (specify)	
72. Which type of foods did you use to prepare complementary foods for your baby?	1. Cereals, tubers and roots 2. Fruits and vegetables 3. Legumes, meat and meat products 4. Fat/oil and sugar 5. Others (specify)	( )
73. Which type of foods did you use to prepare complementary foods for your baby?	.....	
74. How many times in a day do you feed your baby complementary foods?	.....	
75. What do you add in your baby's foods?	1. Fats/oils 2. Milk 3. Sugar 4. Salt 5. Nuts 6. Others (Specify)..... NB: More than one response is possible	( )
<b>BARRIERS ON INFANT FEEDING GENERAL</b>		
76. Have you disclosed your HIV status to anyone?	1. Yes 2. No	( )
77. To whom did you disclose your status?	1. Husband/Spouse 2. My mother 3. My in laws 4. Others mention.....	( )
78. Did you experience any breastfeeding problems?	1. Yes 2. No	( ) If No go to Qn 80
79. If yes, What was the problem	1. Abscess 2. Mastitis 3. Sore/cracked nipples 4. Others (mention).....	( )
80. How did you manage the problem?	1. Express breast milk 2. Went to hospital for advice 3. Rub local herbs on it 4. Others (mention).....	



81. What do you think are the reasons for mothers not Breastfeeding exclusively?	1. Lack of information 2. Work demand 3. Insufficient breast milk 4. Traditions and cultural beliefs 5. Other (mention) .....	( ) If No go to Qn 84
82. Are there any difficulties that hinder you to receive ARV regiment?	1. Yes 2. No	( )
83. Why?	.....	
84. When did you diagnose that you are HIV-positive? (Year and Month)	.....	
85. Is your child tested for HIV status?	1. Yes 2. No	
86. Which option chosen after counseling for your baby?	.....	

#### Nutritional status of the child

Weight:..... Height (For child above 6 months).....

### Appendix 3: Questionnaire for Health Workers

Questionnaire number   Date

day month year

Complete this section before the interview.

Name of the health care facility \_\_\_\_\_

Location/district: .....

Ward.....

Level of health facility: Hospital ☐ H/C ☐ Dispensary ☐

Name of the Health Worker:-----

Sex : -----1.Female 2.Male

Title:-----

Education Level: ----- 1) Primary 2) Secondary 3) High

Have you been trained on the following? 1. Infant feeding 2. PMTCT 3. ENA 4. Nutrition  
for PLWHIV/AIDS

*My signature below indicates that the nature and purpose of this interviewing tool will be explained to those staff that consented to answer questions on the basis of anonymity and confidentiality before this tool will be administered.*

Name of interviewer:.....

Signature of interviewer:.....

KNOWLEDGE ON INFANT FEEDING IN CONTEXT OF HIV/AIDS		
No	Question	Key
1.	What is the right time for a mother to initiate breastfeeding after delivery? 1. Within one hour 2. 2-6 hours 3. After six hrs 4. I don't know 5. Others mention.....	( )
2.	What are the advantages of early initiation of breastfeeding? 1.Aid milk production 2.Prevent postpartum haemorrhage 3.Provide colostrums for a baby 4. I don't know 5.Others (specify).....	( )

