REVIEW OF PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV IN ADDIS ABABA, ETHIOPIA

by

TEFERA GIRMA NEGASH

Submitted in accordance with the requirements for the degree of

DOCTOR OF LITERATURE AND PHILOSOPHY IN HEALTH STUDIES

at the

UNIVERSITY OF SOUTH AFRICA

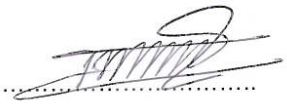
SUPERVISOR: PROF VJ EHLERS

JUNE 2014

Student number: 4201-473-5

DECLARATION

I declare that **REVIEW OF PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV IN ADDIS ABABA, ETHIOPIA** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before any other degree at any other institution.



09/06/2014

Tefera Girma Negash **Date**

Acknowledgements

I want to thank the following persons and institutions for their respective contributions to this dissertation.

- A special thank you to my supervisor Prof VJ Ehlers for her guidance, support and encouragement.
- UNISA's Professors, UNISA-Ethiopia regional learning center staff and guest lecturers who assisted me during the proposal development and data analysis phases of this study.
- Addis Ababa City Administration Health Bureau Ethical Committee for reviewing my application timeously and for allowing me to conduct this study in the health facilities under their jurisdiction.
- My employer for granting me leave during different phases of the research that required my absence from the office.
- Fellow UNISA doctoral students who provided valuable feedback during the proposal development programme.
- Mr Tsegaye Hailu for his assistance with data analysis and the interpretation of the statistics.

REVIEW OF PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV IN ADDIS ABABA, ETHIOPIA.

STUDENT NUMBER: 4201-473-5

STUDENT: TEFERA GIRMA NEGASH

DEGREE: DOCTOR OF LITERATURE AND PHILOSOPHY IN HEALTH STUDIES

DEPARTMENT: HEALTH STUDIES, UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: PROF VALERIE JANET EHLERS

ABSTRACT

This study aimed to identify factors affecting women's utilisation of the prevention of mother-to-child transmission (PMTCT) of HIV, evaluate the quality of PMTCT services, describe health outcomes of mothers and infants and to identify factors that influence mother-to-child transmission (MTCT) of HIV. Structured interviews were conducted with 384 women who had utilised PMTCT services. Information was also obtained from the health records of these women and of their infants.

Better educated women, who had male partners and were self-employed were more likely to use PMTCT services. Being unmarried, poor and feeling stigmatised made it difficult for women to use these services.

Respondents were satisfied with PMTCT services except that clinics sometimes had no medications. The health care workers followed the Ethiopian guidelines during HIV testing and counseling but not when prescribing treatment.

Although the respondents' CD4 cell counts improved, their clinical conditions did not improve.

The MTCT rate was significantly higher if infants did not receive ARVs, had APGAR scores below seven, weighed less than 2.5kg at birth, were born prematurely, and if their mothers had nipple fissures.

PMTCT services could be improved if more women used these services, health care workers followed the national guidelines when prescribing ARVs, clinics had adequate supplies of medicines, all infants received ARVs, and mothers' nipple fissures could be prevented. Antenatal care should help to avoid premature births of infants weighing less than 2.5kg and having APGAR scores below 7.

Future research should compare formula feeding versus breastfeeding of infants with HIV-positive mothers.

KEY CONCEPTS: APGAR score, antenatal care (ANC) , antiretroviral therapy (ART), antiretrorivals (ARVs), Donabedian's Model of Health Care Quality, Ethiopian health care services, Health Belief Model (HBM), HIV/AIDS, HIV counseling and testing, infant feeding options, mother-to-child transmission of HIV (MTCT), nipple fissures, partner testing; prevention of mother to child transmission of HIV (PMTC)

TABLE OF CONTENTS

CHAPTER 1

ORIENTATION TO THE STUDY

CHAPTER 2

LITERATURE REVIEW

CHAPTER 3

RESEARCH DESIGN AND METHOD

CHAPTER 4

ANALYSIS, RESULT AND DISCUSSION OF RESEARCH FINDINGS

CHAPTER 5

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

LIST OF TABLES

LIST OF FIGURES

ANNEXES

LIST OF ABBREVATIONS

AIDS: Acquired Immune Deficiency Syndrome

ANC: Antenatal care

APGAR: appearance, pulse rate, grimace, activity and respiration

AZT: Zidovudine

ART: Antiretroviral therapy

ARV: Antiretroviral

BMI: Body mass index

BMSs: Breast milk substitutes

CVI: Content validity index

ddI: Didanosine

DNA: Deoxi-ribonucleic acid

D4T: Stavudine

EBF: Exclusive breast feeding

EF: Expected frequency

EID: Early infant diagnosis

EVF: Efavirenz

FMOE: Federal Ministry of Education

FMOH: Federal Ministry of Health

FTC: Emitricitabine

HAART: Highly active antiretroviral therapy

HEI: HIV exposed infant

HIV: Human Immune Deficiency Virus

HTC: HIV testing and counseling

MCM: Myungsung Christian Medical Center

MTCT: Mother to child transmistion

NFV: Nelfinavir

NNRTI: Non-nucleoside reverse transcriptase inhibitor

NVP: Nevirapine

OF: Observed frequency

PCR: Polymerase chain reaction

PHCUs: Primary health care units

PI: Protease Inhibitor

PITC: Provider-initiated HIV testing and counselling.

PLHIV: People living with HIV

PMTCT: Prevention of mother to child transmission

sdNVP: Single dose nevirapine

SSA: Sub-Saharan Africa

STI: Sexually transmitted infection

3TC: Lamivudine

TB: Tuberculosis

TDF: Tenofovir

UNAIDS: The Joint United Nations Programme on HIV/AIDS

UNGASS: United Nations General Assembly special session on HIV/AIDS

URTI: Upper respiratory tract infection

UTI: Urinary tract infection

VCT: Voluntary counselling and testing

WHO: World Health Organization

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

The Human Immune Deficiency Virus (HIV) can be transmitted from an infected mother to her unborn baby (foetus) during pregnancy, delivery or breast feeding. This virus can be transmitted to the foetus as early as during the 1st and 2nd trimesters of pregnancy. Nevertheless, mother-to-child transmission (MTCT) occurs most commonly during the perinatal period. In the absence of prevention of mother to child transmission (PMTCT) interventions, the probability of MTCT is 15-25% in developed countries and 25-35% in developing countries. The factors associated with higher levels of MTCT include high levels of maternal plasma viraemia and low maternal CD4 cell counts (Fauci & Lane 2005:1082). The use of recommended PMTCT interventions can reduce MTCT to less than 5% in breast feeding populations and to less than 2% in non-breast feeding populations (World Health Organization [WHO] 2010a:12).

Following the 2001 declaration of commitment at the United Nations General Assembly Special Session on HIV/AIDS (UNGASS), considerable progress has been made by PMTCT programmes. In 2009, 53% of pregnant women living with HIV received some antiretroviral medications (ARVs) for PMTCT in low and middle income countries. During the same year, the Joint United Nations Programme on HIV/AIDS (UNAIDS) called for “virtual elimination” of MTCT. This call finally led to global goals and targets for the “virtual elimination” of MTCT by 2015. Hence, the global target for MTCT is to reduce the number of new HIV infections among children by 90% and reduce the

number of AIDS-related maternal deaths by 50%. There are four elements/prongs that are helpful to reduce the incidence of MTCT:

- primary prevention of HIV infections
- family planning
- antiretroviral therapy (ART) interventions, as well as
- care, treatment and follow-up.

The intent of primary prevention is to prevent HIV infections among pregnant women. Programmes must be integrated within the overall HIV prevention efforts. In this way it is possible to decrease the number of HIV-positive women who become pregnant. Pregnant women, who utilise ante natal care (ANC) services and test HIV-negative, should be targeted for appropriate behavioural interventions to remain HIV-negative.

The 2nd prong is to prevent unintended pregnancies among all women, including those who are HIV-positive, by providing effective and accessible family planning services. The goal of the 3rd prong is to maximise the health of the HIV-positive mother and decrease the chances of MTCT, by decreasing the viral load (VL) and increasing the CD4 count and maintaining the maximum level of health throughout pregnancy. So, the target population to reduce MTCT rates comprises all HIV-infected pregnant women and all HIV-exposed infants. The interventions for this prong include HIV counseling and testing of all pregnant women, lifelong ART for all eligible women and anti-retroviral (ARV) prophylaxis for HIV-positive pregnant women and all infants who are not eligible for ARV and safer infant feeding practices. The major emphasis of prong 4 is improving survival through ongoing chronic care and treatment for HIV-infected pregnant/post partum women and their HIV-exposed and HIV-infected children (WHO 2011a:1-12).

The 2010 revised PMTCT (WHO 2010) guideline is based on two key approaches: lifelong ART for HIV-infected women in need of treatment for their own health; and ARV prophylaxis for PMTCT during pregnancy, delivery and breast feeding for HIV-infected women who are not in need of treatment. For HIV-positive pregnant women, initiation of

ART is recommended when the CD4 cell count is ≤350cells/mm^3, irrespective of the WHO clinical stage or for all women in WHO clinical stages 3 or 4, irrespective of CD4 cell count. HIV-infected pregnant women, in need of treatment for their own health, should start ART irrespective of gestational age and should continue throughout pregnancy, delivery, breast feeding and for the rest of their lives. The preferred first line recommended ARV regimen in pregnancy include Zidovudine (AZT) and Lamivudine (3TC) back bone combined with a non-nucleoside reverse transcriptase inhibitor (NNRTI): AZT and 3TC+Nevirapine (NVP) or AZT and 3TC and Efavirenz (EFV). Alternative recommended regimens are: Tenofovir (TDF) and 3TC (Emitricitabine (FTC)) and NVP or TDF and 3TC (FTC) and EFV. Maternal ART should be coupled with the daily administration of NVP or twice daily AZT to infants from birth or as soon as feasible thereafter until the child is 4-6 weeks old, irrespective of the mode of infant feeding (WHO 2010a:2).

ARV prophylaxis should be started as early as gestational age of 14 weeks or as soon as possible during pregnancy, delivery, post partum or during the breast feeding period. For all pregnant women who are not in need of ART, there are two equally efficient ARV prophylaxis options recommended. The choice of these options should be made at country level by considering the capacity of the country and advantages and disadvantages of the options. Option A comprises maternal AZT and infant ARV prophylaxis while option B supports maternal triple ARV prophylaxis. Option A should be coupled with daily administration of NVP to the breast feeding infant from birth or as soon as feasible thereafter until at least 4-6 weeks of age and until one week after cessation of all breast milk exposure. Infants who receive replacement feeding have only option A, which should be coupled with daily NVP or Sd-NVP + twice daily AZT from birth until 4-6 weeks of age. For option B, infants should be provided with daily NVP or twice daily AZT from birth until 4-6 weeks of age (WHO 2010:3-4). Ethiopia has adopted the WHO 2010 guideline with option A and started implementation of the programme during December 2011 (FMOH 2011:1).

By the end of June 2013, the WHO has released a new consolidated guideline on the use of ARV for treatment and prevention including new recommendations for PMTCT. All HIV-infected pregnant and breast feeding women should start triple ARVs and continue treatment for at least the period of MTCT, during breast feeding. In generalised epidemics, the ART treatment should be continued for life. This approach is option B+. A once daily fixed dose combination of TDF+3TC (FTC)+EFV is recommended. The infant should receive six weeks of prophylaxis with once daily NVP, if breast fed. If the infant is on replacement feeding, he/she should receive 4-6 weeks of prophylaxis with once daily NVP or twice daily AZT (WHO 2013:100). In August, 2012 Ethiopia endorsed the new PMTCT approach, namely option B+. The implementation of the programme is being phased-in during 2013. This option was adopted even prior to the release of the new consolidated WHO ARV guideline. The adoption was based on the WHO programme update released during April 2012 about the use of ARVs for treating pregnant women and preventing HIV infection in infants (FMOH 2013:2).

It is anticipated that adopting the new PMTCT guideline should help to improve the quality of PMTCT services. Quality PMTCT services can improve patient satisfaction and health outcomes. Hence, patient satisfaction can serve as a measure of the quality of PMTCT services. Patient satisfaction refers to attitudes towards care and/or treatment provided by the health system. Clinical quality is one aspect of patient satisfaction (Kronenfeld 2007:7). Patient satisfaction is a summation of a patient's experiences in the hospital and/or with the health services. Satisfaction can be high or low. Patient satisfaction is not only an indicator of quality of care but also a component of quality care. When patients are satisfied they are likely to be more trusting, less stressed, less intimidated by staff and more collaborative during any aspect of care. Trust results in greater compliance with and greater tolerance of frightening procedures. When patients become less stressed, medical outcomes improve (Press 2006:10-15).

1.2 BACKGROUND INFORMATION ABOUT THE RESEARCH PROBLEM

In this section the source of the research problem, the global HIV/AIDS burden, HIV/AIDS prevalence, historical and geographical background, population and health system of Ethiopia will be discussed.

1.2.1 The source of the research problem

There are three sources of this research problem. First the investigator has many years of HIV/AIDS-related work experience. During these years he noticed a major gap in the PMTCT progamme. While undertaking site visits to hospitals and health centers, and having discussions with experts in the area, it became apparent the PMTCT programme is lagging behind other HIV/AIDS programme areas. Activities of the PMTCT programme are failing to reach its targets. While there is a global plan towards virtual elimination of MTCT, the Ethiopian PMTCT programme did not make progress as expected.

The second source of the research problem is a literature review of research undertakings in Ethiopia. All of them show that the programme is underutilised. A study from the Jimma zone, in the South Western region of Ethiopia, found that the effective coverage of PMTCT in this area was very low; only 1.1% of the target group (all pregnant women) utilised the service. The researchers recommended improved PMTCT service coverage through the enhanced implementation of the strategies of Ethiopia's Federal Ministry of Health (FMoH) to increase the utilisation of PMTCT services at hospitals and health centers. PMTCT services were also recommended to be decentralised to primary health care units (PHCUs) and counselors should get adequate training (Hussein, Jira & Girma 2011:6).

The third reason is the report of the FMoH of Ethiopia. This progress report shows that the number of health facilities providing PMTCT service has increased from 32 in 2004

to 1 352 in 2010 and to 1 445 by the end of June 2011. However, in 2011 the percentage of HIV-positive women who received ARVs to reduce the risk of MTCT was only 24%, indicating missed opportunities to reduce the impact of HIV/AIDS in Ethiopia (FMOH/HAPCO 2012:30). Furthermore MTCT rate, health status of the mother and patient satisfaction with PMTCT services require further investigations to evaluate the impact of the PMTCT programme in Ethiopia so that recommendations can be made to improve these services.

1.2.2 Global HIV/AIDS burden

During 2009, an estimated 2.6 million people were newly infected with HIV worldwide. However, in 33 countries the incidence has fallen by 25% between 2001 and 2009. In Sub-Saharan Africa (SSA), 1.8 million people became infected during the same period. The annual number of AIDS-related deaths decreased from 2.1 million in 2004 to 1.8 million in 2009. This could be due to the increased availability of ART, care and support particularly in low and middle income countries. Globally, the number of deaths among children, younger than 15 years of age, is also declining. The estimated 260 000 deaths in 2009, were 19% lower than the estimated 320 000 AIDS-related deaths in 2004. This trend is attributable to the increased expansion of ART programmes, including PMTCT services. The global number of people living with HIV/AIDS in 2009 was estimated to be 33.3 million (UNAIDS 2010:16-30).

In 2011, globally 34 million people were living with HIV. SSA is still the most severely affected region with 4.9% HIV prevalence which accounts for 69% of all people living with HIV worldwide. The number of new infections is declining globally. During 2011, 2.5 million persons were newly infected with HIV which is a 20% decline from 2001. The sharpest decline has been observed in the Caribbean (42%) and SSA (25%) regions. The number of deaths from AIDS-related causes declined since 2000 because of ART expansion. In 2011, 1.7 million people died from AIDS-related causes worldwide. This is a 24% decline since 2005. In SSA alone, the decline was 32% (UNAIDS 2012:6-12).

However, the number of people living with HIV/AIDS in 2012 was 35.3 million because more people were receiving life-saving ART. During the same year there were 2.3 million newly HIV infected people globally which is a 33% decline from 2001. At the same time the number of people dying from HIV/AIDS was 1.6 million, down from 2.3 million in 2005 (UNAIDS 2013:4).

1.2.3 HIV/AIDS prevalence in Ethiopia

The HIV prevalence in Ethiopia is 1.5% among adults aged 15-49. Among men the prevalence is 1.0% while among women it is 1.9%. However, the prevalence in Addis Ababa is higher at 5.2% with the prevalence among men being 4.3% and among women 6.0%. The HIV prevalence among ANC attendees for the last birth during the preceding three years in the public sector was 1.7% while it was 3.1% outside the public sector (CSAE/ICFI 2012:232-236). Since Addis Ababa has a relatively high HIV prevalence, compared to Ethiopia's national HIV prevalence, it is reasonable to have sound PMTCT and other HIV/AIDS services in this area, and to conduct research about the impact of these services on the MTCT rates.

1.2.4 Historical and geographical background information about Ethiopia

Ethiopia is located in the eastern part of Africa with a total surface area of about 1.1 million square kilometers. Countries that border Ethiopia are Djibouti, Republic of South Sudan, Republic of Sudan, Eritrea, Kenya and Somalia. Ethiopia's map is found in annexure 21. Historically Ethiopia was ruled by emperors and kings, with a feudal system of government. A military junta took the power by force and administered the country from 1974-1991. Currently a federal system of government exists and political leaders are elected every five years. Ethiopia is administratively structured into nine regional states namely Tigray, Afar, Amhara, Oromya, Somali, Benishangul-Gumuz, Southern Nations Nationalities and People, Gambela and Harari and two city administrations, namely Addis Ababa and Diredawa (CSAE/ICFI 2012:1).

1.2.5 Population and health system of Ethiopia

According to the 2007 census report of Ethiopia, the country's estimated population was 73 750 930. Out of these 37 217, 130 were males and 36 533 802 were females. The country's population predominantly lives in rural areas (84.0%). In Addis Ababa the total population was 2 739 551 with a male to female ratio of 0.48:0.52 (Population Census Commission [PSC] 2007:7).
The Ethiopian health care system comprises a three tier system:

- primary health care units (PHCUs)
- general hospitals and
- specialised hospitals.

The PHCU has five satellite health posts, a health center and a primary hospital. Each health post is expected to serve 5 000 people, each health center 25 000 people and each primary hospital 100 000 people. The general hospital serves 1 000 000 people while the specialised hospital serves 5 000 000 people (FMOH 2010:2). During the last five years, 34% of Ethiopian women received ANC from skilled health care providers, mainly nurses and/or trained midwives (28%). Only 11% of these women received ANC before the fourth month of their pregnancies and 19% recorded four or more ANC visits.

Only 10.0% of Ethiopian births occurred at public health facilities. Home deliveries in rural areas were 95.0% and in urban areas 50.0%. Postnatal care coverage is extremely low in Ethiopia with only 7.0% of women receiving postnatal checkups within two days of delivery. The maternal mortality rate for Ethiopia is 676 deaths per 100 000 live births. Breast feeding is a common practice in Ethiopia with 98.0% of mothers breastfeeding their babies at some stage and 52.0% of them practising exclusive breast feeding during the first six months of their babies' lives. Reportedly, 51.0% of children aged 6-9 months in Ethiopia are eating supplementary food (CSAE/ICFI 2012:119).

1.3 PMTCT AND VIRTUAL ELIMINATION OF HIV

A global plan strives to attain “virtual elimination” of new HIV infections among children and improve the health of mothers by 2015. This ambitious plan aims to reduce new HIV infections among children by 90%, reduce the number of women dying from HIV-associated conditions during pregnancy, delivery and postpartum by 50% and reduce MTCT of HIV to less than 5%. In 2010, 35% of pregnant women in low and middle income countries received HIV counseling and testing (HCT) compared to 26% in 2009. In SSA this coverage increased from 35% to 42% with the highest increase in eastern and southern Africa (from 52% to 61%). In 2010 the coverage of effective regimens for PMTCT was 48%. Out of the estimated 1.49 million infants born to HIV-infected mothers, 42% received ARVs to prevent HIV infections from their mothers (WHO 2011b:139).

According to a study done in China, risk factors significantly associated with low birth weight babies, included low maternal weight at enrolment, gestational age of less than 37 weeks at delivery, low CD4 cell count (200cells/µl or lower) and high HI viral load (≥20,000 copies/ml). Preterm delivery occurred in 9.8% of mother-infant pairs. The only factor associated with preterm delivery was maternal HIV infection through drug use as compared to sexual transmission of HIV infection. Therefore optimal ANC is critical to PMTCT intervention for reduction of MTCT and prevention of low birth weight pregnancy outcomes (Lan, Wen-ying, Chen, Zhi-rong, Jun, Xiu-zhi, Xiu-ning & Fu-jie 2012:405). In Thailand, despite positive effects of ART on the reduction of morbidity and mortality, ARVs were also associated with adverse drug reactions such as anaemia, nausea and vomiting. PMTCT was able to reduce the perinatal transmission of HIV to 3.9% and the incidence of preterm delivery was 10.7%. The incidence of low birth weight was high (20%). Antenatal care (ANC) should be emphasised for all HIV-positive pregnant women in addition to PMTCT services (Areechokchai, Bowonwatanuwong, Phonrat, Pitisuttithum & Maek-a-Nantawat 2009:12). A French

study reported that out of 404 responses to items, related to satisfaction with physicians and services, 15.6% of PLHIV showed complete satisfaction. Factors associated with complete satisfaction with physicians included older age, having being infected by HIV through sexual contact, not being infected with Hepatitis C, comfortable housing conditions, enjoying strong support from friends and experiencing few side effects from ARVs (Preau, Protopopescu, Raffi, Rey, Chene, Marcellin, Perronne, Ragnaud, Leport & Spire 2012:436).

According to a study done in Abidjan, Cote d'Ivoire, highly active anti-retroviral treatment (HAART) during pregnancy among women with advanced HIV, reduced MTCT to 2.3% but it was associated with low birth weight babies. Additionally low body mass index of the mother was also associated with low birth weight babies (Ekouevi, Coffie, Becquet, Tonwe-Gold, Horo, Thiebaut, Leroy, Blanche, Dabis & Abrams 2008:1819). The same finding has been documented from a study done in Cameroon with a MTCT rate of 4.5%. In the Cameroonian study, the main risk factor identified with MTCT was the type of ARV regimen, but the mode of infant feeding, gestational age at delivery and birth weight were not associated with higher rates of MTCT (Nlend, Ekobo, Junior, Ekani, Tchokoteu, Lyeb, Chewa, Moyo & Takam 2001:5). A study from Abidjan, Cote d'Ivoire, revealed that among HIV-positive children who were not treated with ARVs, the risk of morbidity was 42% with at least one HIV-related condition. Accordingly, at least some clinical complications such as persistent diarrhoea, fever and pneumonia are preventable with early initiation of ART among children infected with HIV (Desmonde, Coffie, Aka, Amani-Bosse, Messou, Debis, Alioum, Ciaranell & Leroy 2011:10).

A different study from Cote d'Ivoire indicated that HIV testing was not proposed to women attending ANC before the introduction of the PMTCT programme. However, after the introduction of the programme, 63% of women attending ANC, were offered HIV testing and 42% of these were tested. Among those who tested HIV-positive, 82% of the mothers and 78% of their infants received Niverapine (NVP). Interpersonal

communication and confidentiality improved ANC and delivery of care, and was also improved after the introduction of the PMTCT programme (Delvaux, Konan, Ake-Tano, Gohou-Kouassi, Bosso, Buve & Ronsmans 2008:972). Any effective PMTCT programme should follow the PMTCT cascade starting from acceptance of HIV counseling and testing, taking ARVs (if necessary) and safe infant feeding practices, according to a study done in Nigeria. Early diagnosis of HIV in infants provides an opportunity for providing effective follow-up services of HIV-exposed infants. If HIV-positive children are untreated, the mortality rate is high. Improved tracking of HIV-positive persons, and strengthening the link between PMTCT, early infant diagnosis (EID) and paediatric ART coupled with appropriate counseling of the mother helps to enroll and retain babies in the ART programme (Anoje, Aiyenigba, Suzuki, Badru, Akpoigbe, Odo, Odafe, Adedokun, Torpey & Chabikulu 2012:7).

According to a South African study, sub-optimal infant feeding practices were noted among HIV-positive and HIV-negative mothers, after the introduction of a national PMTCT programme. However, HIV-positive mothers were more likely to practise exclusive breast feeding during the first six months, compared to HIV-negative mothers. Strong interventions were needed in order to promote exclusive breast feeding among HIV-negative mothers since they lived in high HIV prevalence areas in South Africa (Goga, Doherty, Jackson, Sanders, Covin, Chopra & Kuhn 2012:15).

According to a study done in Malawi, the administration of HAART to pregnant women for PMTCT is cost-effective. However, the cost of drugs and laboratory tests remain the most significant expenses incurred by such a programme. International aid is required to cover such costs (Orlando, Marazzi, Mancinelli, Liotta, Ceffa, Giglio, Alumanda, Ziegler, Shawa & Palombi 2010:633).

A South African study indicated that a significant improvement of the PMTCT programme is possible through a combination of interventions, the introduction of better PMTCT protocols and strategic additions of resources. Such an approach can further help to improve the programme's performance in SSA (Youngleson, Nkorunziza, Jennings, Arendse, Mate & Barker 2010:6). Another South African study found that women, who attended ANC, missed HIV counseling and testing during their first visit due to shortages of staff and supplies. Another reported delay was that some pregnant women did not get their CD4 counts on time to initiate either ART or ARV prophylaxis for PMTCT. During postnatal and ANC visits, women were not properly counseled about appropriate infant feeding practices due to the health care providers' lack of knowledge. Early infant diagnosis was not practised due to the mothers' lack of knowledge about where to take their children for HIV testing. Due to fear of stigma and discrimination formula feeding of these infants was not practised in societies where breast feeding is the norm. When such a community's members noticed that the mother was feeding her baby formula, then they might suspect that she is HIV-positive, and this observation could result in stigma and discrimination (Sprague, Chersich & Black 2011:3-5). A South African study revealed that one third of the clinical staff members had received PMTCT training. Others, who prescribed ARVs and who did not have the formal PMTCT training, felt that they were not supposed to provide PMTCT services. This resulted in low coverage of PMTCT services and poor outcomes (Doherty, Chopra, Nsibande & Mngoma 2009:4).

A Mombasa study reported that clients in Kenya who attended ANC seldom received more than one post test counseling session. Among HIV-negative clients, the post test counseling should focus on disclosing one's HIV status, and on remaining negative. Among HIV-positive clients, emotional reactions were reportedly not addressed in 80% of the women. Among 84% of HIV-positive patients the counselor did not check the availability of follow-up support outside the clinic. However, information about infant feeding and explanations of the NVP administrations (15mg once daily if birth weight

>2500 g or 10 mg once daily if birth weight ≤2500g) were addressed among 84% and 88% of the cases respectively. This study recommended that in order to achieve more frequent, longer and more comprehensive voluntary counseling and testing (VCT) at ANC clinics, investments in extra staff, training and infrastructure were needed (Delva, Mulunga, Quaghebeur & Temmerman 2006:190).

A study, from Western Kenya, revealed a significant reduction in MTCT and infant deaths among those whose mothers received ARV prophylaxis during pregnancy. Many infants could not be traced for follow-up actions and clinicians did not adhere to the clinical guidelines (Nyandiko, Otieno-Nyunya, Musick, Bucher-Yiannoutsos, Akhaabi, Lane, Yiannoutsos & Wools-Kaloustian 2010:47). A study conducted in rural Kenya compared patient satisfaction, based on those who visited fully integrated HIV and ANC services, compared to those who visited non-integrated HIV and ANC services. Of the HIV-infected women, attending fully integrated services, 79% were very satisfied as compared to only 54% of such women attending non-integrated services. HIV-negative women who preferred the integrated service were 68% (Vo, Cohen, Smith, Bukusi, Onono, Schwartz, Washington & Turan 2012:4). Ethiopia has instituted quality improvements as an essential component of health services because quality is the concern of individuals, the population and the FMOH due to health service expansion (FMOH/HAPCO 2008a:3).

1.4 PMTCT IN ETHIOPIA

Ethiopia has adopted the four pronged WHO/UNICEF/UNAIDS PMTCT strategy. So the previous Ethiopian PMTCT guideline advises ART for HIV-infected pregnant women eligible for HAART and their infants. For those not eligible for HAART, ARV prophylaxis should be given during the pregnancy, starting from 14 weeks' gestation. Antenatal, delivery, and post partum care should be provided to all women, irrespective of HIV status (FMOH 2011:28). A study in the Jimma zone, in the south western region of Ethiopia, found that effective coverage of PMTCT in this area was very low (1.1%). The

researchers recommended improved PMTCT service coverage through the enhanced implementation of the strategies of the FMOH to increase the utilisation of PMTCT services at hospitals and health centers. PMTCT services were also recommended to be decentralised to PHCUs and counselors should get adequate training (Hussein et al 2011:6).