3	<p>In your opinion, what are the optimal breastfeeding practices</p> <ol style="list-style-type: none"> <li>1. Skin to skin contact and early initiation</li> <li>2. Giving colostrums</li> <li>3. Breastfeeding on demand</li> <li>4. Exclusive breastfeeding for six month</li> <li>5. Timely introduction of complementary foods</li> <li>6. Continued bf for two years or beyond</li> <li>7. Others (specify).....</li> </ol> <p>NB: More than one response is possible.</p>	( )
4	<p>Have ever heard about BFHI?</p> <ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	If No go to question no. 6
5	<p>If yes, what are the steps to make the hospital Baby Friend?</p> <p>.....</p>	
6	<p>What is the appropriate age for complementation?</p> <ol style="list-style-type: none"> <li>1. Below 4 months</li> <li>2. At 4-6 months</li> <li>3. At 6 months</li> <li>4. Above 6 months</li> <li>5. Others (specify).....</li> </ol>	( )
7	<p>What are the advantages of breastfeeding for infant born to HIV positive mothers?</p> <ol style="list-style-type: none"> <li>1. Complete nutrition</li> <li>2. Protection against diseases</li> <li>3. Good growth and development</li> <li>4. Reduce MTCT of HIV</li> <li>5. Others (specify) .....</li> </ol>	( )
8	<p>Is there a possibility of MTCT of HIV?</p> <p>Yes</p> <p>No</p> <p>I do not know</p>	( )
9	<p>If yes what are the modes of MTCT of HIV?</p> <ol style="list-style-type: none"> <li>1. During pregnancy</li> <li>2. During labour and delivery</li> <li>3. During breastfeeding</li> <li>4. I do not know</li> <li>5. Others (specify).....</li> </ol>	( )

10	What are the infant feeding options for HIV positive mothers? 1. Breastfeeding 2. Replacement feeding (using commercial infant formula) 3. Others (specify).....	( )
11	What are the factors that increase the risk of MTCT of HIV during breastfeeding? 1. Breast conditions 2. Viral load 3. Poor positioning and attachment 4. Mixed feeding 5. Re infection of HIV 6. I do not know 7. Others (specify).....	( )
12	What are the ways of reducing MTCT of HIV? 1. Avoid mixed feeding 2. Replacement feeding 3. EBF 4. Use of ARVs 5. Receiving counseling on infant feeding in the context of HIV/AIDS 6. I do not know 7. Others (Specify).....	( )
13	Are you informed about the revised PMTCT guidelines (2010) in line with WHO recommendations on infant feeding options for HIV positive mothers? 1. Yes 2. No	If No, go to Qn. 15  ( )
14	If yes, explain what does it recommend ( probe on these) 1. Animal milk is no longer a feeding option for infants below six months 2. ARV prophylaxis for mothers/babies 3. Duration of breastfeeding for HIV positive mothers should not exceed one year 4. Others mention.....	( )
15	What supplements should be given to breastfeeding mother after delivery 1. Vit A 2. FeFO 3. Others (specify).....	( )

16	What do you think are the important issues to consider when counselling a mother on infant feeding 1. Enough time 2. Privacy 3. Confidentiality 4. Counselling skills 5. Infant feeding knowledge 6. Others.....	( )
17	Are the positive HIV mothers disclosed their HIV status? 1. Yes 2. No	( )
18	If yes how many are they? 1. Three months..... 2. Six months ..... 3. Nine months..... 4. Twelve months..... 5. Others mention.....	If No, go to Qn. 19
19	Is the positive HIV mothers received TBAs assistance during delivery? 1. Yes 2. No	( )
20	If yes how many are they for the last three months?.....	( )
21	Do you have any list of attendance of positive HIV mothers drop out in your facility?	
22	If yes how many are they for the past.... 1. Three months 2. Six months 3. Nine months 4. Twelve months	( ) ( ) ( ) ( )
PRACTICE ON INFANT FEEDING IN CONTEXT OF HIV/AIDS		
23	How long do you usually give a baby to a mother after delivery? 1. Within an hour 2. After one hour 3. As soon as she is able to respond (after C-section with general anaesthesia) 4. Other (specify).....	( )
24	How do you assist a mother to hold a baby for the first time after delivery 1. Skin to skin contact	( )