A study from southern Ethiopia indicated that interventions to reduce MTCT were failing to reach their goal and its enhancement required quick reconsiderations of strategies at all levels. PMTCT services needed to be assessed. Identification of HIV-positive pregnant women and linking them with ARV services is a definite requirement (Merdekios & Adedimeji 2011:364). Another study conducted in Ethiopia showed that, despite increased PMTCT service coverage, an annual average of 1.3 million pregnant women, who attended ANC, missed PMTCT services. Based on the 2010 report, every PMTCT site missed on average 63 pregnant women over one year at ANC clinics, for providing HIV counseling services. On the other hand, the number of pregnant women at PMTCT sites who accepted HIV testing increased from 52 428 in 2006 to 652 065 in 2010. The prevalence of HIV among these tested women decreased from 8% to 2%. During the same period, the number of HIV-positive pregnant women who took ARV prophylaxis and the number of HIV-exposed infants who took ARVs, increased by more than 300% (Nigatu & Woldegebriel 2011:5).

An Ethiopian study found that after people tested HIV-positive, their intention to have children reduces significantly. Men and women stopped desiring more children once they found out that one or both of them were HIV-positive. Men who stopped desiring more children were also more likely to be in agriculture or unskilled occupations and to have children from previous relationships. Women who stopped desiring more children were less likely to be repeat testers (Bonnenfant, Hindin & Gillespie 2012:1409). This finding shows that HIV testing is helpful prior to pregnancy to enable men and women to make informed decisions about having more children in future. This approach of testing prior to pregnancy and providing family planning service belongs to prong 2 of the

PMTCT programme. According to a study done in Addis Ababa, HIV-positive mothers are afraid to breast feed their babies. They think that they are poisoning the baby and passing HIV on to their children. The mothers feel that breast feeding is morally wrong or bad. They considered an HIV-negative baby after breast feeding to be only God's mercy. As a result 8 out of the 22 participating mothers chose replacement feeding either infant formula or cow's milk. This fear of breast feeding is linked to the counseling they received from health care providers. The study participants recalled how strongly they were discouraged from breast feeding and the advantage of replacement feeding. The counselors did not introduce all of the infant feeding options available; they simply provided the counseling based on their own personal fears that breast milk could pass on HIV to the babies (Koricho, Moland & Blystad 2010:4-6).

A study conducted in Addis Ababa, Ethiopia, showed that follow-up of HIV-exposed infants was disorganised and inconsistent. Despite achieving a higher than 80% immunisation coverage among HIV-exposed infants, slightly more than 50% attended the infant follow-up clinics at six weeks and less than one third had documented HIV test results. Targeted interventions should be developed for HIV-exposed infants within the PMTCT package and integrated with the under fives' health services to ensure continuity of care (Mirkuzie, Hinderaker, Sisay, Moland & Markve 2011:8).

1.5 STATEMENT OF THE RESEARCH PROBLEM

PMTCT services are available free of charge at health care facilities throughout Ethiopia. However, the literature reviewed and the FMOH's statistics indicate that PMTCT services are underutilised in Ethiopia, implying that many pregnant women fail to utilise these services, placing their own and their infants' lives at risk. The problem investigated in this study is that free PMTCT services are not utilised by pregnant women in Addis Ababa. The factors (enablers and barriers) that affected women's utilisation of PMTCT services need to be investigated and addressed, as well as the outcomes of using PMTCT services (infants' HIV status and mothers' health outcomes).

Women's satisfaction with the PMTCT services in Addis Ababa is unknown and should also be investigated in an effort to enable more women to use these services.

The infant's HIV status, the mother's health status (CD4 count and clinical condition) as well as patient satisfaction levels are dependent (outcome) variables. Factors affecting PMTCT service utilisation such as marital status, educational level, income, stigma and discrimination and partner HIV status are independent variables. Additional independent variables such as birth weight, nipple fissure, type of ARV for PMTCT, gestational age during delivery and the infant's APGAR score, affecting the rate of MTCT, are also addressed. Other studied variables included HTC, infant breast feeding, counseling and practice.

1.6 AIM OF THE STUDY

In this section the research purpose and objectives will be addressed.

1.6.1 Research purpose

The purpose of this study was to examine PMTCT services, describe the HIV status of the infant, the health status of the mother, and patients' satisfaction levels with PMTCT services, to identify factors affecting the rate of MTCT and identify factors affecting women's utilisation of PMTCT services in Addis Ababa. Based on these findings, recommendations made for enhancing the utilisation of PMTCT services in Addis Ababa and for improving the outcomes (HIV-negative babies and healthy mothers) of this programme. These findings could contribute towards building a theoretical framework of the HBM and Donabedian's Model of Health Care Quality and to improve the utilisation of PMTCT services.

1.6.2 Research objectives

The objectives of this study were to:

- identify factors affecting the utilisation of PMTCT services in Addis Ababa;
- evaluate PMTCT services in Addis Ababa
- assess patients' satisfaction levels with PMTCT services in Addis Ababa
- examine the health outcomes of mothers using PMTCT services in Addis Ababa;
- describe the HIV status of infants whose HIV-positive mothers used PMTCT services in Addis Ababa;
- identify factors affecting the HIV status of infants in Addis Ababa;
- make recommendations to enhance women's utilisation of PMTCT services in Addis Ababa.

1.7 SIGNIFICANCE OF THE STUDY

From the literature reviewed it has been learned that the main source of HIV infection among infants is their HIV-positive mothers. A study from Romania indicated that vertical transmission of HIV from mother to infant was 25% (Cocu, Thorne, Matusa, Tica, Florea, Asandi & Giaquinto 2013:82). Another study was also conducted in India among 217 HIV exposed infants. Of these infants, 51.6% underwent DNA-PCR testing by the age of six weeks and 17.5% tested HIV-positive (Gupta, Singh, Kaushik, Joshi, Kalra & Chakraborty 2012:2). According to a study from Burkina Faso the rate of MTCT of HIV-1 was 6.2% among women who had received short course ART. This shows the significant impact with which PMTCT could reduce the rate of MTCT (Kouanda, Tougri, Cisse, Simpore, Pietra, Doulougou, Ouedraogo, Ouedraogo, Soudre & Sondo 2010:846). Further investigations of PMTCT services, at various levels of health delivery facilities, could help to obtain better knowledge about the actual practices and associations between different variables. Policies and guidelines were prepared, based

on the capacity of these health facilities to address MTCT. The information generated from this research could thus update decision makers at all levels. Thus these findings might help in programme planning and implementation so that the current low level of PMTCT coverage could improve, contributing towards the reduction of MTCT and improving the mothers' and babies' health status in Addis Ababa, Ethiopia.

1.8 DEFINITIONS OF KEY CONCEPTS

Acquired Immune Deficiency Syndrome (AIDS) refers to HIV clinical stage 3 or 4 disease or where CD4 is available, any clinical stage and CD4 <350cells/mm^3 (WHO 2005:10).

Antenatal care (ANC) implies a service provided to pregnant women including at least four focused ANC clinic visits with the first visit as early as possible during pregnancy, the second visit at 28-32 weeks, the third visit after 36 weeks and the fourth one before the expected date of delivery. During the first ANC visit routine provider-initiated HIV counseling and testing should be provided in order to identify HIV-positive pregnant women and to offer them PMTCT services (FMOH 2011:11).

Antiretroviral therapy (ART) describes the administration of ARV drugs to restore immune function, maintain maximum suppression of viral replication, reduce HIV-related morbidity and mortality and improve the quality of life with prolonged survival rates for both mothers and babies (FMOH/HAPCO 2008b:48).

Exclusive breast feeding (EBF) occurs when an infant is fed breast milk only without any other foods or liquids for the first six months of the infant's life (FMOH 2011:24).

HIV testing and counseling (HTC) refers to counseling, testing and announcing of HIV test results to a client. If the client tests HIV-positive, it can be linked to appropriate care and treatment services. It has two components VCT and PITC provider-initiated testing and counselling (WHO 2009:7).

Human Immunodeficiency Virus (HIV) is a virus that damages the body's immune system, the system that fights infections (Longo & Fauci 2005: 1071-1075). HIV is an aetiologic agent of AIDS and can be transmitted by sexual contact, from blood and

blood products such as needle stick injuries or sharing injection needles or instruments used in tattooing or circumcision and by HIV-infected mothers to their infants during pregnancy, birth or breast feeding. After years of study there is no evidence that HIV can be transmitted by casual contact or spread by insects such as mosquito bites (Fauci & Lane 2005:1079).

Patient satisfaction refers to patients' attitudes towards medical care provided by the health system of people who experienced recent contact with the health care system (Kronenfeld 2007:7).

Prevention of mother to child transmission (PMTCT) refers to the reduction of new paediatric HIV infections through the promotion of primary prevention of HIV amongst women and men of reproductive age, addressing family planning within the context of HIV, promoting access to HIV and ART or prophylaxis for HIV-infected pregnant women and their families and promoting access of HIV-exposed infants to care (FMOH 2011:3).

Provider-initiated HIV testing and counseling (PITC) is the type of testing that "refers to HIV testing and counseling recommended by health care providers to patients attending health care facilities. Providers are expected to recommend testing as a standard component of medical care when patients exhibit clinical manifestations that might result from underlying HIV infection. PITC is provided to populations where the risks of exposure to HIV infection are thought to be considerable and to all patients in high prevalence settings. While this type of testing can be routine under certain conditions, it should never be mandatory or compulsory" (WHO 2009:7).

Quality of health service is a term that refers to "the degree to which health services for individuals and populations increase the likelihood of achieving desired health

outcomes and are consistent with current professional knowledge" (FMOH/HAPCO 2008a:2).

Voluntary testing and counseling (VCT) refers to individuals who request HIV testing and counseling based on their own decisions "… actively seeking HIV testing and counseling. It is conducted in a wide variety of settings including health facilities, stand-alone facilities outside health institutions, mobile services, community-based settings and even people's homes" (WHO 2009:7).

1.9 OPERATIONAL DEFINITIONS

Antiretrovirals (ARVs) for the prevention of mother to child transmission of HIV include the administration of antiretroviral drugs to HIV-positive mothers and their infants to prevent HIV transmission from mother to infant. This includes ART provision for those pregnant women who are eligible for treatment and ARV prophylaxis for those who are not eligible for ART.

HIV testing and counseling (HTC) refers to offering HIV testing by health care providers either during ANC or labour and delivery to mothers of unknown HIV status and the provision of post test counseling.

Infant feeding counseling implies the counseling service provided by health care providers on options available for HIV-positive mothers on how to breast or formula/replacement feed their babies.

Infant feeding practices refer to the actual practice of infant feeding such as exclusive breast feeding or formula/replacement feeding or mixed feeding by the mother.

Patient satisfaction refers to the attitudes of patients towards PMTCT services provided by health care providers in Addis Ababa, Ethiopia.

Prevention of mother to child transmission (PMTCT) in this study includes prevention of mother to child transmission of HIV through HTC, ARVs for PMTCT and infant feeding counseling and practice.

Quality of PMTCT service refers to the standard of PMTCT service provided to HIV-positive women and their infants in health facilities of Addis Ababa, Ethiopia according to the national guideline.

1.10 THEORETICAL FOUNDATIONS OF THE STUDY

The following section presents the theoretical framework used for this study.

1.10.1 Health Belief Model (HBM)

The HBM's primary concepts explain why people will take actions to prevent, to screen for, or to control illnesses. These include a person's perceived susceptibility to and seriousness of a disease as well as the benefits of and barriers to implementing preventive actions/behaviours, cues to action and self efficacy to sustain the required preventive actions/behaviours. Perceived susceptibility concerns beliefs about the likelihood of getting a disease. Perceived severity is about the expected seriousness of the disease, if left untreated or if not prevented. Perceived benefits refer to beliefs about the advantages of performing the available preventive and/or treatment actions. Perceived barriers are the potential negative aspects making the performance of health actions difficult or impossible. Cues to action are those stimuli that can trigger actions. Self-efficacy refers to the conviction that one can successfully execute the behaviours required to produce the outcomes (Champion & Skinner 2008:47).

Thus, according to the HBM, individuals will act to protect or promote their health based on the following circumstances. If they are susceptible to a condition or problem, if the consequences of the condition are severe, if the recommended actions to deal with the

problem are beneficial and if the benefits of action outweigh the costs or barriers. The HBM suggests that behaviour change is the result of scrutinising information and weighing up potential consequences of actions or inactions before a decision is made. Individual behaviour is guided by the rationality of protecting one's health. The application of the HBM suggests that health risks should be personalised to encourage an awareness of a threat to a person's health and thus his/her beliefs of susceptibility (Wills & Earle 2012:133-134).

1.10.1.2 Donabedian's Model of Health Care Quality

Donabedian's Model of Health Care Quality is based on three approaches. These are structure, process and outcome. Structure is the condition under which care is provided such as material resources, human resources and organisational characteristics. Process refers to activities that encompass health care including diagnosis, treatment, rehabilitation, prevention and patient education. Outcome refers to changes (desirable or undesirable) in individuals and populations that can be attributable to health care. Outcome variables include changes in health status, knowledge and/or behaviours of patients or family members and satisfaction of patients and their family members with the quality of health care services they received. Furthermore outcome could be classified as clinical, physiological-biochemical, physical, psychological (mental), social, integrative and evaluative (Donabedian 2003:46-48). Table 1.1 shows this classification.

1.10.2 Relevance of the theoretical frameworks used for this study

The HBM was selected for this study because a pregnant woman needs to accept HTC to receive appropriate PMTCT services, if HIV-positive. This action could prevent HIV from infecting her baby. Perceived susceptibility implies the pregnant women's belief that she might be infected with HIV. Perceived severity explains that once the pregnant woman learns that she is HIV-positive, she needs to consider the consequences of HIV both for her own and her baby's health, if left untreated. Perceived benefits pertain to

the pregnant woman's beliefs about the benefits of PMTCT services for her own and for her baby's health and wellbeing. Perceived barriers imply all obstacles that can make utilisation of PMCT services difficult or impossible, including the mother's lack of education and financial resources as well as cultural and social issues. Cues to action include information about signs and symptoms of HIV from mass media and/or health care services about the importance of PMTCT services. Self-efficacy can be developed when the pregnant woman is confident about her utilisation of PMTCT services.

Donabedian's Model of Health Care Quality is appropriate for this study as the three approaches fit this study purpose. Structure of the PMTCT service encompasses all the medical equipment, health care providers and types of health facilities providing the services.

Table 1.1: Classification of health outcomes

Clinical	Reported symptoms that have clinical significance, diagnostic categorisation as an indication of morbidity, disease staging, relevant to functional encroachment and prognosis and diagnostic performance.
Physiological-biochemical	Abnormalities and functions
Physical	Loss or impairment of structural form or integrity and functional performance of physical activities
Psychological	Feelings, beliefs, knowledge and impairment of mental functions
Social	Behaviours relevant to coping with current illness, role performance and performance under test conditions involving varying degrees of stress
Integrative	Mortality and longevity
Evaluative	Client opinions about and satisfaction with various aspects of care.

Process encompasses the PMTCT services, namely HCT, ARV intervention and breast feeding counseling and factors affecting the rate of MTCT, while outcomes imply the HIV status of the infant, health status of HIV-positive woman (CD4 and clinical condition) and patients' levels of satisfaction with the health care services.

.

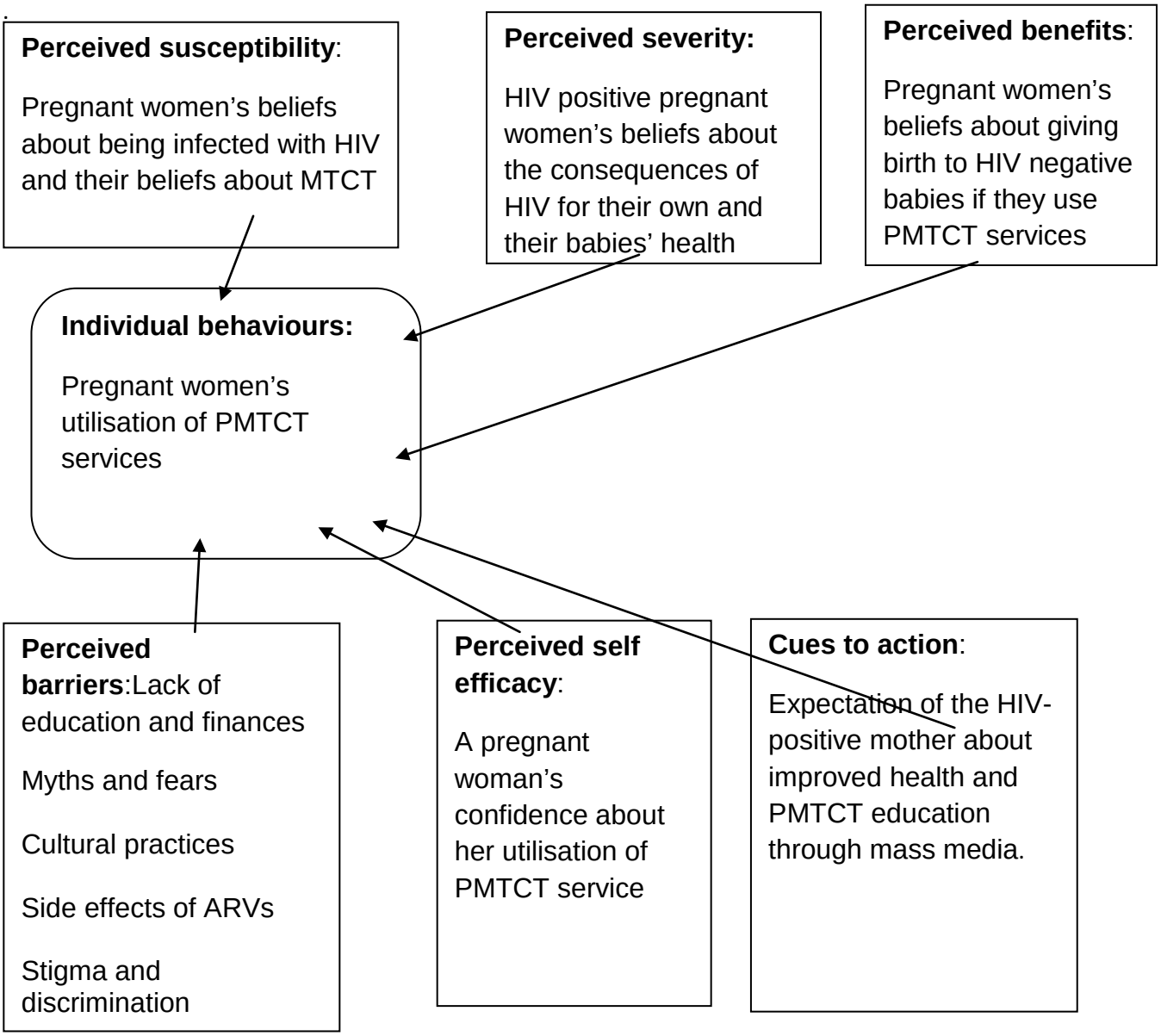
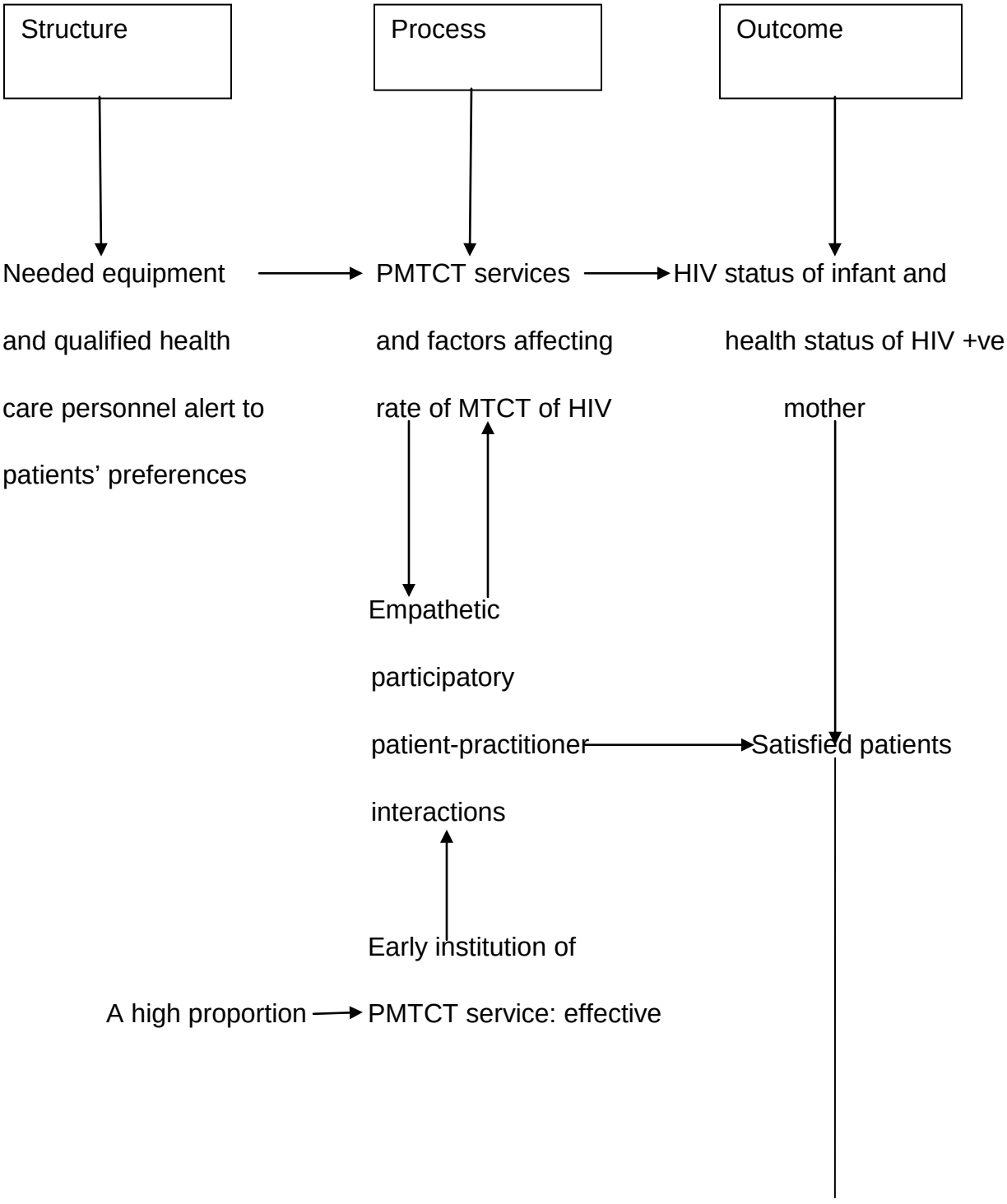


Figure 1.1: Theoretical framework: Health Belief Model (adapted from Champion & Skinner 2008:49)



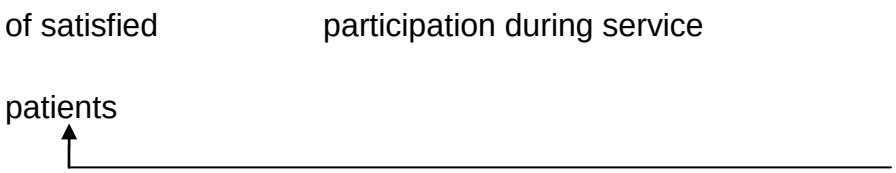


Figure 1.2: Theoretical framework: Donabedian's Model of Health Care Quality (adapted from Donabedian 2003:50)

1.11 RESEARCH DESIGN AND METHOD

A quantitative retrospective cohort design was selected for this study. In cohort studies the researcher selects a group of study subjects, based on their exposure status, and then examines the rate of disease occurrence. Cohort studies are often conducted retrospectively and they fulfill at least one major criterium for causality: the time sequence of cause and effect (Stommel & Wills 2004:144). At the baseline people are classified according to their exposure status. Over time follow-up investigations are conducted to identify the development of the disease (Olsen, Christensen, Murray & Ekbam 2010:8). Mother-infant pairs who received PMTCT services are cohorts for this study. The exposures in this case are PMTCT services, factors affecting the rate of MTCT and factors affecting PMTCT service utilisation.

This study was conducted in Addis Ababa, Ethiopia, which is the capital city of the country. This area is chosen because Addis Ababa has the highest HIV prevalence in the country and proportional to population, more PMTCT attendees are found in this area than anywhere else in Ethiopia. The PMTCT services are provided at hospitals and health centers in Addis Ababa. Stratified random sampling was used to select participating health facilities. The types of health facilities served as strata. The method of data collection involved both structured interviews and document reviews. HIV-positive mothers, using PMTCT services, provided the information during interviews.

Consent was provided by these mothers, for themselves and on behalf of their babies, before data collection commenced.

For this study, descriptive statistics and inferential statistics such as relative risk (RR) and chi-square tests were used to analyse the data. A p-value of 0.05 and a confidence interval of 95% were used as cut off values for association. Both the information sheet and the informed consent document have been prepared to inform each potential

research respondent about the specific objectives of the study and that individual interviews and document review would be conducted to collect information. The informed consent form was given to potential respondents to read and sufficient time was allowed to enable them to make an independent decision.

Ethical clearance was obtained from the Higher Degree Committee of the Department of Health Studies at the University of South Africa (Unisa), and from the Addis Ababa City Administration Health Bureau Ethical Committee. Finally heads of each selected hospital and health center granted permission to collect data. (Please see annexures 6-18 for ethical clearance granted by the relevant authorities).

1.12 SCOPE OF THE STUDY

Since this study was conducted in Addis Ababa, the capital city of Ethiopia, it is not possible to generalise the findings to the wider national population. This study considers only those women who utilised ANC, or labour and delivery services and agreed to participate in the PMTCT progamme at hospitals and health centers. Consequently those women who did not utilise ANC services, and did not participate in the PMTCT programme, could not be reached.

Women who discontinued using PMTCT services could also not be reached to participate in this study, and these women might have had different experiences than women who used these services. Only structured interviews were conducted, augmented by information obtained from the respondents' medical files. Richer information might have been obtained by conducting individual in-depth interviews about these women's experiences of using PMTCT services in Addis Ababa.

1.13 STRUCTURE OF THE THESIS

Chapter one presented the introduction and background information about the research problem. The statement of the research problem, aim of the study and significance of the study were also discussed as well as the theoretical foundations of the study and the research design and method.

Chapter two presents a literature review of the subject matter under study, discussing the components of PMTCT in detail.

Chapter three discusses the design and methodologies used in the study. Population, sampling, data collection, data analysis and ethical considerations will be further elaborated upon.

Chapter four discusses the quantitative data analysis and also presents a discussion and presentation of the research findings.

Chapter five presents conclusions, limitations and recommendations arising from the study.

1.14 SUMMARY

This chapter presented the introduction, background information about the research problem and statement of the research problem, objectives, significance of the study and theoretical foundations. The findings of this study might help to improve the PMTCT programme's achievements and contribute towards the reduction of MTCT rates in Addis Ababa, Ethiopia.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The global community has laid the foundation for ending the AIDS epidemic. The 2011 United Nations' political declaration on HIV/AIDS pledged to end the epidemic. Based on this declaration, the UNAIDS has articulated 10 targets to be met by 2015. To eliminate new infections among children and to substantially reduce the number of mothers dying from AIDS-related causes and to provide ART to 15 million people are some of the targets related to PMTCT (UNAIDS 2012:6-12). Coverage of ARVs for PMTCT increased from 57% in 2011 to 63% in 2012 worldwide. The annual number of newly HIV-infected children in 2012 was 260 000 in low and middle income counties which shows 52% decline from 2001. PMTCT services prevented more than 670 000 children from becoming infected with HIV from 2009 to 2012. Nevertheless, Ethiopia was among the countries with less than 50% coverage of ARV prevention services for

pregnant women living with HIV in generalised epidemic countries in 2012 (UNAIDS 2013:38-40).

To achieve virtual elimination of new HIV infections among children and to keep their mothers alive, the following are required:

- all women should be able to access quality HIV/AIDS prevention, care and treatment services;
- the rights of women living with HIV should be respected so that women, their families and communities could be empowered to ensure their own health;
- adequate resources, both human and financial should be available to provide PMTCT services; and
- national and global leaders must support country-driven AIDS-related efforts.

Therefore there are four key principles for success:

- women living with HIV should be at the center of the response;
- country ownership of the programme;
- leveraging synergies, linkages and integration for improved sustainability, with shared responsibility and specific accountability; and
- PMTCT programmes should be closely linked with ART programmes. This helps to reduce cost, avoid duplication, increase programmes' efficiency and improve women's access and uptake of needed services, as well as the quality of these services. The strategy to virtually eliminate new infections among children should be also based on the four-pronged strategy (UNAIDS 2011:2-12).

Preventing HIV from infecting infants during breast feeding should balance this protection from other causes of morbidity and mortality. The WHO recommends that

countries should choose between two interventions by HIV-infected mothers regarding breast feeding. The mother should continue breast feeding and also receive ARV prophylaxis or avoid all breast feeding. This decision should be based on several factors including the socio-economic and cultural context of the population, availability and quality of health services, local epidemiology including HIV prevalence among pregnant women, main causes of maternal and child under-nutrition and infant and child mortality. When ARVs are not immediately available, breast feeding still provides infants born from HIV-infected mothers some chance of HIV free survival. It is also necessary to inform HIV-infected mothers about the available alternatives to breast feeding. Such information should be provided carefully without causing harm to the general population's infant feeding practices (WHO 2010b:3).

2.2 DISCRIPTION OF THE THEORETICAL FRAMEWORKS

Theories are abstract but come alive in public health and health behaviour when they are filled with practical topics, goals and problems. Theories can be used to guide research undertakings. Theories have concepts as their components which are the building blocks. When concepts are developed or used for a particular purpose they become constructs. Variables are operational forms of constructs; they specify how a construct should be measured. Several theories combined can explain a specific problem or form models. Different theories are best suited to different situations. "The adequacy of theory is most often assessed in terms of three criteria:

- its logic or internal consistency in not yielding mutually contradicting derivations;
- the extent to which it is parsimonious or broadly relevant while using a manageable number of concepts; and
- its plausibility for fitting in with prevailing theories in the field" (Glanz, Rimer & Viswanath 2008:26-35).

In line with these facts two theoretical frameworks have been chosen for this study, namely the HBM and Donabedian's Model.

2.2.1 Health Belief Model (HBM)

A study conducted in SSA countries used the HBM to understand social barriers' impact on the utilisation of PMTCT services. The different components of the model are explained in relation to the study. Perceived susceptibility has been used to explain a woman's acceptance of HIV testing, receiving the result and believing that her infant is susceptible to vertical transmission of HIV. Perceived benefits are related to pregnant women's knowledge and beliefs that PMTCT interventions are beneficial. Perceived barriers include fears of knowing one's own HIV status, stigma and discrimination and opposition of male intimate partners. Self-efficacy indicates the woman's level of confidence that she is able to complete the steps necessary for PMTCT adherence. Using this model the researcher was able to identify both biomedical and social approaches that are needed to address the complex behaviour of HIV-positive women's adherence to PMTCT (Hamanda 2013:2).

A study conducted in the northwestern areas of Ethiopia used the HBM to identify factors associated with readiness for VCT service utilisation among pregnant women attending ANC clinics. The variables considered by the study were knowledge about VCT, readiness to use VCT services during pregnancy, risk perceptions of being infected with HIV, educational status, gravidity and gestation age. The model fits the variables selected and helped the researcher to achieve the intended objectives of the study. The findings revealed that readiness to use VCT services among pregnant women was low (Moges & Amberbir 2011:109-110). A study in Kenya used the HBM to examine the correlates of and motivations for HIV testing. The researchers used different variables that fit into the model: for the perceived risk component anxiety about being infected with HIV, for modifying factors HIV knowledge, beliefs about condom use for HIV prevention and cues to action information on HIV and knowing someone

infected with HIV. Using this model, it was demonstrated that targeted interventions could help young people to assess their level of risk and increase their awareness levels about the benefits of VCT to enhance the utilisation of HIV/AIDS services (Kabiru, Beguy, Crichton & Zulu 2011:3).

2.2.2 Donabedian's Model

Donabedian's Model has been used during the assessment of improving HIV outcomes in resource limited countries. The desired outcomes in the case of the current study were a healthy mother and an HIV-negative baby. The three components of Donabedian's Model (Ahonkhai, Bassett, Ferris & Freedberg 2012:2), considered by this study, were structure, process and outcome:

- structure includes characteristics of physical deployment of resources such as physicians, nurses, buildings and supplies;
- process includes health care professionals' interactions with pregnant women; and
- outcomes are what happen to people, especially with regard to their health.

A study, conducted in Japan, used Donabedian's Model to assess patients' satisfaction levels and perceptions of nursing services. With regard to the structure component of the model, the variables chosen were patients' convenience of care, comfort of surroundings and privacy. For process, the appropriateness of care procedures, patient-nurse interactions and patient participation in the care process, were considered. For outcomes, changes in physical status, changes in patients' knowledge that might influence future care and patients' satisfaction with the care they received were considered (Kobayashi, Takemura & Kanda 2010:420-421).

A study conducted in Canada used Donabedian's Model with definitions of the three components similar to those used in the current study. Structure referred to the

attributes of the setting where health care was provided such as the physical setting and staff characteristics. Process referred to what was actually done during the delivery and receipt of care, including clinical care and interpersonal care. Clinical care referred to the application of medical and other sciences to achieve the best health result or outcome. Interpersonal care referred to the social and psychological interactions between the health care professionals and users of the health care system. Outcome, including patient satisfaction, was the consequence of care (Sword, Heaman, Brooks, Tough, Janssen, Young, Kingston, Helewa, Akhtar-Danesh & Hutton 2012:2-3). A study conducted in Brazil also used Donabedian's Model, but used different variables to fit the components. The structure variables were nursing staff, furniture and infrastructure. The process component included interpersonal relationships and professional training. Finally the outcome implied the effects of service and professional satisfaction with the care that was delivered as well as changes regarding people's knowledge and behaviours. Using this model, the researchers were able to conclude favourable health service evaluations to improve the standard of care (Yuvi & Tronchin 2010:331).

A Zambian study used Donabedian's Model as a theoretical framework. These researchers classified health facilities according to the level of service provision. They distinguished among the structure of health care, the actual care provided (process) and end result of the interaction between an individual and a health care system (outcome). The model helped to improve the level of service provided at ANC facilities and their accessibility, improving the quality of service (Kyei, Campbell & Gabrisch 2012:2).

2.2.3 Justification for using the chosen theoretical frameworks

These theoretical frameworks best fit this study's variables of interest. The HBM deals with the health seeking behaviour component of the study. It is concerned with why people take actions to screen or control illnesses. The barriers or enabling factors of PMTCT service utilisation are best explained within the construct of this model. The rest

of the variables were described using Donabedian's Model. This model deals with three components; structure, process and outcome (Donabedian 2003:46-48). PMTCT services at health facilities are considered as processes and health outcomes and patient satisfaction are considered as outcomes.

The HBM helped to answer the research question as to what barriers and enablers influenced women's PMTCT service utilisation. The variables considered include the educational level of the mothers, economic status, stigma and discrimination. Donabedian's Model helped to address process variables such as VCT, ART and ARV prophylaxis, factors affecting HIV status of the baby, breast feeding counseling and practice. Outcome variables were health status of the mother, HIV status of the baby and patient satisfaction. The use of two models helped to incorporate all variables investigated in this study. Besides, it helped to answer the comprehensive research questions of PMTCT. The models helped to avoid addressing limited objectives. This also shows that it is possible to conduct a study using more than one theoretical framework. The models aided the researcher to maintain the focus of the study. It also assisted in organising the literature review, developing the data collection instrument, presenting and discussing the findings as well as making recommendations. The following sections are presented according to the concepts of HBM and Donabedian's model. Section 2.3 is based on HBM. Sections 2.4 and 2.5 are based on the process component of Donabedian's model and section 2.6 is based on the outcome component of Donabedian's model.

2.3 FACTORS AFFECTING THE UTILISATION OF PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV SERVICES

This section presents factors affecting the utilisation of PMTCT services in terms of the HBM's major tenets.

2.3.1 Perceived susceptibility

According to a study done in Botswana, factors associated with HIV test acceptance for PMTCT, are being knowledgeable about PMTCT, knowing someone who had received ART or PMTCT and having a partner who had been tested for HIV. Out of 432 women who answered questions about pre-test counseling, 59% reported that counseling changed the way they felt about HIV testing. Those 59% who said counselling changed the way they felt about HIV testing, also felt more inclined to have a test done. The factors which were associated with higher PMTCT knowledge scores included receiving counselling from a lay counselor and hearing about PMTCT on the radio (Creek, Ntumy, Mazhani, Moore, Smith, Han, Shaffer & Kilmarx 2009:358).

A study from north western Ethiopia used the HBM approach to assess factors associated with readiness for VCT service utilisation among pregnant women. Four focus group discussions (FGDs) were conducted with pregnant women. Most of these women reported they were not susceptible to HIV because they were married to a faithful husband and trusted their spouses. However, pregnant women who had high perceived susceptibility were three times more likely to accept VCT as compared to those who had low perceived susceptibility levels (Moges & Amberbir 2011:112).

2.3.2 Perceived severity

A study conducted in north western Ethiopia included 418 pregnant women attending ANC. Regarding VCT, 55.5% of them were not ready to use VCT services and they indicated that pregnancy was not the right time for VCT. The reasons mentioned were fears of blood drawing and receiving HIV-positive test results, stigma and discrimination and the husband's disapproval (Moges & Amberbir 2011:109-110). According to a study in the Oromia region of Ethiopia, 62% of the study participants attending ANC, were offered HIV counseling and testing, but only 47% of them accepted HIV testing. The study further showed the major challenges of the PMTCT programme to be human resource limitations, inadequate coordination, erratic supplies of laboratory test kits and

ARV prophylactic medicines and disconnections between the regional health bureaux and local levels in terms of communicating new policies and guidelines (Balcha, Lecerof & Jeppsson 2011:188-189).

2.3.3 Perceived benefits

According to a study from Arba Minch, Ethiopia (Adedimeji, Abboud, Merdekios & Shiferaw 2012:3-4), most women attending ANC, knew that HIV testing is important for a woman since there is a possibility of transmitting the virus to her child. Participants further indicated that hospital delivery, counseling, ARV drugs and avoiding breast feeding were deemed necessary for PMTCT. However, out of 74 pregnant women who

tested HIV-positive, only 7% returned to the facility to deliver their babies. HIV stigma is a key factor preventing women from returning to a health facility in order to keep the HIV status undisclosed to others. Stigma is also present in the health facility because health care providers are not enthusiastic to manage the deliveries of HIV-positive women. Another key issue, preventing pregnant women coming back to the health facility, was inadequate monitoring and referral structures within the health facility. Health workers did not have established systems to properly monitor HIV-infected women and follow them up to provide the required care and support. Inadequate human resources also posed challenges. Too few nurses provided PMTCT services. Other factors that affected PMTCT services included inadequate ARV supplies, cost of accessing the service and poor socioeconomic status of women (Adedimeji et al 2012:3-4).

2.3.4 Perceived barriers

According to a systematic review from India, the uptake of PMTCT service was low. Particularly ARV uptake was low both in private and public sectors. The uptake of HIV testing ranged from 64% to 100%. The uptake of ARVs ranged from 9% to 84%. There was a wide variation in the rate of MTCT ranging from 0% to 29%. Barriers of accessing

PMTCT services included the lack of training among health care providers and inadequate attention to social and gender issues, perceived stigma and experience of discrimination in health facilities, poor education, low economic status of women and lack of support from partners (Darak et al 2012:4). Another study was also conducted in India to understand stigma experienced by women accessing PMTCT services. Women faced different experiences from health care providers which included refusal for treatment, abusive behaviour, moral judgment and lack of confidentiality. Stigma-related behaviours from the community ranged from denial of personal contact to physical removal from one's own community. The women also faced stigma from their own families in the form of moral judgment describing HIV status as being associated with immoral behaviour. Therefore fear and experiences of stigma by various agents that would normally be expected to provide support for HIV-infected pregnant women, might create barriers to PMTCT and maternity services (Rahangdale, Banandur, Sreenivas, Turan, Washington & Cohen 2010:838-840).

2.3.5 Perceived self-efficacy

A study conducted in Vietnam reported about HIV testing among pregnant women which is a first step to receive ARVs for PMTCT if found HIV positive. Out of 300 women who agreed to participate in the study, 40% had received HCT before the end of 34 weeks of gestation, 5% at 35-40 gestational week and 55% were tested during labour (Nguyen, Christoffersen & Rasch 2010:44). A different study from India examined socio-demographic factors associated with getting lost to follow-up of HIV-infected women using PMTCT services. Between 2002 and 2008, a total of 950 HIV-infected women registered for the PMTCT programme. Proportionally 10.9% of them were lost to follow-up before delivery and 19.6% became lost to follow-up after delivery. A woman with less than graduate level educational status was 6.32 more likely to be lost to follow-up compared to graduates. The other factors associated with losses to follow-up are poor family, a woman registered into PMTCT programme after 20 weeks of pregnancy and a

woman whose partner's HIV status is negative or unknown (Panditrao, Darak, Kulkarni, Kulkarni & Parchure 2011:595).

2.3.6 Cues to action

According to a study conducted across four African countries (Cameroon, Cote d'Ivoire, South Africa & Zambia), higher PMTCT service coverage was associated with HIV test kits being found in the ANC (as opposed to in the laboratory), HIV testing was available in the labour ward, availability of CD4 testing at the facility, infant testing with DNA-PCR availability on most days of the month and the presence of an ANC register with PMTCT information. PMTCT coverage was not associated with the type of facility, location of HIV testing during ANC, same day HIV test results and partner HIV testing. PMTCT coverage was associated with higher PMTCT quality scores, infrastructure quality scores, patient satisfaction quality scores and patient understanding of medication scores. On the other hand, there was no association of PMTCT coverage with staff quality scores (Ekouevi, Stringer, Coetzee, Tih, Creek, Stinson, Westfall, Welty, Chintu, Chi, Wilfert, Shaffer, Stringer & Dabis 2012:3-4).

2.4 PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV

This section deals with process of PMTCT based on Donabedian's model. Intervention is necessary to lower the transmission rate of MTCT. Maternal factors that increase the HIV transmission risk include a high maternal viral load, new or recently acquired maternal HIV infection, low CD4 count, advanced maternal disease, viral or parasitic placental infections during pregnancy, labour and child birth, maternal malnutrition and nipple fissures, cracks, mastitis and breast abscesses. Infant factors that increase the transmission risk are preterm (low birth weight), duration of breast feeding, mixed feeding and oral diseases. The risk of MTCT, without intervention, during pregnancy is 5-10%, during labour and delivery it is 10-15% and during breast feeding 5-20% (FMOH/HAPCO 2011:10). The WHO has developed seven strategic directions to

accelerate the scale up of HIV prevention, care and treatment for women and children, namely to:

- strengthen commitment and leadership for achieving full coverage of PMTCT services;
- provide technical guidance to optimise HIV prevention, care and treatment services for women and children;
- promote and support the integration of HIV prevention, care and treatment services within maternal, newborn and child health and reproductive health programmes;
- ensure reliable and equitable access for all women, including the most vulnerable;
- promote and support health systems interventions to improve the delivery of HIV prevention, care and treatment services for women and children;
- track programme performance and impacts on MTCT rates and maternal and child health outcomes; and
- strengthen global, regional and country partnerships for providing HIV prevention, care and treatment for women, infants and young children and advocate for increased resources (WHO 2010c:12).

Successful operational studies are those that can change policy and practice. Operational research can guide the scale up and implementation of PMTCT programmes. Countries may consider the following when undertaking operational research on PMTCT:

- the most effective strategy for providing and monitoring CD4 testing;
- the feasibility and impact of ART for eligible pregnant women in ANC settings;

- the effect and impact of task shifting for PMTCT programme, PMTCT interventions at facility, community and household level that have greater impact on retention in care; and
- operational research related to PMTCT prong 1 and 2 (WHO 2012a:28).

A study was conducted in Rwanda to compare two service delivery models for PMTCT during a transition from administering single Nevirapine at onset of labour to giving multidrug ARVs to pregnant women. The two service delivery models compared were full package versus stand-alone sites. Full package sites provide both ART and PMTCT at the same sites while stand-alone sites provide PMTCT services only. Accordingly by December 2006, 37.5% of sites were providing full package services and 62.5% were stand-alone sites in Ethiopia. Between July 2006 and December 2008, a total of 40 674 women used ANC services, 99% accepted HIV testing and 4% tested HIV-positive. Out of these HIV-positive women, 69% received their CD4 count during pregnancy and 71% of them received ARVs for PMTCT. CD4 count assessments differed across the models with 30% more likely to be undertaken at full package than at stand-alone sites. Enrolment of HIV-positive women into ARV service was twice more likely to be provided at full package than at stand-alone sites (Tsague, Tsiouris, Carter, Mugisha, Tene, Nyankesha, Koblavi-Deme, Mugwaneza, Kayirangwa, Sahabo & Abrams 2010:4-5).

2.4.1 Primary prevention of mother to child transmission of HIV

A study from India interviewed 7 956 women and only 19% of them identified the correct and incorrect answers concerning ways of HIV transmission. Although 39% of them knew the correct way of transmission, 26% failed to describe this correctly. The awareness HIV transmission through sexual contacts was 73%, sharing needles 67%, blood transfusion 67%, vertical transmission 64% and breast feeding 42%. Only 13% of the women believed the use of ARVs could prevent MTCT while 74% were unsure (Firth, Jeyaseelan, Christina, Vonbara, Jeyaseelan, Elan, Abraha, Joseph, David, Cu-Uvin, Lurie, Wanke & Lionel 2010:208).

Information, education and communication are essential to create awareness at community and facility level. Better informed and more aware people could be empowered to protect themselves and their children from HIV.

A study in the town of Gondar, Ethiopia, interviewed 400 pregnant women and found that 88.5% of them knew that HIV could be transmitted from mother to child, 83.5% knew that MTCT of HIV is preventable; 35.9% indicated that HIV can be transmitted during pregnancy, 33.6% during labour and 24.9% during breast feeding; 58.4% knew about the protective effect of ARVs.

Compared to older women (35-49yrs), women aged 15-24 were 4.48 times more likely to have better knowledge about MTCT. Women who had secondary and tertiary education were 6.85 times more likely to have MTCT knowledge than those with no

education. Women who used ANC services in hospitals were 4.49 more likely to know about MTCT of HIV than those who used ANC services at health centers (Malaju & Alene 2012:3-4).

2.4.2 Family planning, HIV counseling and testing for prevention of mother to child transmission of HIV

A study from the United Kingdom (UK) assessed fertility intentions of HIV-infected women. Out of 521 women, 86% completed questionnaires and 6% were pregnant at the time of the survey. Three quarters of the women stated that they would like to have more children. Black African women were more likely to have three or more children and to have a history of trying to become pregnant for more than six months, compared to other women in that study. For 45% of women, their HIV diagnosis had not affected their intentions to have more children. The number of previous pregnancies and time since HIV diagnosis were significantly associated with not wanting more children.

Almost all women (91%) were aware of the availability of PMTCT services. This finding suggests the need for specialised family planning services targeting HIV-infected women (Cliffe, Townsend, Cortina-Borja & Newell 2011:1094-109).

A systematic review from India reported that PMTCT services focused mainly on reducing MTCT and neglected the integration of family planning into this programme. As a result, women's reproductive rights did not get due attention (Darak et al 2012:9).

Family planning is prong 2 of the PMTCT strategy, as discussed in section 1.1 of this thesis. It helps to protect children from becoming infected by enabling the mother to make informed choices about using family planning services. So, this component should not be neglected.

A Vietnamese study included 300 participants on prenatal HIV testing uptake. Out of them, 40% were tested before the end of 34 weeks' gestation, 5% at 35-40 weeks' gestation and the rest were tested during labour. Women who did not attend high school were less likely to be tested during the prenatal period compared to those who had done so. Women who worked as farmers and earned less than two million Vietnamese Dong were less likely to be tested compared to women who were government workers and who earned more than four million Vietnamese Dong. Distance also affected HIV testing. Women who traveled more than 15km to the hospital were less likely to be tested compared to those who traveled less than 5km (Nguyen et al 2010:454-455).

A different study from India reported that out of 7 956 interviewed women, 91% were tested for HIV and 51 of them were HIV-positive. The sero prevalence rate was 0.7% among both urban and rural women. All these HIV-positive women reportedly had one lifetime sexual partner, with the exception of one woman. However, 18 of the HIV-negative women reported that they had more than one life time sexual partner. Only one woman out of 104, who had blood transfusions, were HIV-positive and out of 1 124 women who underwent major surgery only one was HIV-positive (Firth et al 2010:208).

A South African study indicated that out of 116 HIV-positive women, 59.5% had shared their HIV-positive status with someone else, with the highest disclosure being with partners (51.%), followed by mothers (20.7%), sisters (16.4%) and friends (1.7%). Only 14.9% of HIV-positive pregnant women were accompanied by their partners to ANC clinics. Approximately half (54.3%) of the HIV-positive women were comfortable discussing condom use with their partners to prevent pregnancies; 76.3% were counseled about safe sex during pregnancy but only 65.8% of them practised safe sex. Postnatally, 92.2% of these women received family planning counseling. The most frequently used contraceptives were condoms, followed by hormonal injections and pills. Out of these HIV-positive women, 4.3% intended to have another child within a year, 5.2% within 2-3 years, 29.3% after 3 years and 61.2% did not intend having any more children (Peltzer, Chao & Dana 2009:975-976).

An Ugandan study examined contraceptive use and associated factors among women enrolled in HIV programmes. Among married HIV-positive women, 71% had HIV-infected spouses, 5% had HIV-negative spouses, 18% did not know their spouses' HIV status and 7% did not report their spouses' HIV status. Only 7% of these HIV-positive women were on ART, 28% were using contraceptives, (52% used injectable hormones, 30% condoms and 9% oral contraceptives). The variables that were significantly associated with contraceptive use were educational level, marital status, monthly income, having children (who are alive) and HIV status of the spouse. Contraceptive use among single and previously married women was lower than among married women. Having completed secondary education, earning higher monthly incomes and having three or more children were significantly associated with the use of contraceptives (Muyindike, Fatch, Steinfield, Matthews, Musinguzi, Emenyonu, Martin & Hahn 2012:3). A rural western Kenyan study reported that out of 22 566 women who were tested for HIV at the ANC clinic, 1 668 were HIV-positive. Among the HIV-positive women, 1 036 actually registered for participation in the PMTCT programme. However, 632 of these women were lost during the follow-up actions (Azcoaga-Lorenzo, Ferreyra,

Alvarez, Palma, Velilla, E & Del Amo 2011:276). Addressing loss during the PMTCT follow-up phases is an important issue.

A study was conducted in Gambela, Ethiopia, to identify determinants of refusal of HIV testing among women attending ANC. A total of 332 women participated in the study and their median age was 23 years among those willing to be tested and 22 years among those who refused HIV testing. Lower education levels were associated with refusal to use HIV testing services. Those women who rated pre-test counseling as fair were six times more likely to refuse HIV testing compared to those who rated pre-test counseling to be very good. Those women who were unsure about privacy issues were five times more likely to refuse HIV testing compared to those who expected that privacy would be maintained during counseling and testing. Pregnant women who had given birth to 2-3 live infants were more likely to refuse VCT compared to those who had not given birth to a live infant (Fanta & Worku 2012:3-6). A different study was conducted in Diredawa, Ethiopia, to identify determinants of acceptance of VCT at ANC. VCT is the entry point for PMTCT services since those pregnant women who test HIV-positive can access PMTCT services. A total of 234 pregnant women participated in the study, 117 cases and 117 controls. Older women, ≥30 years old, were 78% less likely to accept VCT as compared to the younger women (≤19 years old). Married women were more likely to accept VCT as compared to single ones (OR=22.5). Employed women were four times more likely to be tested than unemployed women. Variables like ethnicity, religion, educational status and family size were not associated with acceptance of VCT. Mothers who had good knowledge of HIV, MTCT and VCT were 23 times more likely to be tested than those who had poor knowledge. Women who had two or more ANC visits were 2.5 times more likely to be tested for HIV (Demissie, Deribew & Abera 2009:142-144).

2.4.3 Antiretroviral intervention, adherence and breast feeding for the prevention of mother to child transmission of HIV

A literature review was done to assess the effect of ARVs on PMTCT. One study from the review showed that out of 604 pregnant women, exposed to EFV during the first trimester, 2.8% gave birth to babies with birth defects. Another study from this review showed an overall birth defect rate of 4.3% after first trimester exposure to EFV. This shows some variations among studies on the effects of ARVs on birth defects. In a pooled adjusted analysis of American and European-based studies, triple ARV drugs reportedly had 1.5 times more premature deliveries than dual ARV regimens. A Dutch case control study revealed first trimester triple ARVs to be associated with a 44% preterm delivery rate and 21% when the ARV drugs were taken in the second or third trimester. Using data from a Botswana study, at birth HIV-uninfected infants' in utero exposure to triple ARVs resulted in significantly lower weight, length and weight for length as compared to those exposed to ZDV alone. Another study from this review found no association between neurological assessment and exposure to ARV drugs in utero among HIV-exposed but uninfected children at two years of age (Heidari, Mofenson, Cotton, Marlink, Cahn & Katabira 2011:291-293).

A study was done in Haiti to assess HIV free survival and morbidity among formula fed infants on a PMTCT programme. A total of 254 mother-infant pairs were included in the study. At 18 months of age, nine children were HIV-infected and 17 had died resulting in a 90.6% HIV-free survival. When analysis was restricted to exclusively formula fed infants, HIV free survival rate was 93.7% and MTCT rate of 3.2%. Among infants who were never breast fed, HIV free survival was slightly better. In this study prevalence of diarrhoea was 12.2% among those children in the PMTCT group. Diarrhoea was found to be 2.9 times more prevalent among the community group as compared to PMTCT infants. This study concluded that breast milk substitute was safe, effective and feasible for HIV-infected mothers choosing this option (Ivers, Appleton, Wang, Jerome, Cullen & Fawzi 2011:4-5).

A systematic review was done in Nigeria to assess PMTCT's effects. AZT has the longest history of effectiveness and safety during pregnancy. However, AZT is

associated with anaemia and should be avoided in women with haemoglobin levels of ≤8mg/dl. NVP is used most commonly in developing countries for PMTCT as a single dose. It is also safe and effective but associated with hepatotoxicity, skin rashes and lactic acidosis. EVF is an alternative for NVP but associated with embryopathy in less than 1% of cases. Since Stavudine (D4T) and Didanosine (ddI) are associated with lactic acidosis, they are not recommended during pregnancy. Protease Inhibitors (PIs) are very effective ARVs but associated with muscular dystrophies. According to this review, the two main infant feeding options are breast milk substitutes (BMSs) and breast milk options. BMSs are animal milk that are modified and effective substitutes for human milk. BMSs are available as commercial infant formula or home-prepared infant formula. During the first 4-6 months of life the infant needs to be fed on breast milk substitutes when this option is chosen. If the breast milk options is selected, then infants should be breast fed exclusively for six months (Nkwo 2012:58-62).

A study from Cameroon assessed the effectiveness of multidrug ARVs on MTCT. A total of 418 mother-infant pairs' data were analysed. The median age of the women was 27 years and the median CD4 count was 380cells/mm^3. Taking into consideration that these women received multidrug ARV regimens before delivery, the MTCT rate was 6.6%. Mothers with CD4 counts below 350cells/mm^3 had a four fold increased risk for MTCT (Tchendjou, Same-Ekobo, Nga, Tejiokem, Kfutwah, Nlend, Tsague, Bissek, Ekoa, Orne-Gliemann, Rousset, Pouillot & Dabis 2010:4). Another study with a similar objective was conducted in Burkina Faso to examine the impact of HAART on MTCT. The sample size comprised 581 HIV-infected women, 55.6% of them were on monotherapy and 44.4% of them were on triple therapy. Among women on HAART, 59.2% of them had received treatment before their current pregnancies and the rest received it during their current pregnancies. A total of 460 of the children received single doses of NVP. The rate of MTCT among those on short course ART was 6.2% and among those on HAART it was 0% when tested at 2-6 months of age. However, the rate of transmission was 3.6% among formula fed children and 7.8% among breast fed children for mothers on monotherapy. A total of 62 children died before their HIV status became known of whom 8% were born from mothers receiving short course ART and

13% from mothers receiving HAART. Among the deceased children, 10.5% were bottle-fed and 14.3% were breast fed (Kouanda et al 2010:844-847)

A South African study assessed factors associated with short course ARV prophylaxis adherence during PMTCT. Out of 139 HIV-positive pregnant women attending ANC, 66.2% initiated AZT, 19.4% took ARVs and 14.4% were on neither AZT nor ARVs. Out of 607 HIV-positive post natal women, 88% had initiated AZT, 10% were on ARVs and 2% had not received AZT. However, 61% of the antenatal women and 85.9% of the post natal women reported complete adherence to the regimen for the past four days preceding the interview date. Out of these women, 23 in the antenatal clinic and 40 in the post natal clinic, reported that they had missed at least one dose of the regimen. The most common reasons for missing doses were being away from home without the medication, forgetting to take the pills and falling asleep. A higher PMTCT knowledge score, disclosure of HIV status, not having consulted a traditional birth attendant during pregnancy, having social support and not having faced discrimination were associated with adherence to maternal AZT. Similarly lower levels of education, being single, disclosure of HIV status, not having consulted a traditional birth attendant during pregnancy, less experience of internalised stigma, less experience of discrimination with care providers, lower depression and higher social support were associated with infant AZT adherence (Peltzer, Sikwane & Majaja 2011:1253-1256).

A study from Soweto, South Africa, revealed that 57% of mothers and 31% of infants received inadequate PMTCT ARV regimens in accordance with the country's national guideline. Challenges experienced by participants towards PMTCT services were delayed ANC attendance because of facility-related barriers and apprehension of antenatal HIV testing, maternal fears of HIV-related stigma affecting decision about PMTCT uptake and confusion about mixed messages on infant feeding. Different kinds of infant feeding options were introduced to the mothers such as formula feeding and all the available options. There was insufficient counseling about associated risks of the

infant feeding methods (Laher, Cescon, Lazarus, Kaida, Makongoza, Hogg, Soon, Miler & Gray 2012:93).

A study from Mozambique revealed that the Ministry of Health recommended weaning the babies of HIV-infected women at six months of age and avoiding breast feeding altogether, if at all possible. However, no specific recommendations regarding pasteurisation or heating of expressed breast milk was provided by the clinic staff. Serious problems could arise when the health system transmits conflicting messages as opposed to the Ministry of Health's recommendations (Agadjanian & Hayford 2009:107).

According to a study from Cote d'Ivoire, HAART substantially reduced MTCT of HIV. The still birth rate was 3.1% but this did not differ among those women who received HAART and ARV prophylaxis. Low birth weights were reported in higher proportion among those who received HAART as compared to those who received ARV prophylaxis. Neither low birth weight nor maternal exposure to ARVs was associated with infant mortality among the HIV-uninfected infants. The only factor associated with infant mortality was paediatric HIV infection (Ekouevi et al 2008:1817-1818).