	2. Wrapped without much skin to contact 3. Others (specify).....	
25	How long do you allow the mother to hold the baby skin to skin for the first time? 1. Less than 30 minutes 2. 30 minutes 3. 60 minutes 4. Other (Specify).....	( )
26	Do you support a mother to initiate breastfeeding? 1. Yes 2. No	If No, go to Qn.28 ( )
27	If yes what support do you provide? 1. Positioning and attachment 2. Show different positions 3. Make her comfortable 4. Provide some food/drink 5. Others (specify).....	( )
28	What are the signs showing that a mother have positioned her baby correctly to the breast? 1. Baby's head and body in line 2. Baby held close to mother's body 3. Baby's whole body supported 4. Baby approaches breast, nose to nipple 5. Others.....	( )
29	What are the signs showing that a mother have attached her baby correctly to the breast? 1. More areola seen above baby's top lip 2. Baby's mouth open wide 3. Lower lip turned outwards 4. Baby's chin touches breast 5. Others.....	( )
30	Do you give anything other than breast milk to babies after delivery? 1. Yes 2. No	If No, go to Qn.32 ( )
31	If yes what do you give? 1. Infant formula 2. Water or glucose 3. Other fluids (specify).....	( )

32	How is it given? 1. Feeding bottle 2. Cup and spoon 3. Cup 4. Other (Specify).....	( )
33	Why do you give those things 1. Baby is hungry 2. Delayed milk production 3. Others (specify).....	( )
34	Do you provide information on infant feeding issues before discharging mothers who delivered? 1. Yes 2. No	If No, go to Qn. 36
35	If yes what information do you give? 1. Exclusive breastfeeding 2. How to maintain milk production 3. Positioning and attachment 4. Duration of feed 5. How to prevent breast problems 6. Where to get support in case of any problem? 7. Others(specify).....	( )
36	What supplements do you give to mothers after delivery 1. Vitamin A 2. Iron tablets 3. Folic acid 4. Other (specify ).....	( )
37	Do you give any information about maternal nutrition to mothers before discharge? 1. Yes 2. No	If No, go to Qn.39 ( )
38	If yes what information do you provide? 1. Increased amount of food 2. Increased frequency of eating 3. Eat iron rich foods 4. Eat Vitamin A rich foods 5. Use Iodised salt 6. Diversity diet	( )

	7. Improved quality of foods 8. Others (Specify).....	
39	Do you give any support to HIV infected mothers? 1. Yes 2. No	If No, go to Qn.41 ( )
40	If yes what kind of support do you provide? 1. Counselling on infant feeding 2. Care and treatment of HIV exposed infant 3. ARV for mothers 4. Others (Specify).....	( )
41	Does this health facility have a private room for demonstration on preparation of milk feeds? 1. Yes 2. No	If No, go to Qn. 43 ( )
42	Do mothers do return demonstration on preparation of milk feeds? 1. Yes 2. No	( )
43	Do you use infant feeding job aids (counselling kit) during counselling 1. Yes 2. No	( )

<b>ATTITUDES ON INFANT FEEDING IN CONTEXT OF HIV/AIDS</b>				
<b>Key:</b> Put the following numbers 1= Agree 2=Disagree 3= Undecided				
No.	Question/statement	1	2	3
44	All HIV positive mothers can transmit HIV to their babies			
45	All HIV positive mothers can transmit HIV to their babies if they choose to breastfeed			
46	A HIV +ve mother can transmit HIV to their baby during pregnancy			
47	A HIV +ve mother can transmit HIV to her baby during labour and delivery			
48	A HIV +ve mother can transmit HIV to her baby through breastfeeding			
49	Bottle feeding is advised to be used for feeding the baby			
50	Vitamin A is the supplement recommended to be given to mother after delivery			
51	Confidentiality is one of the requirement when counselling a mother on infant feeding			
52	Feeding using commercial infant formula for the first six months is the best infant feeding option for HIV positive mothers			
53	Complementary food should be introduced to the baby at age of (4-6) months			
54	Implementation of the 10 steps for successfully breast feeding is the basic			



	requirement for a health facility to be Baby friend			
55	It is not allowed to give a baby any food or drink, even water in the first six months of life unless medically indicated			
56	It is responsibility of a health worker to decide feeding option for HIV positive mothers			
57	Support groups in the community are important agents for positive changes in infant feeding			
58	If a mother travels for few days she can not breastfeed again after coming back because her milk will be sour			
59	If a breastfeeding mother conceive before her baby reach 2yrs she should stop breastfeeding			