A Ugandan study investigated the effect of ARVs on early infant HIV infection rates. From January 2007 to May 2009, 75 159 pregnant women were registered at Mulago Hospital for ANC. As many as 99.7% of these women knew their HIV status through either rapid HIV testing or with a known HIV-positive status result when registering for ANC. Prevalence of HIV was 10%, of whom 96.5% received ARVs, including sdNVP. Among women receiving HAART, 35.5% were older than 30. The early infection rate was highest among those infants whose mothers received no ARV interventions (36.4%), followed by infants whose mothers received sdNVP at the time of labour and delivery (11.2%). The infant infection rate for those babies whose mothers received a combination ARVs of AZT+sdNVP was 4.6%; and AZT/3TC+sdNVP was 3.9%. The lowest rate was found among those babies whose mothers received HAART at 1.7%. This study concluded that the use of combination ARVs is feasible and effective for

PMTCT (Namukwaya, Mudiope, Kekitiinwa, Musoke, Matovu, Kayma, Salmond, Bitarakwate, Mubiru, Maganda, Galla, Biamugisha & Fowler 2011:71-72).

A study done in the Gurage Zone of Ethiopia had a total of 657 respondents. Among these, 60% mentioned exclusive replacement feeding for infants younger than six months of age as an option for PMTCT. The other 24% mentioned breast milk as an option. The rest (16%) mentioned mixed feeding but did not know what to feed their infants. Only 24% knew that HIV could be transmitted from mother to child through breast feeding. Those respondents, who knew about HIV/AIDS and resided in urban areas, knew more about infant feeding options as recommended by the WHO than other women. Hence more information and communication activities were required in this area to increase infant feeding knowledge and improve PMTCT outcomes (Belachew & Jira 2007:41-42).

Another study from northwestern Ethiopia included 209 HIV-positive women and 90.4% of them gave birth between 30 and 48 weeks of gestation and out of these 8.6% had post term deliveries. Only 66% of these women were on ART. Among those not taking ART, 64.8% took NVP starting from 28 weeks' gestation, 4.2% a week before the onset of labour, 12.7% during labour and 18.3% had never taken NVP. Regarding information, 58.4% got information about infant feeding from nurses, 55.5% from counselors, 10.5% from the mass media, 3.8% from their families and 2.9% from their friends. Only 1.9% of them said that they had never been advised about infant feeding. With regard to HIV transmission, 92.3% of them knew that HIV could be transmitted to the child during pregnancy, labour and breast feeding. About feeding options, 39.2% mentioned that EBF is the only infant feeding option. As to the practice, 10.5% of the participants practised mixed feeding. Stigma of HIV/AIDS, insufficient breast milk and husbands' opposition affected their infant feeding options and practices (Muluye, Weldeyohannes, Gizachew & Tiruneh 2012:2-4).

A different study conducted in Ethiopia found progressive declines in medication adherence rates during PMTCT interventions. Out of a cohort of 282 mothers

participating in the study, 232 initiated ARVs during pregnancy. Taking into consideration the type of medication, 64% of them initiated AZT prophylaxis and 33% lifelong ART. Adherence was assessed using one week's recall. Of those on AZT prophylaxis, 68% never missed a dose, 20% missed one dose and 12% missed more than one dose. Of those who initiated ART, 61% never missed a dose, 21% missed one dose and 18% missed more than one dose. Infants who were born at health facilities were more likely to ingest medication at delivery than those born at home (Mirkuzie et al. 2011:4-5).

2.5 FACTORS AFFECTING MOTHER TO CHILD TRANSMISSION OF HIV

Factors affecting MTCT of HIV are categorised as maternal factors, infant factors and obstetric and delivery practices. Maternal factors include high viral loads, new or recent maternal HIV infections, low CD4 counts, advanced maternal disease, viral or parasitic placental infections during pregnancy, labour and childbirth, maternal malnutrition and nipple fissures, cracks, mastitis and breast abscesses. Infant factors are first infant in multiple births, preterm low birth weight, duration of breast feeding, mixed feeding and oral diseases in the child. Obstetric and delivery practices include rupture of membranes for more than four hours prior to delivering the baby, injuries to the birth canal during child birth, ante partum procedures such as amniocentesis, external cephalic version, invasive child birth procedures, vaginal delivery, delayed infant drying with clean towels and eye care and routine infant airway suctioning (FMOH 2011:9-10).

A study conducted in the Dominican Republic analysed infant and child data from the PMTCT programmes and identified factors contributing to the rate of MTCT. The MTCT rate varied by type of delivery. During the period 1999-2008, 6.8% of infants were born by Caesarean section and 23.9% of infants were born vaginally. For the period 2009-2011, the MTCT rate was 2.5% among those delivered by Caesarean section and 7.5% among those born vaginally. The MTCT rate also varied in 1999-2008 from 8.1% among those exclusively formula fed infants to 37.3% among exclusively breast fed infants

(Lorenzo, Beck-Sague, Bautista-Soriano, Halpern, Roman-Poueriet, Henderson, Perez-Then, Veras, Connolly, Callender & Nicholas 2012:5).

A study from Zimbabwe assessed risk factors of HIV vertical transmission. Out of the initial cohort of 479 HIV-infected pregnant women, 9.4% had no delivery information. From the remaining 434 mother-infant pairs, 10.6% infants died without definitive HIV diagnosis. There was no significant difference among women who transmitted HIV and those who did not transmit HIV to their infants in terms of maternal and paternal age, gravidity, marital status, partner circumcision status and risky behaviours such as maternal alcohol use. Additionally no significant association was observed for maternal total lymphocyte count, haemoglobin, history of prolonged fever, diarrhoea and the presence of tuberculosis. Mothers with swollen and tender breasts discharging puss were twice more likely to be vertical transmitters. Vaginal infections (Trichomonas Vaginalis, Bacillus Vaginosis and Candida Albicans) were significantly associated with vertical transmission of HIV. Low birth weight infants were more likely to be infected (Gumbo, Duri, Kandawasvika, Kurewa, Mapingure, Munjoma, Rusakaniko, Chirenje & Stray-Pedersen 2010:718-719).

2.6 OUTCOMES OF PREVENTION OF MOTHER TO CHILD TRANSMISSION INTERVENTIONS

Different metrics can be used to measure the effectiveness and impact of PMTCT programmes. These include new paediatric infections, rate of MTCT, maternal survival and health, child survival and health and HIV-free survival of babies born to HIV-positive mothers. It is recommended to estimate PMTCT outcomes at six weeks and 18 months post natally. The six weeks period reflects transmission during the peripartum phase and the 18 month period reflects transmission through breast feeding. Outcomes of PMTCT can be assessed by following a cohort of mother-child pairs either prospectively or retrospectively. In case of a retrospective cohort study, information can be obtained on mother-child pairs including PMTCT interventions received and these outcomes.

This study used a retrospective cohort design. To calculate the rate of MTCT, the number of infants with positive deoxyribonucleic acid polymerase chain reaction (DNA-PCR) should be divided by the total number of HIV-exposed infants (HEI). Stratified early infant diagnosis (EID) by age group (less than six weeks and older ages) is important to differentiate early prenatal transmission and later post natal transmission (WHO 2012b:4-26).

HIV antibody assays are used for children older than 18 months for screening purposes to determine their HIV status. This assay is used for those above 18 months of age as a diagnostic technique. However, because of the passage of maternal antibodies through the placenta the test cannot be used as a confirmation of infant HIV infection. Nevertheless, this test indicates maternal infection and exposure of the infant. HIV virological assay is used for children at or after six weeks of age for clinical diagnostic purposes. This technique can be used up to 18 months of age. Hence, early screening for exposure facilitates ARV prophylaxis for the HIV-exposed infant. Consent either from the parent or legal guardian is required whenever HIV testing is performed (WHO 2010d:18-26).

This research used the HIV status of the child, health status of the mother and patients' satisfaction to measure PMTCT outcomes. A study from Thailand assessed pregnancy outcomes among HIV-infected women receiving ART. A total of 246 HIV-infected pregnant women were included in the study and classified into three groups. Those who received combined ART, those who received ARVs during ANC and those who received ARVs only during labour. Nausea and vomiting was documented only for 1.6% of these women as a side-effect of taking ARVs. The mode of delivery was normal for 72% of the women, caesarean sections for 19%, vacuum extractions for 2.8% and forceps extractions for 0.8%. Regarding gestational age at time of delivery, 84.6% had full term deliveries, 10.2% pre-term deliveries and one had a still birth. Pre-term delivery was significantly higher among pregnant women on combined ART and among those who started PMTCT during labour because of not attending ANC clinics than among women

on ART during ANC. The incidence of low birth weight was 20% and this was higher among infants whose mothers started PMTCT during labour. The incidence of low Apgar scores was 3.6% (Apgar score=0) and this was also higher among infants whose mothers started PMTCT during labour (Areechokchai et al 2009:9-12).

A study from Zimbabwe assessed the effect of maternal HIV status on infant mortality. The study analysed 469 HIV-positive and 569 HIV-negative mother-infant pairs. Over a nine months' follow-up period, 51 infants born to HIV-positive mothers and 20 infants born to HIV-negative mothers died. The mortality rate of infants was 150 per 1 000 person-years among those born form HIV-infected women and 47 per 1 000 person-years among those born form HIV-negative women. Additional risk factors for mortality among those born from HIV-infected mothers were infant HIV positive status, having a deceased mother and low birth weight. Infants who were not breast fed had the highest risk as compared to exclusively breast fed or mixed fed babies regardless of the HIV status of the mother. Among infants born to HIV-negative mothers, having a deceased mother was the only risk factor identified besides not being breast fed (Kurewa, Gumbo, Munjoma, Mapingure, Chirenje, Rusakaniko & Stray-Pedersen 2010:89-90).

A study from Zomba district, Malawi, included 387 mother-infant pairs to examine the outcomes of PMTCT. There were 6.4% maternal deaths among HIV-infected women. Children of HIV-infected women were four times more likely to die during the time of the study than those of HIV-uninfected mothers. The rate of transmission among living tested children was 13.5%. HIV-free survival at 18-20 months of age among HIV-exposed children was 66.2% and among HIV-unexposed children was 93.1% (Lettow, Bedell, Landes, Gawa, Gatto, Mayuni, Chan, Tenthani & Schouten 2011:4-5). According to a different study in Cote d'Ivoire, introducing the PMTCT programme can improve the quality of ANC and intra-artum care in general. Before the introduction of the PMTCT programme, VCT was never proposed to women attending ANC in five of the health facilities of the study sites. But after PMTCT introduction, VCT was offered to 63% of the women visiting the clinic. After the introduction of the PMTCT programme,

inter-personal communication and confidentiality between health care providers and clients improved. This might also increase patient satisfaction. Additionally individual health information and promotion on nutrition, HIV prevention and family planning improved (Delvaux et al 2008:972-973).

A study from an urban hospital in Angola examined the effectiveness of a PMTCT programme. A total of 104 mothers' and 107 infants' data were analysed. Regarding HIV status, 52.9% of the women were not diagnosed with HIV before pregnancy and 19.2% of them had a previous history of ART. Data on duration of pregnancy was available for 69 women and preterm deliveries were recorded for 31.9% of them. The most common ARV regimen during pregnancy was AZT+3TC+NVP (91.2%). A total of 36 women presented after delivery, having received no ART during pregnancy. As to the feeding option, 86.1% of their infants were breast fed, 69.4% through exclusive and 16.7% through nonexclusive breast feeding, implying mixed feeding. Mortality during the follow-up period among the women with ART during pregnancy was 4.4% and among those with no ART was 16.6%. Among the infants who were followed up, 8.4% had died and 4.7% had unknown HIV status. HIV transmission in the two groups of infants, born from mothers who received ART and from mothers who received no ART, was 1.5% and 37.1%. Overall, exposure to breast feeding was associated with a significantly higher level of HIV transmission or death (OR: 5.70). The risk of HIV transmission or death was significantly higher among those who did not receive AZT as postnatal prophylaxis compared to infants who received postnatal AZT prophylaxis (OR: 6.23) (Lussiana, Clemente, Ghelardi, Lonardi, Tarquino & Floridia 2012:2-7).

2.6.1 HIV status and exposure of children

A study conducted in the Dominican Republic evaluated the progress towards the elimination of MTCT from 1999 to 2011. Data from 1 576 infants and children were analysed. The ages at specimen collection ranged from 20 days to 25 months. Overall HIV was diagnosed among 154 infants and children. The proportion of infection

declined from 11.1% in 1999-2008 to 4% in 2009-2011. The MTCT rate was higher among infants whose mothers used sdNVP than among those infants whose mothers used prenatal HAART in 1999-2008 and in 2009-2011 (6.4% versus 2.5% and 5.7% versus 2.9% respectively) (Lorenzo et al 2012:3-5).

A study conducted at Saint Camille Medical Center in Burkina Faso included 1 300 pregnant women in the study and 378 of them tested positive for HIV-1. As to ARVs, 69.84% of them received ARV prophylaxis and 30.16% received HAART for PMTCT. The prevalence of HIV-1 among their children by DNA-PCR was 0% and 6.82% among those born from mothers receiving HAART and ARV prophylaxis respectively. The mortality rate was 1.32% among children who were born from HIV-positive mothers. This study showed the effectiveness of HAART in comparison to ARV prophylaxis for reducing the rate of MTCT (Linguissi, Bisseye, Sagna, Nagalo, Ouermi, Djigma, Pignatelli, Sia, Pietra, Moret, Nikiema, & Simpore 2012:992-994).

A Nigerian study investigated the prevalence of HIV among exposed infants. A total of 298 children participated in the study. Out of these, 77.9% were brought to hospital for early infant diagnosis within three months of birth. The rate of MTCT was 2.1% after receiving PMTCT services. Proportionally 72.7% of the infants were born to mothers with CD4 cell counts greater than 250cells per mm^3. Mothers who had been on HAART for a long time, preceding their latest pregnancies, had a lower chance of transmitting HIV to their babies (Esene & Omoigberale 2012:107-110). A study from South Africa included data from 1 622 women in its analysis. Regarding HIV status, 99.2% of them tested for HIV and 630 (38.8%) were HIV-positive. There were 352 preterm deliveries in this study population. The median gestational age was 35 weeks. There was a significantly higher proportion of preterm deliveries from HIV-positive women than among HIV-negative women (25.20% vs 19.78%). Women who received HAART were no more at risk of delivering preterm babies as compared to those who did not receive HAART but eligible to receive HAART. There were eight still births among the study population but there was no significant difference between HIV-positive and HIV-

negative women. Low birth weight was significantly more common among HIV-positive women. For diagnosis, 58.9% of the HIV-exposed children were tested for HIV by DNA PCR. Nine of these infants were confirmed to be HIV-infected at birth. The in-utero transmission rate was highest among those who required HAART but did not receive it (8.5%), followed by those who received HAART (2.7%) and finally those not eligible for HAART but receiving ARV prophylaxis (0.4%) (Hussain, Moodley, Naidoo & Esterhuizen 2011:304).

A different study form South Africa assessed retrospectively infants of HIV-infected mothers who used PMTCT services. At six weeks, 220 infants were tested for HIV by DNA-PCR and six of them were HIV-positive. From birth to five months follow-up among 264 infants in the cohort four of them died. The crude mortality rate at six months was 15.2 per 1 000 live births (Chetty, Knight, Giddy, Crankshaw, Butler & Newell 2010:4-5). A South African study was conducted to determine the risk of being infected with severe infections among HIV-exposed infants. A total of 55 infants were included in the study of whom 27 were HIV-exposed uninfected and 28 HIV-unexposed uninfected. All HIV-exposed uninfected infants remained HIV-uninfected at 6 and 12 weeks of age in the absence of breast feeding. Two HIV-unexposed uninfected infants at six months of age and 1 HIV-exposed uninfected infant at twelve months of age had moderate acute malnutrition. A total of 14 hospitalisations in the 10 HIV-exposed uninfected and four hospitalisations in the four HIV-unexposed uninfected infants were reported. The relative risk of hospitalisation for HIV-exposed uninfected infants were 2.74 times greater than for HIV-unexposed uninfected infants. Generally HIV-exposed uninfected children experienced increased risk of infection-related hospitalisations in the absence of the increased number of infectious agents, advanced maternal disease or infant malnutrition (Slogrove, Reiki, Naidoo, Beer, Kevin, Cotton, Bettinger, Speert, Esser & Kollmann 2012:507).

A study from Rwanda examined under two child mortality rates according to maternal HIV status within the national PMTCT programme. A total of 3 020 children were

selected for the study of whom 48.2% were HIV-exposed. Among the HIV-exposed children, 61 died by the age of 9-24 months while 24 died of those not exposed to HIV. The cumulative risk of death was almost three times higher among those exposed to HIV as compared to those not exposed to HIV. Excluding HIV status, household assets were significantly associated with death. Ownership of assets were significantly lower among households who lost children as compared to households whose children lived. The risk of death was 50% lower among children whose mothers used four or more ANC visits as compared to children whose mothers used ANC services once only (Mugwaneza, Shema, Ruton, Rukundo, Lyambabaje, Bizimana, Tsague, Wagner, Nyankesha, Muita, Mutabazi, Nyemazi, Nsanzimana, Karema & Binagwaho 2011:4). A study from rural western Kenya showed that out of the 1 668 mothers initially identified as HIV-positive, the final HIV status after breast feeding was known for 309 babies alone revealing that 260 were HIV negative and 49 were HIV positive. Thus the rate of MTCT after the breast feeding period was 15.86%. Out of the 767 newborns, 40.2% of the babies completed the follow-up, 3.6% died and 19.3% were lost to follow-up. Therefore to reduce the burden of paediatric HIV infection significantly, universal access to PMTCT service is crucial (Azcoaga-Lorenzo et al 2011:276-278).

2.6.2 Health outcomes of mothers receiving prevention of mother to child transmission of HIV services

A Nigerian study involved a population of 130 women between the ages of 17 and 40 who came to a hospital for ANC and PMTCT services. Out of these, 65 were HIV-positive and the other 65 were HIV-negative. The age group of 26-30 years had the highest HIV prevalence (33.4%) and the lowest HIV prevalence was observed among thos 36-40 years old. The median CD4 cell count among HIV-positive women was 287 cells per µL and among HIV-negative women it was 534 cells per µL. The result from this study confirmed that HIV in pregnancy affects CD4 cell count and pregnancy by itself may partially deplete the CD4 cell count. In the absence of accompanying disease

conditions, chronological age did not affect the CD4 cell count (Ekwempu, Ekwempu, Ikeh, Olabode & Agaba 2012:169-170).

A study from Malawi included 173 HIV-infected and 214 HIV-uninfected women to assess mortality and health outcomes with routine PMTCT services. At 18-20 months postpartum, no death was documented among the HIV-uninfected infants. However, among HIV-infected infants, the mortality rate was 42.4 deaths/1000 person years. Neither maternal age nor delivery at home was associated with maternal death. HIV-infected women had higher parity than HIV-uninfected women. But there was no association of still births and preterm deliveries with HIV infection. The women who participated in the study were asked to rate their own health and 51.3% of them rated themselves to be in excellent health, 31.6% to be in good health, 15.7% as fair and 1.3% reported poor health. Proportionally, 14% of the women had low body mass index (BMI) of less than 18.5 and this was not associated with HIV infection. Worse perceived health was associated with HIV infection and being poor. HIV-infected women were four times more likely to have minor signs and symptoms of disease and six times more likely to have major signs and symptoms than HIV-uninfected women. Only 20 of the HIV-infected women reported major signs and symptoms of ill health while being on ART (Landes, Lettow, Bedell, Mayuni, Chan, Tenthani & Schouten 2012: 2-4).

A multi-country study in Africa revealed a decline in CD4 cell count after interruption of ARV prophylaxis received for PMTCT. At 12 and 24 months after delivery, 4.5% and 11.6% of women with enrollment CD4 count of >250cells/mm^3 had CD4 counts decline to <200cells/mm^3 respectively. A total of 4.4% of the women experienced new WHO stage 3 and 0.4% of them reported new WHO stage 4 among those who initiated ARV prophylaxis with CD4 count >250cells/mm^3. Among the women who initiated ARV prophylaxis with CD4 count >400cells/mm^3, the cumulative probabilities of reaching CD4 count <350cells/mm^3 at 12 and 24 months were 11.9% and 27.5% respectively. A total of 4.4% of these women experienced new WHO stage 3 but no new WHO stage 4 manifestations occurred. ARV prophylaxis regimens, age and enrollment (baseline)

CD4 counts were significantly associated with CD4 count decline <200cells/mm^3 and <350cells/mm^3. Higher CD4 count at enrollment was associated with reduced probability of immunological decline at the end point (Ekouevi, Abrams, Schlesinger, Myer, Phanuphak & Carter 2012a:4-6).

A different study was conducted in Kenya to examine CD4, viral response and adherence among ARV naïve breast feeding women while receiving PMTCT services. The study analysed data from 434 women who completed PMTCT interventions. The percentage of women with CD4 counts of <250 cell per microliter decreased from 23% at baseline to 5% at 24 weeks postpartum and this was significant. At baseline 6% of participants and at 24 weeks postpartum 79% of participants had undetectable viral loads. Among those who took NVP-based ARVs, 89% achieved undetectable viral loads as compared to 98% of participants who took Nelfinavir-based ARVs. Adherence levels were significantly associated with achieving undetectable viral loads. A total of 82% of the adherent group achieved undetectable viral loads while only 65% non-adherent group achieved this (Okonji, Zeh, Weidle, Williamson, Akoth, Masaba, Fowler & Thomas 2012:251-254).

2.6.3 Patients' satisfaction with prevention of mother to child transmission of HIV services

According to a study at Hamidia Hospital in Bhopal, India, patient satisfaction towards ART services was rated to be excellent. A total of 256 respondents participated in the study, 17.79% of them were illiterate. Among the literate women, 7.03% were graduates. Clients' attitudes with doctors' services were rated as excellent for the following factors: feeling at ease with doctor (83.98%), able to tell the doctor one's problems (92.19%), doctors' listening to one's problems (87.90%), doctors' understanding of the patients' complaints (95.31%), doctors' effective explanations (93.34%) and doctors' help to improve the women's health (93.34%) (Kishor, Pal, Rama & Vishal 2011:242). Similar findings were documented by a study done in Kenya,

including 326 women in the data analysis. This study compared the satisfaction levels of women attending fully integrated ANC, PMTCT and care and treatment services with non-integrated (or 'stand-alone') services. This integration of services made a difference in terms of satisfaction levels among those HIV-infected women, but not for HIV-uninfected women. Hence, HIV-infected women preferred, and were more satisfied, with integrated services (Vo et al 2012:144).

A study from public health facilities of Addis Ababa, Ethiopia, reported that 61.6% of pregnant women used ANC services (including VCT) on the same day they visited the health facility. The average waiting time at the ANC clinics was 39.8 minutes and the mean time for counseling (pre and post-test sessions) was 14 minutes. The women reportedly gained new knowledge from counseling about HIV and MTCT, the need for partner testing, living with HIV if HIV-infected, HIV prevention and transmission. As to clients' satisfaction levels, 82.5% of the respondents reported that counseling room privacy was maintained and 92.2% were comfortable with the counselors' handling of their clients and respecting of their clients. Regarding competency, 91.5% of the clients reported that they were satisfied with the technical competencies of the counselors (Ismail & Ali 2011:129-130).

2.7 SUMMARY

In this chapter the researcher reviewed relevant literature on PMTCT internationally, in Africa and according to the Ethiopian context. Detailed discussions were presented according to the theoretical frameworks of the study. The components of the two theoretical frameworks, HBM and Donabedian's Model, were described. In this literature review the researcher focused on those factors affecting PMTCT service from HBF perspective, PMTCT services provided at health facility level, namely HCT, ARV intervention, breast feeding counseling and practices as well as outcomes of the PMTC services were described which included patient's satisfaction with PMTCT services,

health status of the mother and HIV status of the baby from the perspective of Donabedian's model.

According to a systematic review from India, by Darak et al, the uptake of PMTCT service was low. Barriers of accessing PMTCT services included the lack of training among health care providers and inadequate attention to social and gender issues, perceived stigma and experience of discrimination in health facilities, poor education, low economic status of women and lack of support from partners. According to a study conducted across four African countries (Cameroon, Cote d'Ivoire, South Africa & Zambia) by Ekouevi et al (2012b: 6) higher PMTCT service coverage was associated with HIV test kits being found in the ANC (as opposed to in the laboratory), HIV testing was available in the labour ward, availability of CD4 testing at the facility, infant testing with DNA-PCR availability on most days of the month and the presence of an ANC register with PMTCT information.

A study was conducted in Gambela, Ethiopia, by Fanta and Worku (2012) to identify determinants of refusal of HIV testing among women attending ANC. Lower education levels were associated with refusal to use HIV testing services. Studies from different parts of Africa such as in Burkina Faso by Kouanda et al (2010:848) and in Cameroon by Tchendjou et al (2010:6) showed decreased rates of MTCT after taking ARVs. Studies from Ethiopia by Belachew and Jira (2007:45) showed women breast fed their babies exclusively in the Gurage zone of Ethiopia.

Patient satisfaction with ART services from India by Kishor et al (2011:242) was rated to be excellent. A multi country study in Africa by Ekouevi et al (2012a:10) showed a decline in CD4 count after interruption of ARV prophylaxis for PMTCT. Different factors affecting the HIV status of the baby were identified from the reviewed literature in relation to maternal, infant and obstetric and delivery practices.

In the next chapter the research design and methodology adopted by this study will be addressed.

.

.

CHAPTER 3

RESEARCH DESIGN AND METHOD

3.1 INTRODUCTION

This chapter describes the research design and method that were used to conduct the study. A quantitative research approach is essential to develop the body of knowledge that helps to improve health care and public health. Concepts that are relevant to quantitative research are basic research, applied research, rigour and control. Basic research is a scientific investigation that involves the pursuit of knowledge for the sake of knowledge. The purpose of basic research is to generate and refine theory and build

constructs. Hence, the findings might not be directly useful in practice. Basic research provides a basis for applied research.

Applied research is conducted directly to improve public health and clinical practice. The purpose is then to solve problems, make decisions, or to predict outcomes. Applied research is also used to test theory. Thus this study used applied research methodology to examine PMTCT services and its outcomes which are relevant to improving mothers' and infants' health and to reduce the incidence of MTCT.

Rigour implies striving for excellence in research and involves discipline, adherence to detail and accuracy. Rigour ensures precise measurement methods, representative samples and controlled design. The researcher in this study applied rigour through using appropriate data collection techniques, proper sample size determination and applying a cohort design. Control shows the application of rules by the researcher to avoid the possibility of errors and making sure that the findings are accurate reflections of reality. Controlling confounding variables, sampling criteria, selection of the research setting, data collection technique and analysis are some of the areas to which control applied during this study (Burns & Grove 2005:32-34).

In an observational study the aim of the researcher is to examine the relationship between characteristics and events without manipulating the variables. The characteristic can be a treatment, behaviours, environmental factors, laboratory measurements, or genetic markers. An event can be an outcome or the occurrence of a disease. In this study the outcomes are related to maternal health, child HIV status and patient satisfaction. Observational studies can be either prospective or retrospective. In a prospective study subjects are selected based on the presence or absence of specific characteristics. In a retrospective study subjects are selected based on the presence or absence of events or occurrences in their lives. Subjects affected by the event are cases and those not affected are controls (Bacchieri & Cioppa 2007: 21). In this study, HIV-infected women were selected provided they enrolled in the PMTCT programme.

This chapter describes the study population, sampling, research instruments, data collection procedures and analysis. The procedures followed for ensuring validity and reliability of the research findings are outlined. The ethical considerations, followed during the conduct of this study, are also described.

3.2 RESEARCH DESIGN

The selected research design directs the selection of the population, sampling procedure, methods of measurement, and a plan for data collection and analysis. It depends on the researcher's expertise, the problem and purpose of the study. "A research design is a blue print for the conduct of a study that maximises control over factors that could interfere with the study's desired outcome" (Burns & Grove 2005:40). The two broad categories of study design are observational and experimental. Observational studies can be analysed using descriptive and/or analytical/correlational techniques. Descriptive studies quantify the extent of a disease or factor in a population while analytical/correlational studies help to identify a cause or risk factor of a disease or an outcome. Both descriptive and analytical/correlational studies use cohort and cross-sectional designs. A cohort is a group of people who share certain characteristic and are followed over a period of time. A cohort study is also sometimes called a follow-up study. There are two types of cohort studies: prospective and retrospective. A retrospective study shortens the period of study as it makes use of previous data (Morroni & Myer 2007:77-81). This study used a retrospective cohort design. Both descriptive and correlational analyses were conducted during this study as elaborated in the data analysis section 3.3.3.

Cohort studies can be conducted using historic data to identify outcomes. A retrospective cohort design is helpful in studying multiple risk factors or multiple outcomes. Cohort designs are considered to be relatively powerful to assess the association between risk factors and outcomes. When designing such kinds of studies, the researcher should have developed clearly stated dependent and independent

variables prior to commencing the study (Murphy 2009:20). In cohort studies the researcher selects a group of study subjects, based on their exposure status, and then examines the rate of disease or outcome occurrences. Cohort studies are often conducted retrospectively and they fulfill at least one major criterium for causality: the time sequence of cause and effect (Stommel & Wills 2004:144). At the baseline people are classified according to their exposure status. Overtime follow-up investigations are conducted to identify the development of the disease (Olsen et al 2010:8).

In retrospective cohort designs, researchers assemble a cohort by reviewing their exposure status in the past. Then they also measure the occurrence of outcomes to some defined point in time. Tracing most of the cohort members must be possible in order to measure the outcome of interest. Retrospective cohort designs have comparative advantages over prospective designs that help to accomplish the research within shorter periods of time, rendering the study less expensive (Burns & Grove 2005:308).

In this study exposure status was determined based on PMTCT services. HCT, ART and ARV prophylaxis, infant feeding counseling and health care practices were taken into consideration. A cohort was assembled among women and their children who used PMTCT services at health facilities in Addis Ababa within two years prior to the study. Along with this additional variables were measured such as factors affecting HIV status of babies and barriers and enablers of PMTCT service utilisation. Outcome variables that were studied included the health status of the mother, HIV status of the baby and patient satisfaction with PMTCT service. These characteristics were studied retrospectively by reviewing patients' records and conducting interviews with mothers who had utilised the PMTCT services.

3.3 RESEARCH METHOD

The chosen research paradigm for this study is quantitative. According to Burns and Grove (2005:23) "…quantitative research is a formal, objective, systematic process in

which numerical data are used to obtain information about the world". A quantitative approach deals with variables and might explore the association or cause and effect relationships between them. Stommel and Wills (2004:178) mentioned the features of quantitative research as being orientated toward theory testing, focusing on predetermined variables, preference for statistical and numerical summaries or descriptions, being analytical and providing explanations in terms of causal theories.

This study identified relevant theories (the HBM and Donabedian's Model) that had been used for other studies. Variables were selected prior to data collection and analysis. The selected variables were helpful for numerical and statistical measurements and analyses. Both descriptive and analytical analysis techniques were applied.

3.3.1 Population and Sampling

In probability (random) sampling techniques every element of the population has a greater than zero chance of being included in the sample. Probability samples are more likely to be representative of the population as compared to the non-probability samples. Most commonly probability sampling techniques are used in quantitative research. There are four kinds of probability sampling techniques: simple random sampling, stratified sampling, cluster sampling and systematic sampling. Stratified sampling is used in situations where the researcher knows some of the variables that are critical to achieve representativeness. Variables which are commonly used for stratification are age, gender, ethnicity, socioeconomic status, diagnosis, geographical region, type of institution, type of care and site of care. Subjects are then randomly selected from the chosen strata. Stratified sampling can be disproportionate sampling or proportionate sampling. In disproportionate sampling each stratum should have an equivalent number of subjects in the sample. During proportionate sampling each stratum should have a

number of subjects in proportion to their occurrence in the population (Burns & Grove 2005:346-348).

Probability sampling is considered in selecting a representative sample. In stratified random sampling the population is divided into sub-populations that are individually more homogeneous than the total population. These different sub-populations are called strata. Hence, strata are formed based on common characteristics. They are formed based on the past experience and personal judgment of the researcher. Usually the size of a sample from each stratum is proportional to the size of the relevant stratum. If P represents the proportion of population in the stratum i and n represents the sample size, then the number of elements selected from stratum i is n*P. To select elements from each stratum usually simple random sampling is applied (Kothari 2004:62-64).

3.3.1.1 Population

A population constitutes the universe of interest and hence it is a universe of all of the units or elements to which the researcher wants to generalise the results obtained during a specific study. A researcher further defines these elements or units. This process of developing units or elements is referred to as the definition of the target population. Usually target populations are infinite or open ended. Practically researchers draw their samples from accessible populations that are often finite. Accessible populations may be defined in terms of their geographic locations or institutional affiliations or personal characteristics. Accessible populations are defined by observation periods chosen by the researcher. A sampling frame is a symbolic representation of study population. It is a list of all members of the target population or it is a set of procedures that allow the researcher to access members of the target population (Stommel & Wills 2004:297-306). Population, sometimes referred to as

target population, comprises the entire set of individuals or elements who meet the sampling criteria.

An accessible population is a portion of a target population to which the researcher has reasonable access. Samples are obtained from accessible populations and hence, the generalisations made are applied to the accessible population and then to the target population. In order for each person in the target or accessible population to have a chance of being included in the sample, a sampling frame must be identified and random sampling must be implemented. A list of every member of the population must be acquired for this sampling frame. Hence, the sampling frame is this list of the population. The researcher then can select members from this list using the sample plan (Burns & Grove 2005:342-346). A sampling frame is a source list from which a sample is drawn. It should be comprehensive, correct, reliable and appropriate. It should represent the target population (Kothari 2004:56).

For this study the population comprised 8 365 HIV-positive women and their babies utilising PMTCT services in Ethiopia. The target population comprised 1 689 HIV-positive women and their babies who used PMTCT service in Addis Ababa, Ethiopia. The sampling frame comprised 796 mother-infant pairs who used PMTCT services at the selected 12 hospitals and health centers in Addis Ababa. The accessible population comprised those mother-infant pairs who received PMTCT services at selected public hospitals, private hospitals and health centers in Addis Ababa. Hence, inclusion criteria included mother-infant pairs who used PMTCT services, infants' HIV known test results and the mothers who agreed to sign consent for themselves and on behalf of their babies. Exclusion criteria were mother-infant pairs who discontinued PMTCT services, pregnant women at the time of data collection, babies whose HIV test results were unknown and those who used PMTCT services at facilities outside Addis Ababa or at facilities that did not participate in this study.

3.3.1.2 Sampling

In 2011 there were 1 445 hospitals and health centers providing PMTCT services in Ethiopia (FMOH/HAPCO 2012:30). The accessible population for this study encompassed PMTCT service users at health facilities in Addis Ababa during 2011-2013. This area was chosen because Addis Ababa has the highest HIV prevalence in the country and more PMTCT attendees were found in this area than anywhere else in Ethiopia. In 2012 PMTCT services were provided at 61 hospitals and health centers in Addis Ababa, comprising the site target population for this study. Thus the accessible sites comprised 10 public hospitals, 15 private hospitals and 36 public health centers providing PMTCT services In Addis Ababa. All these health facilities are located within Addis Ababa. These sites provide PMTCT services and they were accessible for data collection purposes.

Proportionate stratified random sampling was used to select health care facilities. The types of health facility served as strata. Public hospitals, private hospitals and health centers were selected to represent each category. These health facilities were categorised, given consecutive numbers within each category and from each group, sites were selected randomly. From each selected site, the respondents were selected using simple random sampling to ensure representativeness. Patients' ART/pre-ART/medical record numbers used. Then a table of random number was used to select women attending PMTCT services. Those selected women were contacted during their follow-up visits to the PMTCT service sites. The number of mother-infant pairs selected was proportional to the number of patients treated at each health facility.

3.3.1.3 Sample size

Twelve (19.7%) health facilities, out of a total of 61 health care institutions, were selected for this study. To ensure representativeness from each category of health facilities (private hospitals, public hospitals and health centers), approximately 20% of the facilities in each stratum were selected. The names of all facilities in each of the

three strata were written on individual slips of paper, folded and placed into three different containers. Someone, not associated with this study, blindly selected two slips of paper indicating which public hospitals would participate in the study. The same procedure was followed to select three private hospitals and seven health centers. This amounted to stratified random selection without replacement. Subgroups of the health facilities, hospitals and health centers, were mutually exclusive. The selected public hospitals are Zewditu Hospital (Kirkos subcity) and Yekatit Hospital (Arada subcity). The selected private hospitals are Bethezata Hospital (Kirkose subcity), Myungsung Christian Medical Center (MCM) Hospital (Bole subcity) and Kadisco Hospital (Bole subcity). The public health centers selected are Addis Ketema (Addis ketema subcity), Bole17 (Bole subcity), Kolfe (kolfekeraneo subcity), Yeka (Yeka subcity), Meshualekia (Kirkose subcity), Kotebe (Yeka subcity) and Gulele (Arada subcity) health centers.

The formula used for sample size calculation of respondents was $S=p(1-p)z^2/d^2$ where p stands for anticipated population proportion, z refers to the cut-off value of the normal distribution and d is the precision required on either side of the proportion (Sayed 2007:347). There were three scenarios considered for sample size calculation based on the outcome of the study.

Patients' satisfaction with PMTCT services was measured based on the assumptions of a 95.0% confidence interval, 80% frequency of satisfaction among mothers who utilised PMTCT services and 5% worst acceptable result. Using this scenario the sample size became $S=0.8(1-0.8)1.96^2/0.05^2 = 246$.

The health status of mothers utilising PMTCT services, was based on the assumptions of a 95.0% confidence interval, 50% of the mothers who used PMTCT services showed improved health status and 5% worst acceptable result. Using this scenario the sample size became $S=0.5(1-0.5)1.96^2/0.05^2 = 384$.

The HIV status of infants, born from mothers utilising PMTCT services, was based on the assumptions of 95.0% confidence interval, 10% of infants born from mothers attending PMTCT service became HIV-infected and 5% worst acceptable result. Using this scenario the sample size became $S=0.1(1-0.1)1.96^2/0.05^2 = 138$.

The second scenario generated higher sample sizes and as such the adopted sample size was 384. To ensure proportionate distribution of the size of sample among participating facilities, this sample size was divided by health care facilities according to their patient load. So, for each health facility the sample size was calculated as: patient load * sample size/ size of sample frame.

- Zewditu hospital:201*384/796=97,
- Yekatit 12 hospital: 104*384/796=50,
- Bethezata hospital: 77*384/796=37,
- MCM hospital: 61*384/796=29,
- Kadisco hospital:35*384/796=17,
- Addis Ketema health center: 34*384/796=16,
- Bole17 health center: 61*384/796=30,
- Kolfe health center:33*384/796=16,
- Yeka health center: 79*384/796=38,
- Meshualekia health center: 23*384/796=11,
- Kotebe health center: 47*384/796=23 and
- Gulele health center: 41*384/796=20

3.3.2 Data collection

Data can be classified into qualitative or quantitative. In case of qualitative data numerical figures cannot be assigned while in the case of quantitative data numerical calculations are used. Quantitative data can be measured in different scales of measurement, including nominal scale, ordinal or rank order scale, equal interval scale

and ratio scale. A nominal scale implies the classification of an item into two or more categories without any magnitude. In the case of an ordinal scale it allows assigning of values in relative rank order. An equal interval scale is the same as an ordinal scale but with the additional feature that the distance between any two numbers on the scale is known. Ratio scales have all the properties of equal interval scales with two additional characteristics: it has a true rather than an arbitrary zero and have the qualities of real numbers that can be added, multiplied, subtracted or divided (Singh 2006:313).

In choosing a data collection method it is important to consider that it fits the purpose. The method should capture the information needed for the research. Hence, different kinds of data collection tools exist that range from questionnaires to observation. Questionnaires contain a set of questions that people will answer. When designing a questionnaire people may interpret it in different ways so it is important to make the questions as clear as possible. Questions can be open ended or closed ended. Open ended questions are not limited by definitive answers and closed ended questions have predetermined answers such as yes-no or true-false or responding to a predetermined Likert type scale such as yes definitely, yes, no, definitely not (Taylor, Wilkie & Baser 2006:29).

There are primary and secondary sources of data. In the case of primary data the researcher collects the data for the first time. Secondary data are collected for other purposes and have already passed through a statistical process. Primary data can be collected through interviews or questionnaires or observations. It can be done through personal or telephone interviews. Personal interviews are usually conducted through structured interviews where a set of pre-determined questions are prepared. In case of unstructured interviews the interviewer does not follow a system of pre-determined questions. The chief merits of the interview method include that more information and more observations can be applied. Personal information can easily be obtained, non-response rates generally remain low and the language of the interview can be adapted to the ability or educational level of each interviewee.

Weaknesses of the interview method include that it is a very expensive method when wide geographical samples are involved, there is also the possibility of bias of the interviewer or respondent, certain groups of populations such as high ranking officials, or people with high incomes might not be easily approached and it is time consuming when the sample size is large.

Another method of data collection through conducting structured interviews is also possible. In this method the data collector records information obtained from respondents on the structured interview schedule. When secondary data are used, the researcher has to look into the different sources where he/she can get the data. Such secondary data can be available in the form of reports, public records, publications and technical books (Kothari 2004:97).

3.3.2.1 Data collection approach and method

Data sources for this study were both primary and secondary data sources. Patients' charts or records served as secondary data sources while interviews with mothers served as a primary data source. Hence, the method of data collection involved both structured interviews and document reviews. HIV-positive women, using PMTCT services, were interviewed individually using structured interview schedules. Once these mothers had signed consent for themselves and on behalf of their babies, data collection commenced.

The information gathered during the interviews included patients' characteristics, patients' levels of satisfaction with PMTCT services, breast feeding practices, factors affecting MTCT and barriers and enablers of the use of PMTCT services. The other variables that were obtained from patients' records were HCT, ARV intervention, breast

feeding counseling, factors affecting the rate of MTCT, HIV status of the infant and health status of the mother.

3.3.2.2 Development and testing of the data collection instruments

Two data collection instruments were used to capture both primary and secondary data, namely structured interview schedules and document review checklists. The instruments were developed by the researcher. An extensive literature review and consultation with experts in the field of data collection and PMTCT were made prior to developing the tool. After the tools had been developed, pre-testing was done and the instruments were revised to address deficits and ambiguous words.

3.3.2.3 Characteristics of the data collection instruments

The structured interview schedule has five sections:

- Section A addresses patient characteristics like age of the mother, age of the baby, and residential address.
- Section B asks questions about infant feeding counseling and practices.
- Section C's questions pertain to patient satisfaction. This section is again subdivided into different sections asking mothers about their satisfaction levels with different areas related to PMTCT like infrastructure and perceptions about health care providers.
- Section D is about HIV testing and counseling.
- Section E addresses factors affecting PMTCT services, as perceived by the participating women.

The second data collection instrument was a document review checklist, subdivided into two sections for the mother and for the baby. The document review checklist of the mother has six sections.

- Section A is about background information of the health facility like public or private.
- Section B deals with the health status of the mother using CD4 count, WHO stage and other illnesses.
- Section C encompasses factors affecting the HIV status of the baby.
- Section D contains HIV testing and counseling questions that could not be answered during the structured interview.
- Section E is about ARVs for the mother.
- Section F deals with family planning issues.

The document review checklist of the baby has four sections.

- Section A deals with background information of the baby.
- Section B captures information about factors affecting the HIV status of the baby that could not be addressed by the mother's checklist.
- Section C captures information about ARV interventions for the baby.
- Finally section D captures information about the HIV status of the baby.

Both the English and Amharic structured interview schedule as well as the document review checklists has been attached as Annexures 1 and 2.

3.3.2.4 Pre-testing of the data collection instrument

Prior to data collection, each data collector was trained to collect data for pre-testing purposes. Nineteen respondents were included in the pre-test at the randomly selected health facilities. During the pre-test phase ambiguous or unclear words and sentences were identified rephrased and corrected such as stigma and discrimination questions rephrased in order not to hurt the feeling of respondents. Questions which cannot gather data from the patients' files were deleted. This helped to enhance the reliability of the data collection tool which is discussed further in section 3.4.

3.3.2.5 Data collection process

Three research assistants were recruited to collect both the primary data and secondary data. These assistants were nurses with extensive experience in the provision of PMTCT services and data collection. The researcher trained them for two days prior to commencement of data collection in order to standardise the data collection process. The topics covered during the training included how to conduct structured interviews and document reviews, PMTCT and ethical issues. They were trained adequately on all of the rights of respondents and the signing of informed consent by each interviewee was mandatory before data collection could commence. The theoretical training was followed by rehearsals and role play sessions until they mastered the required interview skills. The training helped them to avoid losing meaningful information and to capture the verbatim statements of respondents. The research assistants were fluent both in English and in Amharic. They administered the structured interview in Amharic and collected data from patients' records in English. The researcher supervised the data collection procedures and could assist if and when necessary because he is well versed in both Amharic and English.

The researcher translated the Amharic verbatim statements into English and then a professional Amharic-English translator checked the translations for accuracy. The

same procedure was followed when the researcher translated the Amharic direct quotations into English and the Amharic-English translator checked the translation as conveying the correct meanings. The actual data collection took place from May 2013 to November 2013. (Please see the letter from English-Amharic translator in Annexure 22 of this thesis).

3.3.3 Data analysis

The choice of statistical methods to be used depends on the variables, sampling procedures and sample size of the study. Outcome variables could be one of three types: numerical, binary or ratio. In the case of numerical outcomes the mean, standard deviation, confidence intervals, p-values, analysis of variance (ANOVA), linear regression and multiple regressions can be applied. Binary outcome variables are characterised by samples where the value is one of the two alternatives such as yes/no responses. For this outcome proportions, probabilities, risks, odds rations (ORs), z-tests, confidence intervals and logistic regressions were used. Two of the particular types of proportions that are relevant to health research are cumulative incidence (or risk) of a disease event and the prevalence of a disease. Cumulative incidence (or risk) is the probability that a disease occurs during a specified period of time. It is calculated by the new number of cases during a specified period of time divided by the number of persons initially disease-free and at risk of contracting the disease.

On the other hand, prevalence is the burden of a disease at a particular time. It is calculated based on the number of existing cases among the whole population. Analysis of rate is used during longitudinal studies (Kirkwood & Sterne 2007:32, 130, 226). The likelihood of developing a particular disease, among those exposed to a factor, compared to the risk of the individual who has not been exposed, is measured by relative risk (RR). Hence, it is the ratio of two incidence rates. Odds ratio is a good estimate of relative risk when the disease is rare. Relative risk is the risk of disease in the exposed relative to the risk of disease in the un-exposed. The difference of this risk

among exposed to the un-exposed is attributable risk. In the presence of confounding variables these statistics may not reveal the true association. Confounding variables can be controlled by using matching and multiple logistic regression statistical calculations (Wassertheil-Smoller 2004:101).

Statistical analysis of quantitative data can be descriptive or inferential. Descriptive analysis is concerned with the numerical description of a particular group or variable. In contrast, inferential statistics deal with statistical measures that can be used to infer results from a sample to estimate a parameter or the corresponding value of the population as a whole (Singh 2006:224).

Both descriptive and inferential statistics are used in the analysis of this research such as the mean, relative risk and chi-square (X^2) test to calculate the p-values and confidence intervals. A p-value of 0.05 and a confidence interval of 95% were used as cut off values for associations. Each independent and dependent variable was analysed using descriptive statistics before associations were calculated. The frequency of each independent variable among HIV-positive infants and HIV-negative infants was explored as well as the other outcome variables. Standard deviations and measures of central tendency (mean, median and mode) were used for HTC, ARV intervention and infant feeding practices and counseling. The number of women who underwent HTC before pregnancy and after pregnancy, the number of HIV-positive pregnant women receiving ARV prophylaxis at 14 weeks' gestation and the number of mothers practicing exclusive breast feeding for the first six months are some of the areas where descriptive statistics were applied. The patients' levels of satisfaction with PMTCT services were analysed using descriptive statistics.

Different variables' association with infants' HIV status were explored using X^2 test and RR. The proportion of mothers, using PMTCT services, whose own health improved were also explored. Both descriptive and analytical statistics were applied for analysing factors affecting the rate of MTCT and barriers and enablers influencing PMTCT service

utilisation. Mainly the Statistical Package for the Social Sciences (SPSS version 20.0) was used to aid for data analysis. Besides Epi info version 3.5.1 was used for calculating statistics that cannot be calculated by SPSS such as RR. Microsoft Excel 2007 was used for plotting graphs.

3.4 RELIABILITY OF THE STUDY

Reliability is the consistency of measurement results in terms of persons, occasions, locations, and instruments. It should indicate the relative absence of unsystematic, random measurement error. Test-retest or repeated-measures reliability ensures that the tool measures stable results when applied twice or more frequently. The inter-rater reliability deals with the reliability of data recorded by two or more trained observers or data collectors. The data obtained by these different observers should provide consistent results (Stommel & Wills 2004:209-224).

Reliability testing focuses on three aspects stability, equivalence and homogeneity. Stability is usually referred to as test-retest reliability and is concerned with the consistency of a repeated measure of the same attribute with the use of the same instrument. Equivalence focuses on the comparison of two versions of paper and pencil or two observers measuring the same event. Homogeneity is concerned with primarily paper and pencil tests in terms of correlation of various items in the instrument (Burns & Grove 2005:374-376). Prior to data collection, the structured interview schedule and document review checklist were pre-tested and revised based on identified shortcomings. The few shortcomings included that long sentences were shortened and that Amharic phrases familiar to the interviewed women were used, wherever possible.

To ensure internal reliability Chronbach's alpha coefficients were used. Chronbach's Alpha calculation formula is: $A = \frac{K}{K-1}\left(1 - \frac{K}{K+K(K-1)r}\right)$

Here K stands for number of items and r stands for the average correlation among the items. The Cronbach alpha "… measures the extent to which different subparts of an instrument are equivalent in terms of measuring the same critical attribute" (Polit & Hungler 2005:372). It can range from +1 to -1. A value close to 1 indicates a high degree of internal consistency or agreement among items.

As this is a purposefully self-designed structured interview schedule and document review checklist, a Cronbach alpha of 0.7 was regarded as being acceptable (Burns & Grove 2005:374). The chronbach's alpha for the different scales of data collection tool is presented in table 3.1. Acccordingly all the constructs had chronbach's alpha above 0.7.

To further ensure reliability of the tool, repeated measures of the same variables were done and the same results were obtained. To ensure interrater reliability, three data collectors were trained to obtain informed consent from the interviewees, to conduct structured interviews and to record the information accurately on the checklist in the same way.

One data collector had experience of PMTCT services at a public hospital, one at a private hospital and the other one at a health center. During the training, they practiced to conduct interviews with each other until they mastered both the interviewing and the recording of the responses. The researcher was available during the data collection phase and checked the completed interview schedules and checklists at regular intervals. This enabled the researcher to identify and address any challenges the data collectors might have encountered.

To further ensure interrater reliability, Cohen's Kappa was computed. Cohen's Kappa values of 0.41 to 0.60 can be considered moderate, values of 0.61 to 0.80 can be considered substantial and values of 0.80 to 1.00 are almost perfect (Stommel & Wills 2004:216).

Cohen's Kappa was used to assess the agreement between two or more data collectors for a categorical outcome (Marston 2010:126). Accordingly Cohen's Kappa was calculated for the outcome variables. In this research the calculated Cohen's Kappa values were above 0.81. Specifically for HIV status of the infant was 0.842 and patient satisfaction 0.909.

Table 3.1 Chronbach's alpha coefficients of the different sections of the data collection tool

Scale	Chronbach's alpha	Number of items
HIV status of infants	0.706	4
Health outcomes of the mothers used PMTCT service	0.837	12
Patient satisfaction	0.800	37
HIV testing and counseling	0.803	7
Antiretrovirals for prevention of mother to child transmission of HIV	0.809	4
Infant feeding counseling and practice	0.742	4
Factors affecting mother to child transmission of HIV	0.768	7
Factors affecting the utilisation of PMTCT services	0.853	16

3.5 VALIDITY OF THE STUDY

A measurement is valid when it measures the characteristic or attribute that it intends to measure. Content validity is the most common approach to establish the validity of a measurement. Criterion validity is concerned with the use of external criteria to validate a given measurement instrument. The other one is construct validity which measures the meaning of the concept that it is intended to measure (Stommel & Wills 2004:209-224). Content validity deals with adequate coverage of the topic under study by the measurement instrument. Its determination is primarily judgmental and intuitive. It can also be determined by the use of experts or panels but there is no numerical way to

express it. Criterion-related validity possesses qualities of relevance, free from bias and availability.

Construct validity is the most complex and abstract form of validity measurement (Kothari 2004:73). Nevertheless content validity can be expressed numerically using the content validity index (CVI). Experts rate the content relevance of each item using four point rating scale. 1=not relevant; 2=unable to assess relevance without item revision or item is in need of such revision that it would no longer be relevant; 3=relevant but needs minor alteration; 4=very relevant and succinct. Experts must be also asked to add important areas not included in the instrument (Burns & Grove 2005:378).

The tool was tested for face validity, content validity and construct validity. For content validity experts working in PMTCT services and those who undertake PMTCT research consulted to ensure that every item in the data collection tool relates to PMTCT services. For face validity these experts had to agree that the interview schedule and checklist appeared to request information about PMTCT use. The data collection tool items were revised based on a review of the literature. Exploratory factor analysis was also applied to test construct validity. An appropriately defined population, a large sample size and a proportional stratified random sampling technique enhanced the external validity of the study, implying that the findings of this study could be generalised to the population of mother-infant pairs using PMTCT services in Addis Ababa.

3.6 ETHICAL CONSIDERATIONS

Ethical considerations relate to respondents' (patients') rights. The discussion of these respondents' rights will address autonomy, anonymity, confidentiality, privacy and justice including beneficence (or the absence of maleficence).

3.6.1 Ethical issues relating to patients' rights

Ethical research throughout the world is informed by principles of respect for persons, beneficence/non-maleficence and justice. These principles help to protect humans' rights. These rights are self-determination, privacy, anonymity and confidentiality, fair treatment and protection from discomfort and harm. Respect for persons is based on the fact that individuals know what works for them, emphasising the importance of autonomy. Researchers are required to respect the individuals' willingness to participate or not to participate in the research. To comply with this principle, the requirement for informed consent and confidentiality must be met. In case of beneficence, researchers and health care providers must act in ways that benefit the health and wellbeing of the research participants. On the one hand, the principle of non-maleficence requires the obligation to do no harm. It emphasises minimising potential harms. The principle of justice is concerned with equality and fairness in determining who receives the benefits and who bears the burden of research (Marshall 2007:7).

Institutional review boards (IRB) help to ensure that ethical principles are applied, appropriate methods followed and the potential benefits of the investigation are greater than the risks. IRBs have the authority to approve, require modification or disapprove research. IRB reviews assess benefit/risk analysis, informed consent process, the selection of subjects, privacy and confidentiality. IRBs have the responsibility to ensure that the rights of persons to decide whether or not to participate is respected and they are not coerced to participate in any way. Besides the IRB ensures that informed consent is obtained, implying that the potential study participant/respondent has access to all relevant information about the study and about his/her participation in the study and knows who has the right to access his/her records (Lachman 2006:52).

The informed consent should have specific information and be understood by the research participant. For this purpose both written and oral information should be provided to the research participant. The information should be clear enough to be understood by the potential participants/respondents. There are certain groups of persons who are unable to provide consent such as children, permanently incapacitated

adults and persons temporarily unable to consent due to emergencies or illnesses. The general rule for children, who are legally unable to consent, is that their parents or guardians can consent for their participation in research (Holm 2007:52) but that the child's assent should be obtained, where possible to do so.

3.6.1.1 Ensuring autonomy

In this research people's autonomy was respected by ensuring that every woman participated in the research voluntarily and that no woman was coerced into signing consent, being interviewed or answering any specific question. The women were informed that they could terminate the interview at any stage and could refuse to answer specific questions without incurring any negative consequences whatsoever. The information sheet and the consent form informed every potential respondent about the specific objectives of the study and the method of data collection. Every woman was granted sufficient time to read the information sheet, ask any questions, and make her own independent decisions as to whether or not to agree to be interviewed. All women were re-assured that their treatment, and the treatment of their babies, would not be affected in any way whatsoever by their decisions to participate in the study or not to do so. The women's rights to self-determination were respected because no one was coerced to agree to be interviewed, to answer specific questions or to complete the interview. The women's decisions were respected at all times.

There was no compensation or incentive for participating in this research. Participation was voluntary and every woman's choice to participate or not to do so was respected and did not influence her treatment, or the treatment of her baby, in any way whatsoever. No costs were incurred by participating women as they were recruited at health care facilities and the interviews were conducted at convenient places, determined by each woman's preference.

3.6.1.2 Ensuring anonymity, confidentiality and privacy

The women were re-assured about anonymity because no names were mentioned on any documents and no one would be able to connect any informed consent form with any specific completed interview schedule and/or checklist. The women were informed that their signed consent implied consent to be interviewed, and consent to access the health records of both the mothers and their babies, implying full disclosure of the nature of the study and the data collection methods.

As the nature of the study required that the information obtained during the structured interview had to be correlated with information from the mother's and from the baby's medical records, the researcher kept a list correlating each interviewed woman's number (ranging from 1 to 384) with her medical file number and with the baby's clinic chart number. This list was kept locked up and only the researcher had access to it. This list was kept in case any audits might be required to confirm the data entries or in case any health facility might query the results of the study's findings. Subsequent to the acceptance of the research report this list will be destroyed with the completed interview schedules and the completed checklists (pertaining to the mothers' and babies' medical files/charts).

The women's right to privacy was respected because the interviews were conducted in a private room at the health facility or at any venue preferred by a specific woman and at a preferred time specified by her.

Confidentiality was maintained because only the researcher and statistician and the study's supervisor had access to the completed interview schedules and checklists. The data were entered into a secure computer accessible to the researcher and the statistician only and protected by a secure password known only to these two persons. Subsequent to acceptance of the research report, the completed interview schedules and checklists and the data entered on the computer will be destroyed.

3.6.1.3 Ensuring justice and beneficence/non-maleficence

The appointment time and place for each interview could be specified by the woman concerned and this was respected. All women were contacted in the same way. No harm was inflicted on any woman as only interviews were conducted and data were obtained from the mothers' and from the babies' files. (No tests whatsoever were performed to supply data for this study). Potential benefits (beneficence/non-maleficence) could result from the implementation of recommendations based on the study's findings. If more women could access and utilise the available PMTCT services before, during and after their pregnancies, this could help to reduce the rate of MTCT in Addis Ababa, enhancing the wellbeing of mothers and babies.

3.6.2 Ethical issues related to sampling

Fair treatment of respondents included that probability sampling ensured that every respondent was selected by chance, not by choice. Accordingly the sample was representative of the target population of women who utilised PMTCT services in Addis Ababa. All scientific procedures were followed appropriately. Only women who signed voluntary consent to participate in the study were interviewed.

3.6.3 Ethical issues pertaining to the researcher's conduct

All references were appropriately acknowledged and a complete list of references is included in the report. Statistics were calculated and interpreted with the assistance of a statistician. The researcher and the statistician independently entered the coded data onto the SPSS program and compared their data entries. Any discrepancies were investigated and addressed. This enhanced the accuracy of the data entered and helped to avoid wrong data entries and incorrect conclusions.

The information sheet and informed consent form (see Annexure 3, 4, 5 and 6) informed each potential respondent about the specific objectives of the study and that interviews will be conducted with the respondents, and that information from the mothers' medical records and from the babies' charts will comprise data for this study. Mothers provided consent both for themselves and on behalf of their babies. Ethical clearance, once obtained from the Higher Degrees Committee, Department of Health Studies, University of South Africa, was requested from the Addis Ababa City Administration Health Bureau Ethics Committee. Finally the head of each selected hospital and health center granted approval before the commencement of data collection at any facility. Dates for data collection at each site were arranged with the person in charge of the specific facility.

3.7 SUMMARY

This chapter discussed the research design and method. The quantitative approach and why it has been chosen was discussed in detail. The selection of a retrospective cohort design was justified. Stratified random sampling technique, structured interview schedule and document review issues were addressed. The characteristics of the data collection tools were explained. This was augmented by proper data analysis applications and explanations of the underlying rationale for adopting specific data analyses. Reliability and validity of the instruments and sampling procedure were also discussed. Finally the ethical procedures that were followed to protect the rights of respondents were explained as well as the IRB review and the balance of risks and benefits.

The next chapter will present the data analysis and discussion of the study's findings.

CHAPTER 4

ANALYSIS AND DISCUSSION OF RESEARCH FINDINGS

4.1 INTRODUCTION

This chapter discusses the research findings based on the quantitative data analysis. Before statistical tests were applied each variable was analysed using descriptive statistics in the case of continuous variables and summary statistics in the case of categorical variables. Variables related to the mothers and infants were analysed and discussed. The findings address the objectives of the study, namely to:

- identify factors affecting the utilisation of PMTCT services in Addis Ababa;
- evaluate PMTCT services in Addis Ababa;
- assess patients' satisfaction levels with PMTCT services in Addis Ababa;
- examine the health outcomes of mothers using PMTCT services in Addis Ababa;
- describe the HIV status of infants whose HIV-positive mothers used PMTCT services in Addis Ababa;
- identify factors affecting the HIV status of infants in Addis Ababa;
- make recommendations to enhance women's utilisation of PMTCT services in Addis Ababa (to be addressed in chapter 5).

The total sample size comprised 384 mother-infant pairs (N=384) for this study. All responses that did not total 384 are indicated by n, and frequencies of responses within any total (N or n) are indicated by *f*.

4.2 RESPONDENTS' SOCIO-DEMOGRAPHIC CHARACTERISTICS AND IMMUNOLOGICAL CONDITIONS

This section presents the socio demographic characteristics of the mothers. The ages, marital status, religious affiliations, income and educational levels are discussed of the 384 mothers who used PMTCT services in Addis Ababa and who participated in this study.

Table 4.1: Respondents' socio demographic characteristics and CD4 counts (N=384)

Socio-demographic characteristic	Number	Percentage (%)
Age of the mother		
16-20	5	1.3
21-25	92	24.0
26-30	180	46.9
31-35	93	24.2
36-40	14	3.6
Marital status		
Never married	10	2.6
Live in union	10	2.6
Married	340	88.5
Separated	21	5.5
Divorced	2	0.5
Widowed	1	0.3
Educational level		
Never attended school	22	5.7
Grades 1-6	66	17.2

Grades 7-8	95	24.7
Grades 9-12	145	37.8
University/college	56	14.6
Religion		
Christian	311	81.0
Muslim	73	19.0
Baseline CD4 count		
<350cells/mm^3	267	69.5
≥350cells/mm^3	117	30.5
Most recent CD4 count		
<350cells/mm^3	224	58.3
≥350cells/mm^3	160	41.7

4.2.1 Respondents' ages and marital status

At enrollment in the PMTCT programme, 46.9% (*f*=180) of the mothers were 26-30 years of age while 24.2% (*f*=93) were 31-45 years old and 24.0% (*f*=92) fell into the age group of 21-25. Only 1.3% (*f*=5) of the mothers were 20 years old or younger.

Most respondents were married (88.5%; *f*=340) but 5.5% (*f*=21) were separated, 2.6% (*f*=10) had never been married, 2.6% (*f*=10) lived with their partners, 0.5% (*f*=2) were divorced and 0.3% (*f*=1) widowed.

A study conducted in Ethiopia reported that out of 418 pregnant women, 91.4% were married, 5.5% were single and 3.1% were divorced (Moges & Amberbir 2011:109). Another Ethiopian study reported that all women who attended ANC clinics and participated in that research project were married (Adedimeji et al 2012:3). At Dilchora hospital, in eastern Ethiopia, out of 234 ANC attendees who accepted HIV testing,

98.3% were married (Demissie et al 2009:143). Those studies' findings were similar to the current study's finding, indicating that the majority of pregnant Ethiopian women, who used PMTCT services, were married.

4.2.2 Respondents' religious affiliations and educational levels

Out of the 384 mothers who participated in this study, 81.0% (*f*=311) were Christians and 19.0% (*f*=73) were Muslims.

Of the women who used PMTCT services, 37.8% (*f*=145) attained grades 9-12; 24.7% (*f*=95) attained grades 7-8, 17.2% (*f*=66) attained grades 1-6. Those who attended university/college level education comprised 14.6% (*f*=56) and those who never attended school were 5.7% (*f*=22).

4.2.3 Respondents' incomes compared to their educational levels

The average monthly income of the women was 2533.7 birr per month but it ranged from 100 to 9200 birr (when 1USD was equivalent to 19birr). Those who never attended school earned on average 1106.8 birr per month (95%CI=782.1-1431.5). Mothers who attended grade 1-6 earned on average 1421.3 birr per month (95%CI=1080.6-1761.9). PMTCT service users who attained grades 7-8 earned on average 1923 birr per month (95%CI=1545.5-2300.5). Mothers who attained grades 9-12 earned on average 2075.3 birr per month (95%CI=1632.3-3313.6). Those mothers, who used PMTCT services and who had attended university/college level education, earned on average 4304.3 birr per month (95%CI=3807.8-4800.7). This shows that as the mothers' educational levels increased, their monthly incomes also increased. Since the women's educational levels had more than two categories, the analysis of variance (ANOVA) test was used to determine whether any significant difference of monthly incomes existed among women with different levels of education. Accordingly, the relationship is statistically significant at 0.05 P value using ANOVA ($P<0.01$). The finding implies that those women with

higher levels of education were better positioned to afford costs related to PMTCT services and other associated expenses due to their relatively higher incomes, compared to the incomes of women with lower levels of education.

Table 4.2: ANOVA of respondents' educational levels versus monthly incomes

	Sum of squares	Df	Mean square	F	Sig
Between groups	365437119.3	4	91359279.82	27.307	0.000
Within groups	1267988073	379	3345614.969		
Total	1633425191	383			

4.2.4 Respondents' baseline and most recent CD4 counts

At baseline 69.5% (*f*=267) of the women who participated in the study had CD4 counts of 350cells/mm^3 or less while 30.5% (*f*=117) had CD4 counts greater than 350cells/mm^3. The most recent CD4 counts of less than or equal to 350cells/mm^3 decreased to 58.3% (*f*=224) from the initial 60.5% (*f*=267). On the other hand, women with CD4 counts of greater than 350cells/mm^3 increased to 41.7% (*f*=160) from the initial 30.5% (*f*=117).

4.3 FACTORS AFFECTING THE UTILISATION OF PMTCT SERVICES IN ADDIS ABABA

Out of the study's 384 respondents, 84.9% (*f*=326) knew that they were HIV-positive before presenting at ANC clinics whereas 15.1% (*f*=58) were unaware of their HIV-positive status. Most of the women (89.1%; *f*=342) disclosed their HIV status to at least one other person but the remaining 10.9% (*f*=42) did not do so. The respondents' reported partner sero-concordant HIV status was 81.5% (*f*=313), implying that 81.5% of the respondents' partners were also HIV-positive.

Since factors affecting the utilisation of PMTCT services are contextualised within the HBM's major tenets, the rest of the findings in this section will be presented according to perceived susceptibility, perceived severity and perceived barriers.

4.3.1 Perceived susceptibility

In this study, perceived susceptibility implied pregnant women's beliefs about being infected with HIV and their beliefs about PMTCT. The pregnant women's beliefs about being infected with HIV were manifested by seeking HIV diagnosis and utilising PMTCT services when HIV-positive. Since the respondents of this study were HIV-positive, their beliefs about being infected with HIV were assessed based on their knowledge of their HIV-positive status when presenting at ANC clinics. Accordingly this knowledge was assessed in relation to the respondents' educational level, marital status and employment status.

4.3.1.1 Educational level versus knowledge of HIV status of the mothers at presentation at ANC clinics

Before presenting at the ANC clinic, of those

- 22 women who never attended school, 81.8% (*f*=18) knew their HIV status and four (18.2%%) of them did not;
- 66 who had attained grades 1-6, 80.3% (*f*=53) knew their HIV status and 13 (19.7%) did not;
- 95 women who attained grades 7-8, 77.9% (*f*=74) knew their HIV status and 21 (22.1%) did not;
- 145 women who attained grades 9-12, 88.3% ((*f*=128) knew their HIV status and 11.7% (*f*=17) did not; and
- 56 women who attended university/college education, 94.6% (*f*=53) knew their HIV status and 5.4% (*f*=3) did not.

The highest percentage of women who knew their HIV status before presenting for ANC were those who had attained university/college level education and the lowest percentage were those who attained grades 7-8. Both educational level and knowledge of HIV status are categorical variables, thus X^2 tests were used. The observed frequency (OF) was smaller than the expected frequency (EF) of mothers who had never attended school, attained grades 1-6 and grades 7-8 with known HIV status at presentation for ANC. On the other hand the OF was higher than the EF for mothers who attained grades 9-12 and university/college level education with known HIV status at presentation for ANC. Hence, there was a statistically significant difference between educational level and HIV status at presentation for ANC at p-value of 0.05 using X^2 test (P=0.035). These findings imply that at high levels of educational attainment, women tended to know their HIV-positive status before coming to ANC clinics. Nevertheless Cramer's V showed only a weak association (V=0.164).

Table 4.3: Observed and expected frequencies of educational level versus HIV status at presentation at ANC clinics (N=384)

Educational level		HIV status at presentation for ANC		Total
		Known	Unknown	
No schooling	Count	18.0	4.0	22.0
	Expected Count	18.7	3.3	22.0
Grade 1-6	Count	53.0	13.0	66.0
	Expected Count	56.0	10.0	66.0
Grade 7-8	Count	74.0	21.0	95.0
	Expected Count	80.7	14.3	95.0
Grade 9-12	Count	128.0	17.0	145.0
	Expected Count	123.1	21.9	145.0
University/College	Count	53.0	3.0	56.0
	Expected Count	47.5	8.5	56.0
Total	Count	326,0	58.0	384.0
	Expected Count	326.0	58.0	384.0

Table 4.4: Chi-square test: educational level versus HIV status at presentation at ANC clinics (N=384)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.321	4	.035
N of Valid Cases	384		

A study conducted in northwestern Ethiopia reported the educational level of pregnant women attending an ANC clinic where HCT and PMTCT services were provided. Out of 418 pregnant women, 46.7% were unable to read and write, 9.8% had passed grades 1-6, 7.2% attained grades 7-8, 19.1% attained grades 9-12 and 11.5% progressed beyond grade 12 (Moges & Amberbir 2011:109). A study conducted in four SSA countries (Burkina Faso, Kenya, Malawi and Uganda) investigated the correlation between educational level and HCT. Those who had not been tested for HIV, were those who had lower levels of education. Women in the highest educational levels were more likely to be tested at the VCT sites while women with lower educational levels were more likely to get tested at PMTCT sites (Obermeyer, Neuman, Hardon, Desclaux, Wanyenzes, Ky-Zerbo, Cherutich & Namakhoma 2013:1113-1116).

A systematic review of research reports identified women's educational levels and low socio-economic status as posing barriers to accessing PMTCT services in India (Darak et al 2012:4). Another study from India also documented factors associated with women who discontinued using PMTCT services. A woman with less than graduate level education was 6.32 times more likely to discontinue using PMTCT services compared to a woman with graduate level education. A woman from a poor family was 1.61 times more likely to discontinue using PMTCT services compared to a woman form a middle income or a rich family in India (Panditrao et al 2011:595).

Thus the current study's findings, indicating that women with higher education levels were more likely to access and utilise PMTCT services in Addis Ababa, are supported by other studies' findings from Ethiopia, SSA and India.

4.3.1.2 Respondents' marital status versus knowledge of their HIV status when presenting at ANC clinics

Most of the women, utilising PMTCT services, were married (88.5%; *f*=340), 5.5% (*f*=21) were separated, 2.6% (*f*=10) lived with their partners, 2.5% (*f*=10) had never been married while 0.5% (*f*=2) were divorced and only one (0.3%) was a widow. The following women knew their HIV status before attending the ANC clinic (classified according to marital status):

- 100.0% (1 out of 1) who were widowed;
- 90.0% (9 out of 10) who lived with their partners without being married;
- 80.0% (8 out of 10) who had never been married;
- 76.6% (294 out of 340) who were married;
- 66.7% (14 out of 21) who were separated;
- 100.0% (0 out of 2) who were divorced.

Women who knew their HIV status before presenting at ANC clinics could start using PMTCT services timeously and use ARVs as prescribed. If pregnant women do not know their HIV status early, they might fail to start PMTCT services timeously for the unborn baby to derive maximum protection from being born HIV-infected. The chi square test showed that the OF was smaller than the EF for mothers who had never been married, separated and divorced with known HIV status at presentation for ANC. However, the OF was higher than the EF for mothers who lived "in union" (with their male partners without being married), married and widowed for known HIV status at presentation for ANC. This showed that the presence of partners, either in the form of marriage or living in union, influenced women's knowledge of their HIV status at presentation for ANC and it is statistically

significant at a p value of 0.05 as indicated by the chi square (X^2) test (p=0.003).The strength of association using Cramer's V between these two variable was weak (V=0.216). Therefore this finding implies that women who had male partners (being married, widowed or living in union) were less likely than other women (who were unmarried and not living with male partners) to know their HIV status when they presented for ANC. Since knowledge of HIV status is an initial step towards using ARVs for PMTCT, women's knowledge of their HIV status played a role in their utilisation of PMTCT services because only women who knew that they were HIV-positive could commence using those services.

Table 4.5: Observed and expected frequencies of marital status versus HIV status at presentation at ANC clinics (N=384)

Marital status		HIV status at presentation for ANC		Total
		Known	Un-known	
Never married	Observed count	8.0	2.0	10.0
	Expected Count	8.5	1.5	10.0
Living in union	Observed count	.09	1.0	10.0
	Expected Count	8.5	1.5	10.0
Married	Observed count	294.0	46.0	340.0
	Expected Count	288.6	51.4	340.0
Separated	Observed count	14.0	7.0	21.0
	Expected Count	17.8	3.2	21.0
Divorced	Observed count	0	2.0	2.0
	Expected Count	1.7	.3	2.0
Widowed	Observed count	1.0	0	1.0
	Expected Count	.8	.2	1.0
Total	Observed count	326.0	58.0	384.0
	Expected Count	326.0	58.0	384.0

Table 4.6: Chi-square test: respondents' marital status versus HIV status when presenting at ANC clinics (N=384)

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.909	5	.003
N of Valid Cases	384		

A study which was conducted in Kenya had reported findings about married women's experiences of HIV testing at ANC clinics. A total of 2 700 mothers were enrolled in the study and 86.2% of them were married. Of these 2 700 mothers, 92.1% reported getting their HIV-1 test results during pregnancy. Women who had not been tested for HIV during pregnancy were less likely to be married than those who had been tested (Kinuthia, Kiarie, Farquhar, Richardson, Nduati, Mbori-Ngacha & John-Stewart 2011:3). A Tanzanian study reported a different finding indicating that VCT attendance was higher among those women who had never been married (49%) and those who had been separated or divorced (49%). VCT desire was also high among those with recent marital status changes (40%) (Wringe, Isingo, Urassa, Mailseli, Manyalla, Changalucha, Mngara, Kalluvya & Zaba 2008:321-322). Thus this study from Kenya produced different result than those reported by the current study.

4.3.1.3 Respondents' employment status versus their knowledge of their HIV status at presentation at ANC clinics

Out of this study's respondents, 39.6% (*f*=152) were employed full time, 7.3% (*f*=28) had part time employment, 19% (*f*=73) were self-employed and 34.1% (*f*=131) were unemployed. Out of the 73 self-employed women 91.8% (*f*=67) knew their HIV status before attending the ANC clinic while 82.9% (*f*=126) of those who were employed full time had such knowledge. Although 88.5% (*f*=116) of the unemployed women knew their HIV status before presenting at the ANC clinic, only 60.7% (*f*=17) of the women who had part time employment were aware of their HIV status at the same stage. The highest percentage of self-employed women knew their HIV status before presenting at

the ANC clinic, and the lowest percentage were part-time employed women. The chi-square test showed an OF which was smaller than the EF for full time and part-time employed women with known HIV status at presentation for ANC. Nevertheless, the OF was higher than the EF of self employed and unemployed women with known HIV status at presentation for ANC by 5 and 4.8 respectively. This was statistically significant at 0.05 cut off p value using X^2 test (P=0.001). X^2 test was used to cross tabulate employment status and HIV status at presentation for ANC because both are categorical variables. Self employed and unemployed women benefited more from the PMTCT programme by knowing their HIV status earlier than the employed women. The strength of association was weak using Cramer's V (V=0.212).

Table 4.7: Observed and expected frequencies of employment status versus HIV status at presentation at ANC clinics (N=384)

Employment status		HIV status at presentation for ANC		Total
		Known	Unknown	
Full time employed	Observed count	126.0	26.0	152.0
	Expected Count	129.0	23.0	152.0
Part-time employed	Observed count	17.0	11.0	28.0
	Expected Count	23.8	4.2	28.0
Self-employed	Observed count	67.0	6.0	73.0
	Expected Count	62.0	11.0	73.0
Unemployed	Observed count	116.0	15.0	131.0
	Expected Count	111.2	19.8	131.0
Total	Observed count	326	58	384
	Expected Count	326.0	58.0	384.0

Table 4.8: Chi-square test: respondents' employment status versus HIV status at presenting at the ANC clinic (N=384)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.306[a]	3	.001
N of Valid Cases	384		

A study conducted in northwestern Ethiopia reported different findings as to women's employment status. Out of 418 women who participated in that study, 3.6% were government employees, 7.7% private employees, 62.2% housewives, 3.3% day labourers, 2.6% housemaids and 6.9% merchants but most women were unemployed (Moges & Amberbir 2011:109). A Kenyan study with 2 700 respondents, reported that 70.3% were unemployed and that 20 had known that they were HIV-1 infected prior to their pregnancies. As many as 92.1% reportedly received their HIV-1 results during pregnancy. There was no significant difference in employment status between HIV tested and untested respondents (Kinuthia et al 2011:3).

Other studies reported different findings pertaining to women's employment status and their knowledge of their HIV status from those reported by the current study. However, it should be remembered that Addis Ababa is an urban environment while the other studies might have been conducted in rural areas and that the association (Cramer's V) was weak.

4.3.2 Perceived severity

Perceived severity implies that the HIV-positive pregnant woman needs to consider the consequences of HIV for herself and for her unborn baby. She could transmit HIV to her sexual partner if he is uninfected. The partner should be tested for HIV to know whether or not he is HIV-positive and to plan appropriate preventive actions. The HIV status of

the respondents' partners, versus awareness of respondents' partners that the pregnant women were using PMTCT services, was discussed in this construct. The partner's HIV status was associated with the awareness of his partner's utilisation of PMTCT services.

4.3.2.1 HIV status of respondents' partners versus awareness that the pregnant women were using PMTCT services

Reportedly 81.5% (*f*=313) of the 384 of the respondents' partners were HIV-positive, but 7.3% (*f*=28) were HIV-negative and the HIV status of 11.2% (*f*=43) was unknown. As many as 88.5% (*f*=340) of the 384 respondents indicated that their partners knew that they were using PMTCT services but the partners of 11.5% (*f*=44) did not know. Out of 313 partners who were HIV-positive, 97.8% (*f*=306) were aware of their partners' utilisation of PMTCT services while 2.2% (*f*=7) were unaware of this fact. Most of the 28 HIV-negative partners (92.9%; *f*=26) were reportedly aware of the women's utilisation of PMTCT services but 7.1% (*f*=2) were unaware of this fact. Only 18.6% (*f*=8) of the women's 43 partners with unknown HIV status knew about the women's utilisation of PMTCT services and 81.4% (*f*=35) did not have this knowledge.

Thus 97.8% (*f*=306) of the respondents' partners whose HIV status was positive, were aware that their partners used PMTCT services. However, only 18.6% (*f*=8.) of those partners with unknown HIV status were aware that the respondents used PMTCT services. Among the 28 HIV-discordant couples the majority of the male partners (92.9%; *f*=26.) knew about the respondents' utilisation of PMTCT services. The chi-square test shows that the OF was higher than the EF by 28.9 among HIV-positive partners who knew that their HIV-positive partners used PMTCT services. The OF was also higher than the EF of HIV-negative partners by 1.2 among those partners who knew that their HIV-positive partners were using PMTCT services.

On the other hand, the OF was lower than the EF of partners with unknown HIV status by 30.1 among those partners who knew their partners were using PMTCT services.

This finding is also statistically significant, using the chi-square test (P<0.01). Cramer's V shows a strong association between a partner's HIV status and his awareness that his partner (the pregnant woman) utilised PMTCT services (V=0.781), since Cramer's V approached 1. This finding indicates that most respondents' HIV-positive partners knew about their PMTCT service utilisation, while few partners from HIV discordant couples were aware of this fact.

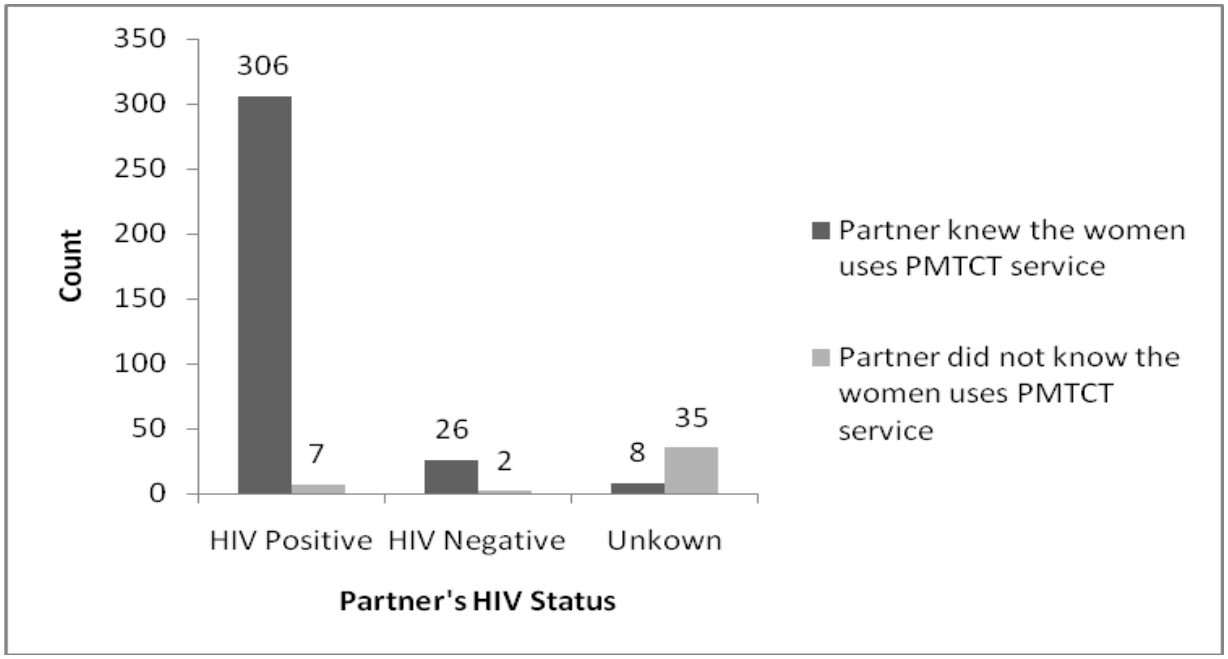


Figure 4.1: Partners' HIV status versus their awareness of PMTCT service utilisation (N=384)

Table 4.9: Observed and expected frequencies of partners' HIV status versus their awareness of the respondents' utilisation of PMTCT services (N=384)

Partner HIV status		Knowledge of partner about use of PMTCT service		Total
		Yes	No	
HIV-positive	Observed count	306.0	7.0	313.0
	Expected Count	277.1	35.9	313.0
HIV-negative	Observed count	26	2.0	28.0
	Expected Count	24.8	3.2	28.0
Unknown status	Observed Count	8.0	35.0	43.0
	Expected Count	38.1	4.9	43.0
Total	Observed Count	340	44	384
	Expected Count	340.0	44.0	384.0

Table 4.10: Chi square test: HIV status of partners versus their awareness that respondents were using PMTCT services

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	234.058	2	.000
N of Valid Cases	384		

A systematic literature review identified three reports indicating that the lack of support, especially among women having HIV-uninfected partners, was one of the factors preventing women from using PMTCT services (Darak et al 2012:9). A study from India reported that a woman, whose partner's HIV status was negative or unknown, was 2.69 times more likely to discontinue using PMTCT services than a woman whose partner was HIV-positive (Panditrao et al 2011:595). An Ethiopian study interviewed 107 HIV-positive women attending ANC. Out of the respondents whose partners' HIV status was known, 33.6% had disclosed their HIV status to their partners but only 20.6% of women whose partners' HIV status was negative had shared this information with their partners (Sendo, Cherie & Erku 2013:2-6). Thus fewer women seemed to disclose their HIV-

positive status to HIV-negative husbands than to HIV-positive husbands, similar to this study's findings.

4.3.3 Perceived barriers

Perceived barriers imply obstacles that could impact negatively on women's utilisation of PMCT services. Different variables could obstruct the use of PMTCT services. The variables addressed in this section include marital status versus disclosure of HIV status, stigma and discrimination versus most recent CD4 count and employment status versus monthly income.

4.3.3.1 Marital status versus disclosure of HIV status

As to disclosure of HIV status, 89.1% (n=342) of the current study's respondents, had disclosed their HIV status to a third party whereas 10.9% (*f*=42) did not do so. Of the married women, 91.2% (*f*=310) had disclosed their HIV status to a third party while 90.0% (*f*=9) of those who had never been married, and 70.0% (*f*=7) of those living with their partners, 66.7% (*f*=14) of those who had been separated from their partners, and 50% (*f*=1) of the divorcees had done so. The percentage of married women who had disclosed their HIV status was the highest. The chi-square test also shows that the OF was higher than the EF of married women by 7.2 among those who had disclosed their HIV status to a third a person. The OF was higher than the EF by 0.1 among never married and widowed and those who disclosed their HIV status to a third a person. On the other hand, the OF was lower than the EF by 0.8 among women who were divorced, by 1.9 among women living in union and by 4.7 among those women who had been separated and disclosed their HIV status to a third person. This was statistically significant at 0.05 p value using the chi-square test (P=0.002). Both marital status and disclosure of HIV status are categorical variables. Cramer's V indicated that the association was weak (V=0.225) between the respondents' marital status and the disclosure of their HIV status to other persons.

Table 4.11: Observed and expected frequencies of marital status of women versus their HIV status disclosure to a third person (N=384)

Marital status		Disclosure of HIV status to a third person		Total
		Yes	No	
Never married	Observed count	9.0	1.0	10.0
	Expected Count	8.9	1.1	10.0
Live in union	Observed Count	7.0	3.0	10.0
	Expected Count	8.9	1.1	10.0
Married	Observed count	310.0	30.0	340.0
	Expected Count	302.8	37.2	340.0
Separated	Observed count	14.0	7.0	21.0
	Expected Count	18.7	2.3	21.0
Divorced	Observed count	1.0	1.0	2.0
	Expected Count	1.8	.2	2.0
Widowed	Observed count	1.0	0	1.0
	Expected Count	.9	.1	1.0
Total	Count	342	42.0	384.0
	Expected Count	342.0	42.0	384.0

Table 4.12: Respondents' marital status versus disclosure of their HIV-positive status (N=384)

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.368	5	.002
N of Valid Cases	384		

A study conducted in southwestern Ethiopia determined the rate, barriers and outcomes of HIV-positive status disclosure among sexual partners. Only 6% of that study's respondents had disclosed their HIV status to their sexual partners. Women who had non-regular sexual partners were less likely to disclose their status than women with

regular sexual partners (Kassaye, Lingerh & Dejene 2005:128). Another study conducted in Addis Ababa reported similar findings as to disclosure of HIV status. In that study 107 HIV-positive pregnant women were interviewed. All those women were married, had one regular sex partner and 73% had disclosed their HIV status to their sexual partners. Positive outcomes, cited by the women, due to disclosure of their HIV-positive status, included increased support, less anxiety and enhanced intentions to utilise PMTCT services (Sendo et al 2013:2-4). A Ugandan study reported lower HIV disclosure rates. That study's sample comprised 105 men and 298 women of whom 48.7% were married, 14.7% were single and 8.9% were separated or divorced. Only 48.9% had disclosed their HIV status to their sex partners. Factors associated with a reduced likelihood of disclosure included having an unstable relationship and changing one's sexual partners (Osinde, Kakaire & Kaye 2012:62-63).

4.3.3.2 Stigma and discrimination versus most recent CD4 count

As to perceived stigma, in the current study, 9.6% (*f*=37) of the women agreed that some people were afraid to touch them once their HIV-positive status had become known but 90.4% (*f*=347) disagreed with this statement. In a similar trend, 92.2% (*f*=354) of the respondents disagreed that some people physically backed away once they learned that the woman was HIV-positive while 7.9% (*f*=30) of them agreed. In response to a related question, 81.3% (*f*=312) disagreed that some people acted as if HIV was the affected person's own fault and 18.8% (*f*=72) agreed. As many as 87.8% (*f*=337) of the women disagreed and 12.2% (*f*=47) agreed that people were perceived to be uncomfortable once they learned about the woman's HIV-positive status.

Of the respondents 92.1% (*f*=352) of respondents disagreed that some people physically backed away once they knew that these women were HIV-positive. Women (*f*=30) who agreed that some people physically backed away once they learned the woman was HIV-positive, had a mean most recent CD4 count of 380cells/mm^3. However, a mean most recent CD4 count of 348cells/mm^3 was recorded for the 354

women who disagreed with this statement. The difference of these two groups of respondents' most recent CD4 counts was not statistically significant using Z-test at 0.05 p value (P=0.0309; 95%CI=-29, 93). Hence, the women's most recent CD4 counts were not associated with whether or not people were perceived to physically back away once they learned that the women was HIV-positive.

Internalised stigma was reported by 66.7% (*f*=256) of the respondents as they sometimes felt worthless because they had HIV and 33.3% (*f*=128) did not have such feelings. Reportedly 60.7% (*f*=233) of the women felt guilty because they had HIV and 39.3% (*f*=151) did not have such guilt feelings. During the 12 months preceding the interview, 36.7% (*f*=141) of the women avoided friends and/or family members because of their HIV status. The most recent mean of CD4 counts of those 256 women who agreed that they sometimes felt worthless was 332cells/mm^3 while the most recent mean of the CD4 count of 388cells/mm^3 was recorded for women who disagreed with this statement. This difference was statistically significant using the Z test at 0.05 P value (P=0.001; 95%CI=-90,-22). This difference is also shown in box plots (see figure 4.2). Therefore, those women who experienced internalised stigma and sometimes felt worthless had lower mean most recent CD4 counts than those who did not face such internalised stigma.

Regarding discrimination during the 12 months preceding the interview, 4.2% (*f*=16) of the women avoided social events, 3.6% (*f*=14) had been abandoned by their partners, 1.8% (*f*=7) had been abandoned by other family members, 5.7% (*f*=22) had been verbally abused and 3.4% (*f*=13) had been physically assaulted, 2.3% (*f*=9) had lost their jobs, 1% (*f*=4) had been expelled from their homes and 1.6% (*f*=6) had lost their property. No woman had been denied health services during the preceding 12 months because of her HIV status. Discrimination was reported by 5.7% of those women who had encountered verbal abuse.

Those 22 women who had experienced verbal abuse, had a recent mean CD4 count of 389cells/mm^3 and for the 362 women who did not face verbal abuse their most recent mean CD4 count was 348cells/mm^3. This difference of most recent CD4 count mean was not statistically significant using the Z-test at 0.05 p value (P=0.257; 95% CI=-30,111). Thus the most recent CD4 count was not associated with whether or not women had experienced verbal abuse.

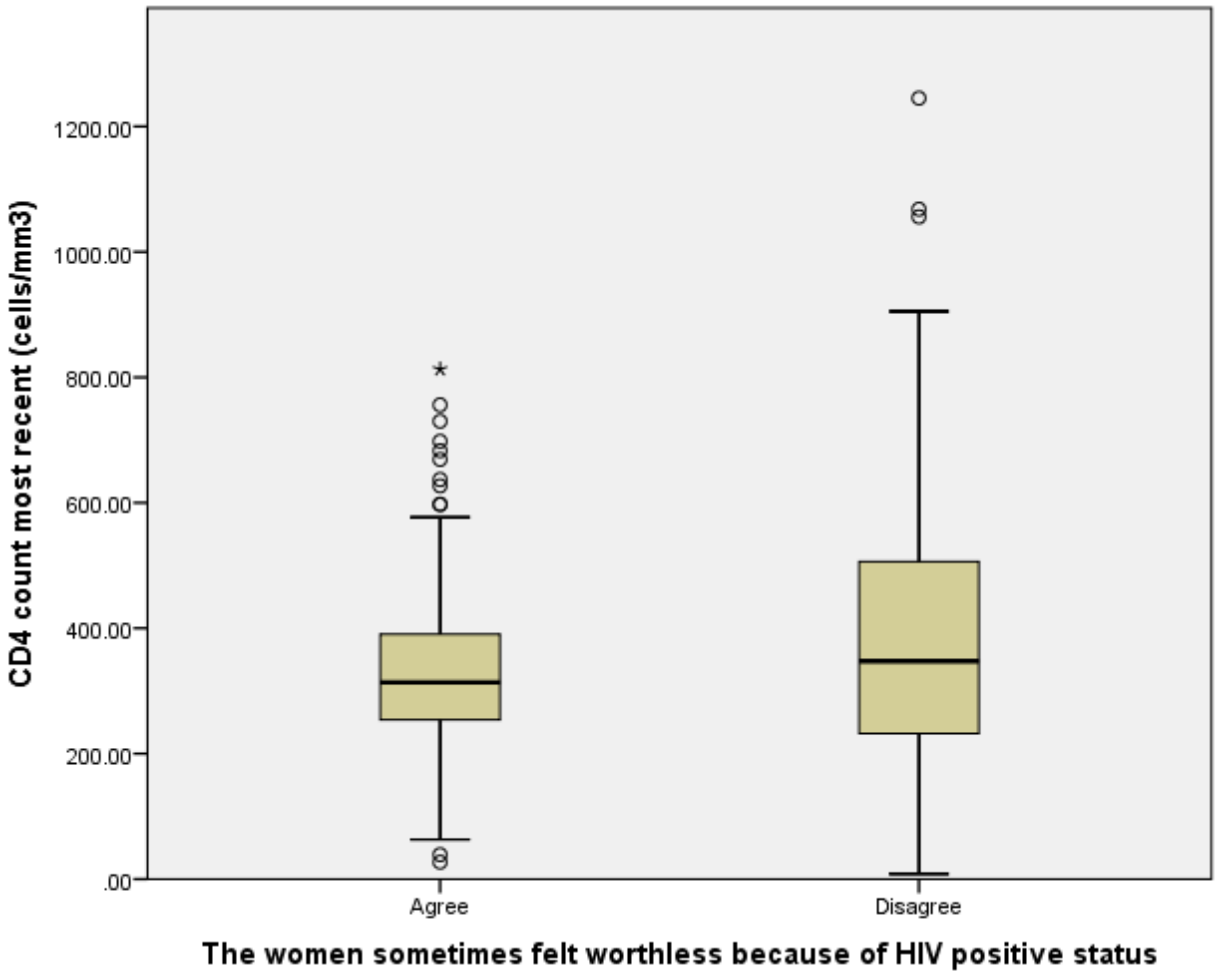


Figure 4.2: Box plots for women's feeling of worthlessness due to HIV-positive status versus most recent CD4 counts (N=384)

Table 4.13: Stigma and discrimination among the women who used PMTCT service (N=384)

Perceived stigma				
		Agree	**Disa-gree**	**Total**
Some people are afraid to touch me once they know I have HIV	%	9.6	90.4	100
	f	37	347	384
Some people have physically backed away from me once they learned I have HIV	%	7.9	92.1	100
	f	30	352	382
Some people act as if it is my fault I have HIV	%	18.8	81.3	100
	f	72	312	384
People seem uncomfortable being around me once they learn I have HIV	%	12.2	87.8	100
	f	47	337	384
Internalised stigma				
I sometimes feel worthless because I am HIV-positive	%	66.7	33.3	100
	f	256	128	384
I feel guilty because I have HIV	%	60.7	39.3	100
	f	233	151	384
In the past 12 months, I have found myself avoiding or isolating myself from friends or family because of my HIV status	%	36.7	63.3	100
	f	141	243	384
Enacted stigma (discrimination)				
In the past 12 months, have you faced any of the following?				
Exclusion from social events	%	4.2	95.8	100
	f	16	368	384
Abandonment by partner	%	3.6	96.4	100

	f	14	370	384
Abandonment by other family members	%	1.8	98.2	100
	f	7	377	384
Verbal abuse or ridicule	%	5.7	94.3	100
	f	22	362	384
Physical assault	%	3.4	96.6	100
	f	13	371	384
Being fired from work	%	2.3	97.7	100
	f	9	375	384
Being expelled from home	%	1.0	99.0	100
	f	4	380	384
Had property taken away	%	1.6	98.4	100
	f	6	378	384
Denied health services	%	0	100	100
	f	0	384	384

A review of published research reports from SSA revealed that stigma continued to influence the effective implementation of PMTCT programmes. That review evaluated studies from 12 African countries, and identified stigma as a barrier affecting the uptake of PMTCT interventions in all reviewed qualitative studies. Two quantitative studies also reported that stigma, including self-stigma, adversely affected women's utilisation of PMTCT services. Discrimination directed specifically at pregnant HIV-positive women was described in one qualitative study from Kenya. Blame for potentially dying and leaving an orphaned baby was a form of discrimination which resulted in a barrier to the utilisation of PMTCT services by some pregnant SSA women (Gourlay, Birdthistle, Mburu, Lorpenda & Wringe 2013:4-6).

A Kenyan study determined the relative role of stigma versus health system factors in influencing the non-utilisation of PMTCT interventions. The 2 700 mothers who participated in that study would not buy food from a vendor who was visibly sick. Internal and enacted stigma did not differ between tested and untested mothers. Overall, health system factors rather than stigma, were identified as barriers affecting the utilisation of PMTCT services (Kinuthia et al 2011:3-8). A systematic review from low and middle income countries reported that social norms and stigma were identified as obstacles preventing the utilisation of PMTCT interventions and HIV testing (Car, Brusamento, Elmoniry, Velthoven, Pape, Welch, Tugwell, Majeed, Rudan, Car & Atun 2013:12).

A South African study examined perceived stigma among patients receiving ART. At baseline 735 treatment naïve patients were included in the study and follow-up assessments were done at six and 12 months. Internalised stigma had decreased from baseline to six months up to 12 months of follow-up time. Whereas discrimination experiences increased during these follow up periods, CD4 cell counts increased from baseline to six months and up to 12 months during the follow-up period. Univariate analysis also showed that lower CD4 cell counts were associated with internalised HIV/AIDS stigma. Likewise multivariate analysis showed that persistent lower CD4 cell counts were predictors of internalised HIV/AIDS stigma (Peltzer & Ramlagan 2011:60-64).

Another study from the USA investigated the number of missed visits to health care facilities in relation to stigma and CD4 count decline. At baseline 215 HIV-infected patients were identified but later on 75 patients were included as they met all the sampling criteria. The number of missed visits was associated with a decline in CD4 count. For each 10% increase in the number of missed visits, the CD4 count decreased by >50cells/mm^3 from baseline (Walburn, Swindells, Fisher, High & Islam 2012:780-784).

4.3.3.4 Employment status versus monthly income

Self-employed women earned the highest incomes of 3 747 birr per month on average in the current study. The average monthly income of fully employed women was 2 909 birr per month. The lowest earners were part-time employed women who got 919 birr per month on average while unemployed women reported average incomes of 1 767 birr per month, in the form of partner or family support. As employment status had more than two categories, ANOVA was the best statistical test to compare differences in monthly incomes of the respondents. The monthly income difference was statistically significant at 0.05 P value using ANOVA (P<0.01). The monthly median income difference is portrayed in the box plots of figure 4.3.

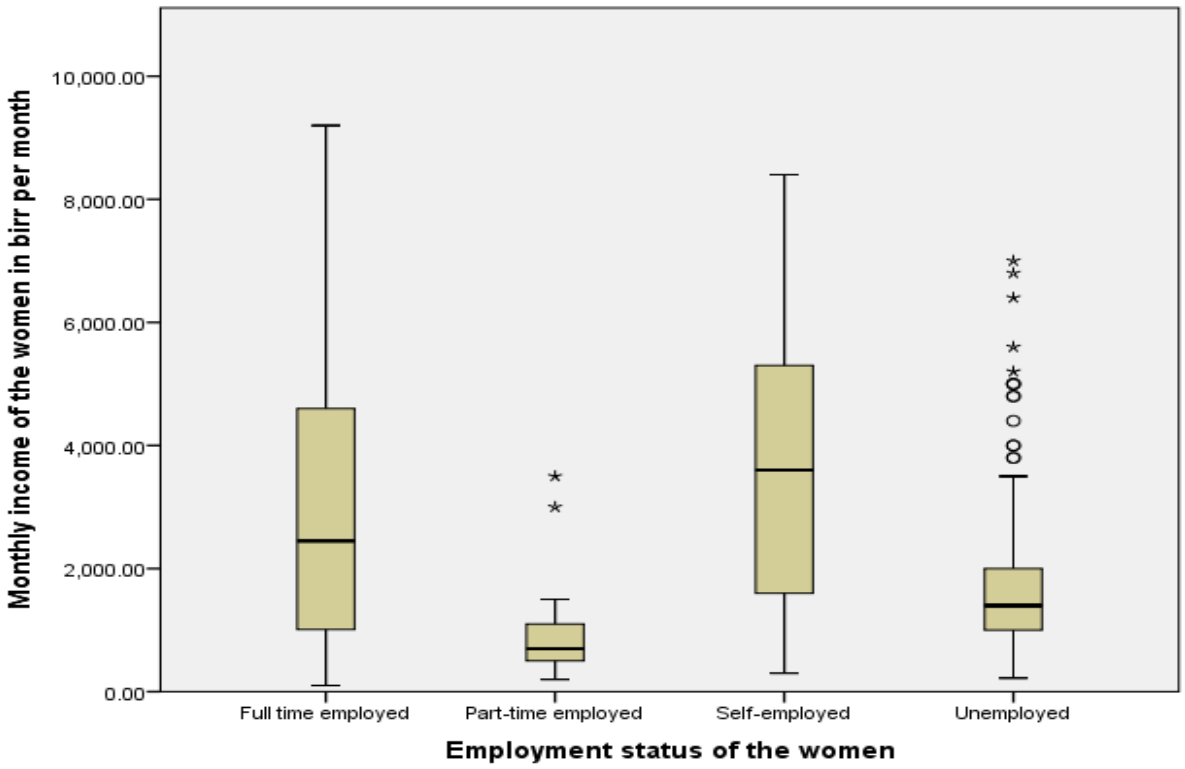


Figure 4.3: Box plots of employment status versus monthly incomes of the women in birr (N=384)

Table 4.14: ANOVA of respondents' employment status versus their monthly incomes (N=384)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	278979995.794	3	92993331.931	26.090	.000
Within Groups	1354445196.703	380	3564329.465		
Total	1633425192.497	383			

A study conducted in Arba Minch, Ethiopia, showed low levels of household incomes, similar to the current study's findings. The majority were not self-employed nor employed formally. The average reported household income was 727 birr with the highest being 7 168 birr. This low socio-economic status of the women could pose a barrier to women's utilisation of PMTCT services (Adedimeji et al 2012:3-4). A Ugandan study showed that economic constraints were barriers to accessing PMTCT services. Costly transportation was cited by 42 out of 45 respondents as a barrier to enrolling in PMTCT programmes in that study. Other financial constraints included the cost of the food while waiting to be seen by healthcare providers and the cost of nutritious foods that patients on HAART should eat. Many women indicated that they were economically dependent on their husbands, limiting these women's control over their treatment seeking decisions and their ability to begin with and adhere to HAART (Duff, Kipp, Wild, Rubaale & Okech-Ojony 2010:4).

4.4 PROCESS OF PMTCT SERVICES IN ADDIS ABABA

PMTCT services were evaluated according to the process construct of Donabedian's model. According to this model process encompasses the following healthcare activities: HIV testing and counseling of pregnant women, ARVs for PMTCT, infant feeding counseling and practices and factors affecting the rate of MTCT.

4.4.1 HIV testing and counseling services provided to pregnant women

All 384 (100%) respondents of this study had received pre-test information during HIV testing and counseling. Out of 326 women who knew their HIV status before presenting at the ANC clinic, 58.9% (*f*=192) had received the pre-test information during group sessions, 20.2% (*f*=66) got pre-test information in the form of couples' counseling and 38.7% (*f*=126) received individual counseling. Group sessions were the most frequently employed method of providing pre-test information to women who knew their HIV status before presenting at the ANC clinic.

On the other hand, out of the 58 women, who had been tested for HIV when presenting themselves at the ANC clinics, 6.9% (*f*=4) attended group sessions before HIV testing, 20.7% (*f*=12) had couples' counseling and 72.4% (*f*=42) received individual counseling. Thus individual counselling was the most frequently used approach for providing counselling to this group of women. The national HIV counseling and testing guideline indicates that no HIV test should be provided without pre-test counseling. The pre-test session can be provided to individuals, couples or groups (FMOH/HAPCO 2007:10).

Almost all women (97.7%; *f*=375), mentioned that they could ask questions during the pre-test session and 99.0% (*f*=380) were informed that they had the right to say "no" to HIV testing. Similarly, 99.7% (*f*=383) of the women received HIV counseling after testing had been completed and the same number of women believed their privacy had been maintained during testing and counseling. Additionally, 99.5% (*f*=382) of the women also believed that confidentiality had been maintained during HIV testing and counseling.

Table 4.15: HIV testing and counseling services provided to pregnant women (N=384)

		Yes	No	Total
Able to ask questions during the HIV pre-test information session	%	97.7	2.3	100
	f	375	9	384
Informed by the nurses/midwives, during the pretest information session, that they had the right to say “no” to HIV testing	%	99.0	1.0	100
	f	380	4	384
Received counseling after the HIV testing had been completed.	%	99.7	0.3	100
	f	383	1	384
Privacy maintained during HIV testing and counseling	%	99.7	0.3	100
	f	383	1	384
Confidentiality maintained during HIV testing and counseling.	%	99.5	0.5	100
	f	382	2	384
Disclosed HIV status to at least one other person	%	89.1	10.9	100
	f	342	42	384

A Ugandan study on 30 women also reported that most HIV-positive women were given sufficient time to ask questions during post-testing counseling. Most women had also learned about HIV counseling and testing during their previous visits to the health facilities (Rujumba, Neema, Tumwine, Tylleskar & Heggenhougen 2013:8-11). Similar findings were also reported from four African countries indicating that HIV-positive women were given time to ask questions during counseling sessions, 92% of those women were asked if they would agree to HIV testing and 84% of them were informed they had the right to refuse HIV testing. Most of those women (85%) reported that the health workers and counselors kept their HIV test results confidential. However, 79% of those women did not disclose their HIV status to any third party (Hardon, Vemooij,

Bongololo-Mbera, Cherutich, Desclaux, Kyaddondo, ky-Zerbo, Neuman, Wanyenze & Obermeyer 2012:6-9). A study conducted in Vietnam documented a different finding. It included 1 108 women in the study and only 38.6% of those Vietnamese women got pre-test counselling while only 7.5% received post-test counseling. The study further recommended that HIV counseling and testing could be enhanced if PMTCT services were integrated into ANC services at primary level health facilities (Hahn, Gammeltoft & Rasch 2011:5-8).

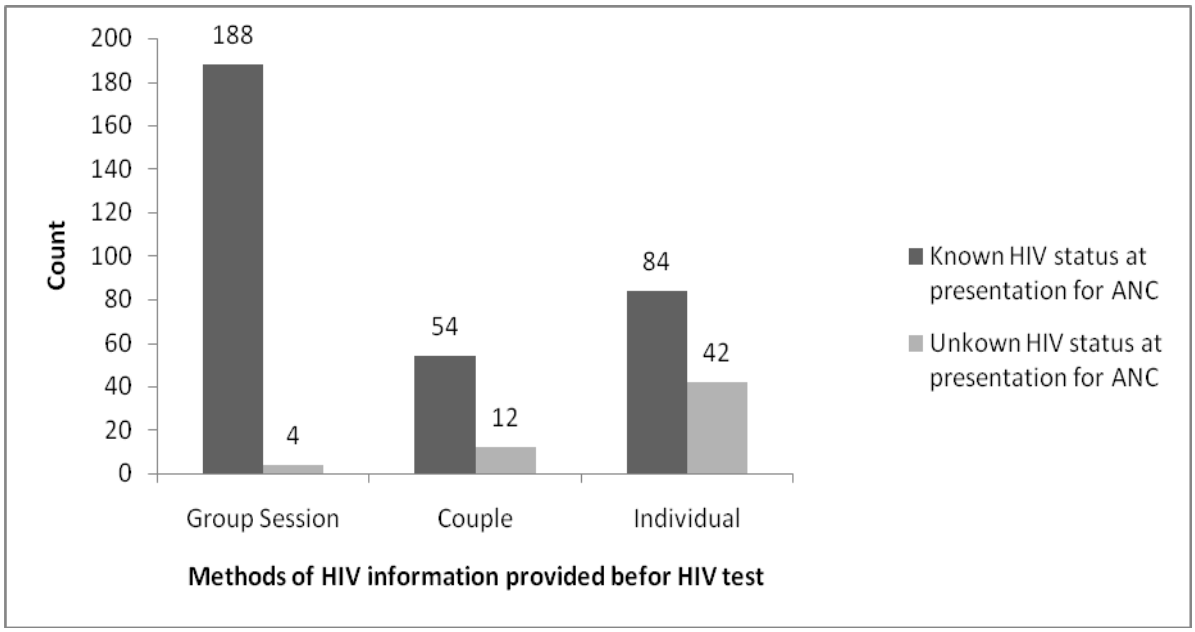


Figure 4.4: Methods of HIV information provided before HIV testing (N=384)

4.4.2 Antiretrovirals for the prevention of mother-to-child transmission of HIV

Out of 384 women who participated in the current study, 14.3% (*f*=55) received ARV prophylaxis and 85.7% (*f*=329) received ART for PMTCT. Out of those 55 mothers who had received ARV prophylaxis, 25.5% (*f*=14) started taking ARVs when their CD4 counts were below 350cells/mm^3 and 74.5% (*f*=41) started the prophylaxis when their

CD4 counts were equal to or above 350cells/mm^3. However, 25.5% (*f*=14) of this study's respondents on ARV prophylaxis were in fact eligible for ART, because their CD4 counts were equal to or below 350cells/mm^3.

There were 329 patients on ART, of whom 79.6% (*f*=262) had CD4 counts of <350cells/mm^3 and 20.4% (*f*=67) had CD4 counts of ≥350cells/mm^3. Some patients (20.4%; *f*=67) taking ART, had initiated treatment before they were eligible to do so in terms of their CD4 counts.

Out of 276 patients with CD4 counts of less than 350cells/mm^3, 5.1% (*f*=14) were taking ARV prophylaxis and 94.9% (*f*=262) were receiving ART. Out of those 108 patients with CD4 counts of ≥350cell/mm^3, 38.0% (*f*=41) were taking ARV prophylaxis and 62.0% (*f*=67) were taking ART.

As shown in table 4.16, 19.8% (*f*=76) of 384 women who participated in the current study, were in WHO stage I, 54.2% (*f*=208) in WHO stage II, 24.2% (*f*=93) in WHO stage III and 1.8% (*f=7)* were in WHO stage IV when they started taking ARVs for PMTCT. Out of those 76 respondents who were in WHO stage I, 47.4% (*f*=36) were receiving ARV prophylaxis and 52.6% (*f*=40) were receiving ART. Out of 208 patients in WHO stage II, 7.2% (*f*=15) were receiving ARV prophylaxis while 92.8% (*f*=193) received ART. Of those 93 patients in WHO stage III, 4.3% (*f*=4) were receiving ARV prophylaxis and 95.7% (*f*=89) ART. Finally of the seven patients in WHO stage IV, 100.0% (*f*=7) were taking ART. Ethiopia adopted the WHO 2010 ART guidelines during the implementation of this study that recommends the provision of ART at WHO stage III and IV irrespective of CD4 count (WHO 2010b). The revised WHO (2013:94) guideline also recommends the initiation of ART among PLHIV with clinical stage of III or IV regardless of CD4 cell count. The WHO 2010 guideline recommends that all patients should start ART at less than 350 CD4 cell counts. However, the WHO 2013 guideline suggests that this should be implemented for all persons with CD4 cell counts

below 500, irrespective of WHO stage (WHO 2013:94), but this had not been implemented in Ethiopia during the data collection phase of this study.

Only 13.0% (*f*=50) of the 384 respondents had received ARVs at the ANC clinic, with 94.0% (*f*=47) of them receiving ARV prophylaxis and 6.0% (*f*=3) ART. Most respondents (85.2%; *f*=327) received their ARVs from the ART the clinic, but 1.8% *(f*=7) did so in the delivery ward.

Table 4.16: CD4 count and WHO stage when ARVs were commenced (N=384)

CD4 count when ARVs were commenced		**ARV Prophylaxis**	**ART**	**Total**
<350 cells/mm^3	%	5.1	94.9	100
	f	14	262	276
≥350 cells/mm^3	%	38.0	62.0	100
	f	41	67	108
WHO stage when ARVs were commenced				
WHO stage I	%	47.4	52.6	100
	f	36	40	76
WHO stage II	%	7.2	92.8	100
	f	15	193	208
WHO stage III	%	4.3	95.7	100
	f	4	89	93
WHO stage IV	%	0	100	100
	f	0	7	7
Total	%	14.3	85.7	100
	f	55	329	384

Similar findings had been reported from a study conducted in Uganda indicating that 85.8% of the women with low CD4 counts (<350 cells/mm^3) received HAART (Namuwaya et al 2011:72). Thus the Ugandan study, and the current study conducted in Addis Ababa, Ethiopia, indicate that most respondents' treatments complied with the WHO (2013) guideline.

However, a study conducted in Burkina Faso reported that out of 581 women, 55.6% were on monotherapy and 44.4% were on triple therapy. Among those in WHO stage I, 64.0% were receiving short course ART (ARV prophylaxis) during the perinatal period and 23.0% were receiving HAART. Among respondents in WHO stage II, 24.7% were receiving short course ART and 54% were receiving HAART. Among those on WHO stage III and IV, 11.3% were receiving short course ARVs and 23% were receiving HAART. Among those with CD4 count <200cells/mm^3, 9.7% were receiving short course ARVs and 51.0% were receiving HAART (Kouanda et al 2010:846). Thus the Burkina Faso study's findings indicated that respondents in that survey were not treated according to the WHO's (2013) guidelines.

4.4.3 Infant feeding options

In the current study, respondents had been counseled on average 3.46 times by healthcare providers about infant feeding, ranging from 0 to 10 times. Out of 384 respondents, only 0.5% (*f*=2) reportedly received no such counseling. As to specific kinds of counseling, 83.0% (*f*=319) of the women had been counseled on exclusive breast feeding during the first six months of life, 11.0% (*f*=42) had been counseled on mixed feeding and 5.5% (*f*=21) had been counseled on replacement feeding. Most women (87.0%; *f*=334), were using exclusive breast feeding during the first six months of their babies' lives. Only 2.9% (*f*=11) of the respondents gave their infants mixed

feeding and 10.0% (*f*=39) used replacement feeding such as cow's milk, milk powder and porridge.

During the course of infant feeding, most respondents (85.4%; *f*=328) received follow-up advice from health care providers. Of these 328 women, 0.9% (*f*=3) received follow up advice from health officers, 0.6% (*f*=2) from medical doctors and 98.5% (*f*=323) from nurses, rendering nurses the most important source of information concerning infant feeding. Out of 384 respondents, 9.9% (*f*=38) received follow-up counselling from family members, 1.0% (*f*=4) from community volunteer workers and 3.6% (*f*=14) received no follow-up counselling.

Table 4.17: Infant feeding counseling and practices (N=384)

		Exclusive breast feeding	**Mixed feeding**	**Replacement feeding**	**None**	**Total**
Infant feeding counseling	%	83.1	11.0	5.5	0.5	100
	f	319	42	21	2	384
Infant feeding practice	%	87.0	2.9	10 .2	0	100
	f	334	11	39	0	384
People who undertook follow up of the mother during infant feeding period						
	Healthcare provider	**Community volunteer**		**Family member**	**No body**	**Total**
%	85.4	1		10	3.6	100
f	328	4		38	14	384

The demographic health survey of Ethiopia also shows that breast feeding is a common practice in Ethiopia with 98% of mothers who breastfeed their babies at some stage and 52% of them practicing exclusive breast feeding during the first six months of their babies' lives. Reportedly, 51% of children aged 6-9 months in Ethiopia are eating

supplementary food (CSAE/ICFI 2012:119). However, a study from the Gurage zone of Ethiopia showed that 60% of the women used replacement breast feeding as an option for PMTCT. Only 24% of them indicated exclusive breast feeding as an option. The remaining 16% indicated mixed feeding and did not know what to feed their infants (Belachew & Jira 2007:41-42).

A South African study reported similar findings showing that different kinds of infant feeding options were introduced to the mothers (Laher et al 2012:93). Another study conducted in South Africa also indicated that HIV-positive mothers were likely to practise exclusive breast feeding during the first six months of their infants' lives after the introduction of the PMTCT programme (Goga et al 2012:15).

Thus studies from Ethiopia and South Africa seem to confirm the current study's findings that most HIV-positive mothers using PMTCT services, employed exclusive breast feeding during the first six months of their babies lives.

4.5 OUTCOMES OF PMTCT SERVICES

PMTCT outcomes were examined in terms of the components of Donabedian's Model. Outcomes in this model refer to changes in individuals and populations that can be attributed to health care interventions. The different outcomes of PMTCT addressed in this section include:

- patients' satisfaction levels with PMTCT services,
- health status of the mother and
- HIV status of the infant.

Factors affecting MTCT are also discussed in this section to ensure continuity of information related to the infant.

4.5.1 Patients' satisfaction levels with PMTCT services in Addis Ababa.

The domains used to assess the mothers' satisfaction levels included their expectations about the infrastructure, accessibility and availability of PMTCT services, the affordability of PMTCT services and patients' perceptions about the nurses/midwives. Patient satisfaction data can be analysed by the percentage of responses under each category of agreement or disagreement. Another way of reporting patient satisfaction is by adding the percentages of responses for the two top categories and considering this number to indicate the satisfaction of the patients. Patient satisfaction could also be analysed using a single mean score based on all response categories. It also facilitates a comparison of satisfaction across different components (Press 2006:111-113).

A Likert scale was used to assess the level of agreement. The scale ranged from strongly agree to strongly disagree. At the beginning of each component's analysis, percentages and numbers are presented for each category of responses. Then the 'strongly agree' and 'agree' answers were added to identify the number of satisfaction responses. Likewise the responses of 'strongly disagree' and 'disagree' were added to identify the number of dissatisfaction responses. The mean scores were calculated to identify components with which patients were satisfied or dissatisfied. Accordingly a scale had been used indicating 1 being the lowest level of satisfaction and 5 the highest level of satisfaction.

Out of all the components considered the lowest mean score of 3.29 was obtained for accessibility and availability of PMTCT services. The highest mean score of 3.67 was obtained for expectations about the infrastructure. Each component with a high mean score of satisfaction was analysed in relation to the women's most recent CD4 count and WHO stage using ANOVA, chi-square tests and Cramer's V.

4.5.1.1 Expectations about the infrastructure

Eight Likert scale type questions pertained to the women's expectations about the infrastructure. Most women were satisfied with the cleanliness and the attractiveness of the health facility as 92.5% (*f*=355) were satisfied, 2.3% (*f*=9) were uncertain, and 5.2% (*f*=20) were dissatisfied. Most respondents (89.3%; *f*=343) considered the waiting room to be comfortable but 1.6% (*f*=10) were uncertain and 8.1% (*f*=31) disagreed. As can be seen from Table 4.18, the respondents were satisfied with the infrastructure except for the health facility's wheelchair friendliness. In response to this question, 44.3% (*f*=170) agreed, 16.4% (*f*=63) were uncertain, and 39.3% (*f*=151) disagreed that the facility had was wheelchair-friendly.

The lowest mean score of 3.11 (out of 5.0) was obtained for the health facility's wheelchair friendliness. The highest mean score of 4.29 was obtained for the health facility's cleanliness and attractiveness. The overall mean score of expectations about the infrastructure was 3.67, implying that the patients were satisfied with this aspect. Patients' satisfaction levels were further analysed in relation to their most recent CD4 counts, revealing that the:

- patients who strongly agreed that the health facility was clean and attractive, had a mean CD4 count of 318cells/mm^3
- satisfied patients' mean CD4 count was 364cells/mm^3
- dissatisfied patients' mean CD4 count was 505cells/mm^3
- strongly dissatisfied patients' mean CD4 count was 473cells/mm^3

The dissatisfied patients had higher most recent mean CD4 counts. This difference was also statistically significant using ANOVA ($P<0.01$). However the post hoc Bonferroni test does not show any significant difference of the most recent mean CD4 counts among strongly satisfied and strongly dissatisfied patients ($P=0.076$; 95%CI= -317, 8).

Table 4.18: Expectations about the health facility's infrastructure (N=384)

Expectations about the infrastructure		Strong. agree	Agree	Uncert.	Disag.	Strongly disagree	Total	Mean score
Facility was clean and attractive	%	43.8	48.7	2.3	3.1	2.1	100	4.29
	F	168	187	9	12	8	384	
Comfortable waiting room	%	17.4	71.9	2.6	6.8	1.3	100	3.97
	F	67	276	10	26	5	384	
Adequate seats in waiting room	%	15.1	66.1	4.4	13	1.3	100	3.81
	f	58	254	17	50	5	384	
Clean toilets in good, working order	%	8.9	50.3	10.4	26.6	3.9	100	3.34
	f	34	193	40	102	15	384	
Safety of the health facility	%	23.7	62.2	4.4	9.6	0	100	4.00
	f	91	239	17	37	0	384	
Wheelchair friendliness	%	7.6	36.7	16.4	37.5	1.8	100	3.11
	f	29	141	63	144	7	384	
Visible direc-tions for patients	%	11.7	55.5	7.8	23.2	1.8	100	3.52
	f	45	213	30	89	7	384	
8. Visible name and contact details of the person in charge	%	4.7	54.9	9.9	26	4.4	100	3.29
	f	18	211	38	100	17	384	
Overall mean score								**3.67**

Thus patients' high levels of satisfaction with the health facility's cleanliness and attractiveness were not related to their most recent mean CD4 counts. However, the dissatisfied patients had slightly higher CD4 counts than the satisfied patients.

Among strongly satisfied patients with the health facility's cleanliness and attractiveness, 16 were in first, 112 in second, 40 in third and none in the fourth WHO stage. Among satisfied patients 55 were in first, 79 in second, 50 in third and 3 in the fourth WHO stage. Among dissatisfied patients, 9 were in first, 2 in second, 1 in third and none in the fourth WHO stage. Among strongly satisfied patients, 3 were in first, 4 in second, 1 in third and none in the fourth WHO stage. As the respondents' clinical condition worsened, the number of satisfied patients decreased. This was also statistically significant using Chi-square test ($P<0.01$). However, Cramer's V only showed a weak association ($V=0.235$).

An Ethiopian study reported similar findings as to patients' satisfaction with the cleanliness of the health facilities. Satisfaction levels of patients were assessed at six hospitals and six health centers. The mean score of patients' satisfaction with health facilities' cleanliness ranged from 76.50% to 90.57% (Bekele, Taye, Mekonnen, Girma, Gegefu, Mekonnen & Dejene 2008:44).

A study from Kenya also reported similar findings as overall satisfaction with ANC services was high. As many as 96% of the women participating in the Kenyan study, who attended a fully integrated ANC clinic, and 97% of women, who attended a non-integrated ANC clinic, were either satisfied or very satisfied. However, 79% of HIV-infected women were very satisfied with the fully integrated ANC clinic's services ((Vo et al 2012:1444). A Zambian study also reported that 76.7% of the health care providers rated the clinic's infrastructure as being good or very good and 65.1% rated PMTCT services the same way (Kim, Banda, Hiner, Tholandi, Bazant, Sarkar, Andrade & Makwala 2013:4).

4.5.1.2 Accessibility and availability of PMTCT services

Patients' satisfaction levels with the accessibility and availability of PMTCT services were assessed based on responses to five questions. Concerning the time taken by patients' to reach the health facility, 89.1% (*f*=342) agreed, 0.3% (*f*=1) were uncertain and 10.7% (*f*=41) disagreed that it took them more than 30 minutes to reach a health care facility. Reportedly the current study's respondents had to wait on average 80.87 minutes before receiving PMTCT services. After being attended to at the clinic, patients waited on average a further 22.28 minutes at the pharmacy to get their prescribed medications. Similarly 82.6% (*f*=317) of the respondents agreed, 0.8% (*f*=3) were uncertain and 16.7% (*f*=64) disagreed that the health facility rendered services during convenient hours. Respondents indicated their levels of agreement with the statement "sometimes I cannot get the prescribed medicines because of shortages ('stock-outs')" as

- 5.5% (*f*=21) strongly agreed,
- 28.9% (*f*=111) agreed,
- 3.1% (*f*=12) were uncertain,
- 56% (*f*=215) disagreed and
- 6.5% (*f*=2%) strongly disagreed.

Thus 34.4% (*f*=132) indicated that medicines were sometimes unavailable at clinics. This could have serious impacts on the treatment outcomes of the women using PMTCT services, as treatment interruptions could impact negatively on the immunological and clinical outcomes as well as on the HIV status of their babies. Unavailable ARVs could annul the entire PMTCT programme's objectives.

Responses to the statement "I can reach a referral hospital when necessary" were that:

- 93.0% (*f*=357) agreed
- 1.6% (*f*=6) were uncertain
- 5.5%; *f*=21) disagreed.

Patients' responses to the statement "there is a visible suggestion box in the health facility to voice my opinions and concerns anonymously" were diverse because 73.2% (*f*=281) agreed, 2.3% (*f*=9) were uncertain, 24.5% (*f*=94) disagreed.

A lowest mean score of 1.77 (out of 5) was obtained for the statement indicating that it took patients more than 30 minutes to reach the health facilities. The highest mean score of 4.07 was obtained in response to the statement that patients could reach a referral hospital when necessary. The overall mean score for accessibility and availability of PMTCT services was 3.29. The patients who were strongly satisfied with reaching a referral hospital when necessary, had a mean most recent CD4 count of 423cells/mm^3. The satisfied patients' mean most recent CD4 count was 335cells/mm^3, while it was 306cells/mm^3 among dissatisfied patients and 350cells/mm^3 among strongly dissatisfied patients. Those patients who were strongly satisfied with the accessibility and availability of a referral hospital had higher most recent CD4 counts than other patients. This finding was statistically significant at 0.05 P value by ANOVA (P=0.001). (As CD4 count is a continuous variable and satisfaction level is a categorical variable with more than two categories, ANOVA was the preferred statistical test to use for these calculations).

Out of 74 respondents who were strongly satisfied with the accessibility of the referral hospital when necessary, 43.2% (*f*=32) were in first, 39.2% (*f*=29) in second, 17.6% (*f*=13) in third and none in fourth most recent WHO stage. Among 283 satisfied patients, 18% (*f*=51) in first, 54.1% (*f*=153) in second, 26.5% (*f*=75) in third and 1.4% (*f*=4) in fourth most recent WHO stage. Among 20 dissatisfied patients, 5% (*f*=1) was in first, 60% (*f*=12) in second, 35% (*F*=7) in third and none in fourth most recent WHO stage. As their clinical conditions worsened, the number of satisfied patients decreased. This was also statistically significant at 0.05 P value using the chi-square test (P=0.002). Nevertheless, Cramers' V showed a weak association (V=0.162).

Table 4.19: Accessibility and availability of PMTCT services (N=384)

Accessibility of the PMTCT services		**Strong. agree**	**Agree**	**Uncert.**	**Disagree**	**Strong. disagree**	**Total**	**Mean score**
Requiring 30+ minutes to reach the health facility	%	49.0	40.1	0.3	6.8	3.9	100.1	1.77
	f	188	154	1	26	15	384	
Convenient hours of health facility	%	15.1	67.4	0.8	3.6	13.0	99.9	3.68
	f	58	259	3	14	50	384	
Medicine shortages at times	%	5.5	28.9	3.1	56.0	6.5	100	3.29
	f	21	111	12	215	25	384	
Able to reach referral hos-pital when necessary	%	19.3	73.7	1.6	5.2	0.3	100.1	4.07
	f	74	283	6	20	1	384	
Suggestion box to voice opinions and concerns anonymously	%	22.4	50.8	2.3	17.4	7.0	99.9	3.64
	F	86	195	9	67	27	384	
Overall mean score								**3.29**

This finding is in line with another study conducted in Addis Ababa, Ethiopia, which showed that 91.4% of pregnant women who used PMTCT services, reported that they understood the information received and 89.8% of them were satisfied with their counseling sessions. The average waiting time at these ANC clinics was 39.8 minutes (Ismail & Ali 2011:129-130). A study conducted at the Jimma Referral Hospital, in

Ethiopia, reported similar findings. Out of that study's 422 participants 19% were very satisfied and 36% were satisfied with the availability of medicines. However, regarding the overall waiting time, only 3.1% were very satisfied and 44.5% were satisfied (Assefa, Mosse & Michael 2011:105). A study from Uganda reported that the long waiting times (averaging four hours) at clinics posed major barriers for Ugandan women to continue using HAART for PMTCT (Duff et al 2010:5).

4.5.1.2 Affordability of PMTCT services

Respondents' responses were documented for seven questions about the affordability of PMTCT services. Although 61.2% (*f*=235) respondents agreed that they could afford to pay the fees for the PMTCT services, 26.6% (*f*=102) disagreed with this statement. Patients were asked whether they received health care at the clinic if they could not pay the requested sum of money. Although 85.7% (*f*=329) agreed, 1.8% (*f*=7) were uncertain and 12.5% (*f*=48) disagreed. Patients rated their level of agreement with the care received as being worth the money they paid as follows:

- 87.3% (*f*=335) agreed
- 2.6% (*f*=10) were uncertain and
- 10.2% (*f*=39) disagreed.

In response to another statement that the treatment was of an acceptable quality, 96.9% (*f*=372) of the respondents agreed and 2.3% (*f*=9) strongly disagreed. Only 4.2% (*f*=16) of the respondents agreed that the healthcare workers discriminated against patients according to race, according to age (3.1%; *f*=12) and according to status (6.8%; f=26).

The average most recent CD4 count of those patients who were very satisfied with the quality of the treatment received was 380cells/mm^3, among satisfied patients it was 335cells/mm^3, among dissatisfied patients 422cells/mm^3 and among very dissatisfied patients it was 669cells/mm^3. Those very dissatisfied patients had higher CD4 counts

than others and this was statistically significant at 0.05 P value using ANOVA (P=0.002). The post hoc Bonferroni test showed the significant CD4 count difference was found between the groups of satisfied patients and very dissatisfied patients (P=0.036; 95%CI=12, 655).

Among very satisfied patients (with treatment being of an acceptable quality, 27 were in first, 40 in second, 25 in third and none in fourth WHO stages. Among satisfied patients, 55 were in first, 153 in second, 68 in third and 4 in the fourth WHO stages. Among dissatisfied patients, none were in first, 4 in second, 3 in third and none in fourth WHO stages. Among very dissatisfied patients, 1 was in the first and second and none in third and fourth WHO stages.

It appears that as the respondents' clinical conditions worsened, the number of satisfied patients decreased. However, this was not statistically significant at 0.05 P-value using Chi-square test (P=0.06), but Cramer's V showed a weak association (V=0.133).

A study, conducted at Felege Hiwot Hospital in Ethiopia, reported similar findings as to patients' satisfaction levels with the affordability of HIV/AIDS clinical care. The study was conducted with an objective of assessing the quality of clinical care provided to 365 PLHIV (respondents). Accordingly the mean satisfaction score was 3.2 out of 5 points (Alemayehu, Bushen & Muluneh 2009:360). A study from Uganda reported that transportation fees posed barriers to their respondents to access health facilities and to receive PMTCT services (Duff et al 2010:4). One study from Malawi reported that distances from the hospital and transportation costs constituted barriers to access to PMTCT services (O'Gorman, Nyirenda & Theobald 2010:3-6).

Table 4.20: Affordability of PMTCT services (N=384)

Affordability of PMTCT service		Strong. agree	Agree	Uncert.	Disagree	Strong. disagree	Total	Mean score
Health care received even if unable to pay	%	37.8	47.9	1.8	10.7	1.8	100	4.09
	F	145	184	7	41	7	384	
Care re-ceived is worth the money paid	%	16.1	71.1	2.6	3.4	6.8	100	3.86
	F	62	273	10	13	26	384	
Treatment is acceptable	%	23.9	72.9	0.8	1.8	0.5	99.9	4.18
	F	92	280	3	7	2	384	
Healthcare workers dis-criminate (race)	%	1.3	2.9	2.3	70.6	22.9	100	4.11
	F	5	11	9	271	88	384	
Healthcare workers dis-criminate (age)	%	0.8	2.3	1.3	69.8	25.8	100	4.17
	F	3	9	5	268	99	384	
Healthcare workers discriminate (status)	%	0.8	6.7	1.8	64.8	26.6	100	4.10
	F	3	23	7	249	102	384	
I can afford to pay the PMTCT fees	%	25.0	36.2	12.2	13.3	13.3	100	3.46
	F	96	139	47	51	51	384	
Overall mean score								**3.57**

4.5.1.4 Respondents' perceptions about the nurses/midwives

Perceptions of the respondents about the nurses/midwives were assessed by using eight questions. Some respondents (51.6%; *f*=198) agreed that there were too few nurses/midwives at the clinics. In response to another question, 91.1% (*f*=350) agreed that they felt comfortable talking to the nurses/midwives. Most respondents (85.4%; *f*=382) agreed that the nurses/midwives treated the patients with respect. Again, 68.8% (*f*=264) of the respondents agreed that the nurses/midwives explained what was wrong with the patients and 96.9% (*f*=372) also agreed they could ask questions from the nurses/midwives without being afraid. Likewise, 96.4% (*f*=370) of the respondents agreed that they were pleased with the way they had been treated by the midwives at the health facilities but 32.6% (*f*=125) agreed that the nurses/midwives sometimes used words that the patients did not understand. However, some respondents (39.6%; *f*=152) agreed that the nurses/midwives ignored some of their questions.

The lowest mean score of 2.63 was obtained for perceptions of the respondents about the number of nurses/midwives working at the clinics. The highest mean score of 4.35 was obtained indicating that patients could ask the nurses/midwives questions without being afraid. The overall mean score for perception of patients about nurses/midwives was 3.62. The mean CD4 count among those patients who were very satisfied because they could ask nurses/midwives questions without being afraid was 354cells/mm^3, among satisfied patients it was 349cells/mm^3 and among dissatisfied patients it was 356cells/mm^3. There was no statistically significant difference in terms of most recent CD4 count among satisfied and dissatisfied patients at 0.05 P value using ANOVA (P=.655).

Among very satisfied patients who could ask nurses/midwives questions without being afraid, 28 were in first, 99 in second, 31 in third and none in fourth WHO stages. Among satisfied patients, 56 were in first, 92 in second, 62 in third and 4 in fourth WHO stages. Among dissatisfied patients, 1 was in first, 7 on second, 3 in third and none in fourth

WHO stages. As the clinical condition worsened, the number of satisfied patients decreased. This was also statistically significant at 0.05 P value using Fisher's exact test (P=0.014). Yet, Cramer's V showed only a weak association (V=0.134).

Another study from Ethiopia supports these findings. Among women who attended ANC clinics and used PMTCT services, 92.2% were comfortable with the counselors' handling of and respect for their clients. Regarding competency, 91.5% of the clients reported that they were satisfied with the technical competencies of the counselors (Ismail & Ali 2011:129-130). Another study conducted in the northwestern part of Ethiopia also found that patients were satisfied with provider-patient interactions as the average satisfaction score was 4.4 out of 5 points (Alemayehu et al 2009:360).

An Indian study also produced similar findings even though the patients' satisfaction was measured with doctors' services. The Indian respondents' satisfaction levels with doctors' services were rated as excellent for the following factors: feeling at ease with a doctor (83.98%), able to tell the doctor one's problems (92.19%), doctors' listening to one's problems (87.90%), doctors' understanding of the patients' complaints (95.31%), doctors' effective explanations (93.34%) and doctors' help to improve the women's health (93.34%) (Kishor et al 2011:242).

Table 4.21: Respondents' perceptions about the nurses/midwives (N=384)

Patients' perceptions about nurses/mid-wives (n/ms)		Strong-ly agree	Agree	Uncer-tain	Disagree	Strong-ly dis-agree	Total	Mean score
Too few n/ms at the clinic	%	28.1	23.4	9.4	35.2	3.9	100	2.63
	f	108	90	36	135	15	384	
Comfortable talking to n/ms	%	15.1	76.0	0.8	8.1	0	100	3.98
	f	58	292	3	31	0	384	
N/ms treat-ing patients with respect	%	13.3	72.1	1.0	13.0	0.5	99.9	3.85
	f	51	277	4	50	2	384	
N/ms explain what is wrong with patients	%	7.6	61.2	1.3	29.4	0.5	100	3.46
	f	29	235	5	113	2	384	
Can ques-tion n/ms without being afraid	%	41.1	55.7	0.3	2.9	0	100	4.35
	f	158	214	1	11	0	384	
Pleased with the way the n/ms treated patients	%	23.2	73.2	0.8	2.9	0	100.1	4.17
	f	89	281	3	11	0	384	
N/ms used difficult words	%	3.1	29.4	7.8	55.2	4.4	99.9	3.28
	f	12	113	30	212	17	384	
N/ms ignored some questions	%	2.9	36.7	5.7	47.1	7.6	100	3.20
	f	11	141	22	181	29	384	
Overall mean score								**3.62**

4.5.2 RESPONDENTS' HEALTH OUTCOMES

In this section health outcomes of the mothers were measured using CD4 counts, WHO stages and other illnesses diagnosed while using PMTCT services. The CD4 counts and the WHO stages as well as the most recent measurements, used to assess maternal health outcomes, were considered. Prescribed ARVs versus most recent CD4 counts were analysed to evaluate the health outcomes of mothers who used PMTCT services.

4.5.2.1 CD4 counts and WHO stages as measurements of respondents' health outcomes

All the respondents (100%; N=384) who participated in this study had initial CD4 counts recorded, 87.8% (*f*=337) had second CD4 counts, 75.0% (*f*=288) had third CD4 counts, 28.6% (*f*=110) had fourth CD4 counts, 10.9% (*f*=42) had fifth CD4 counts and 5,7% (*f*=22) had six CD4 counts recorded. This trend indicates that as time went on the percentage of women with successive CD4 counts decreased. As can be seen from figure 4.5, for those women who had six recorded CD4 counts, the mean CD4 count increased from 302.1cells/mm^3 at the first count to 414cells/mm^3 at the sixth count. Repeated measure ANOVA also showed an increase of CD4 count that was significant at 0.05 P-value (P=0.008). (Repeated measure ANOVA was used taking into consideration the comparisons of significant differences among the same group of people for measurements taken up to six times).

At the beginning all the women, 100% (N=384), had their WHO staging recorded. However this decreased during subsequent visits:

- during the second visit 92.4% (*f*=355)
- during third visit 87.2% (*f*=335)

- during fourth visit 47.4% (*f*=182)
- during fifth visit 34.1% (*f*=131) and
- during six visit 31.3% (*f*=120) had their WHO staging recorded

Like CD4 count, the percentage and number of women who had recorded WHO staging decreased at subsequent visits. However, during the second and subsequent WHO staging the percentage of women was higher than those with CD4 counts. During the initial visit 53.9% (*f*=207) of the women were at WHO stage II and 1.1% (*f*=4) were at WHO stage IV.

During the second visit 56.1% (*f*=199) were at WHO stage II and 1.1% (*f*=4), were at WHO stage IV. The percentage for WHO stage I fluctuated during subsequent stages. As can be seen from table 4.23, the percentage of WHO stage IV increased from the first to sixth time staging whereas the percentage of women in WHO stage III increased form the second time staging onwards.

If the clinical condition of the women who used PMTCT services improved, the percentage composition of women in WHO stage III and IV (advanced illness) should have decreased. Hence, maternal health status from WHO stage showed no marked improvement. This was the case because the CD4 count did not increase sufficiently (to at least 500) to restore the clinical health status of these women.

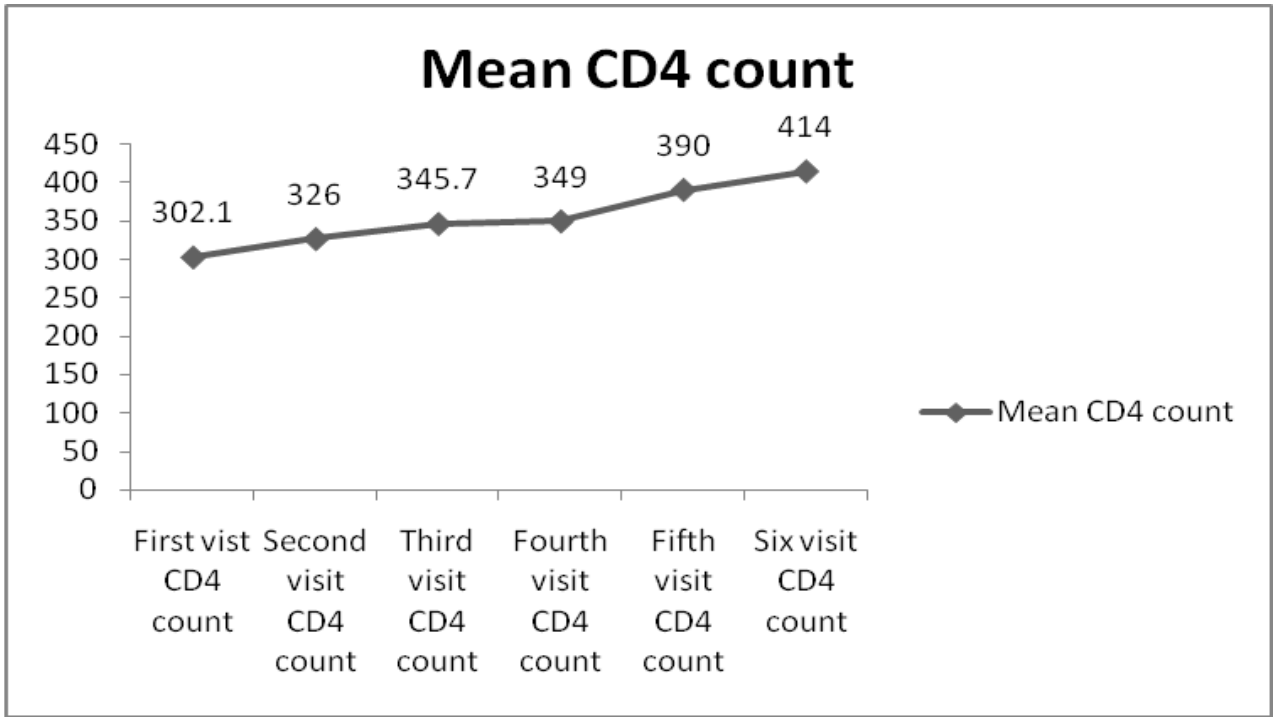


Figure 4.5: Mean CD4 count at six measurements

Table 4.22: Repeated measures ANOVA of CD4 counts

Source	CD4 count	Df	F	Sig
CD4 count	Linear	1	8.822	.008

A Kenyan study analysed data from 434 women who completed PMTCT interventions. The percentage of women with CD4 counts of <250 cells per microliter decreased from 23% at baseline to 5% at 24 weeks postpartum and this was significant (Okonji et al 2012:251-254).

Table 4.23: Respondents' WHO stage at six different occasions

WHO staging at 6 different times		Percent and number of women in each WHO stage				Total
		WHO stage I	WHO stage II	WHO stage III	WHO stage IV	
	%	21.4	53.9	23.7	1.0	100
1	*f*	82	207	91	4	384
	%	19.4	56.1	23.4	1.1	100
2	*f*	69	199	83	4	355
	%	17.6	56.7	24.2	1.5	100
3	*f*	59	190	81	5	335
	%	28.0	41.8	26.9	3.3	100
4	*f*	51	76	49	6	182
	%	32.1	35.1	28.2	4.6	100
5	*f*	42	46	37	6	131
	%	30.8	35.8	29.2	4.2	100
6	*f*	37	43	35	5	120

A study from South Africa reported similar findings as to HIV infected women's CD4 counts during antenatal and post natal periods. Out of 1 369 pregnant women who had CD4 counts recorded during their antenatal period, 11.6% had CD4 count <200cells/ml

as compared to 6.02% of the 822 women at the post natal assessments. The results of both antenatal and post natal CD4 counts were found for 793 women of whom 9.96% had low CD4 counts during antenatal and 6.18% during post natal checks. However, a few (1.51%) of these women progressed from a high antenatal to a low post natal CD4 counts (Lebon, Bland, Rollins, Coutsoudis, Coovadia & Newell 2007:1472-1473).

A multi country study in Africa used CD4 counts and WHO stages to measure maternal health status. The findings related to the women's CD4 counts were contrary to those of the current study's findings while their findings concerning WHO stages supported the current study's findings. The study reported that maternal CD4 counts declined at 12 and 24 months after delivery, as 4.5% and 11.6% of women with enrollment CD4 count of >250cells/mm^3 had CD4 counts that declined to <200cells/mm^3. A total of 4.4% of of those women developed new WHO stage III and 0.4% of them developed new WHO stage IV (Ekouevi et al 2012b:4-6).

4.5.2.2 ARVs used versus CD4 count in relation to maternal health outcomes

The mean CD4 count increment was compared between those women who received ARV prophylaxis and those who were on ART. The mean CD4 count among those who received ARV prophylaxis increased from 471cells/mm^3 at commencement of ARVs to 480cells/mm^3 most recently. This shows that the mean CD4 count of women receiving ARV prophylaxis increased on average only by nine cells/mm^3 while among those women who received ART, the mean CD4 count increased from 267cells/mm^3 at commencement of ARVs to 329cells/mm^3 most recently, a mean CD4 count increase of 62cells/mm^3. Therefore the increment of CD4 counts among those women who received ART was almost seven times higher than those of women who received ARV prophylaxis. This finding indicates that ART had improved the immunity of the respondents compared to those respondents on ARV prophylaxis. Correlation analysis of the CD4 counts when ARVs started and the most recent CD4 counts was done by scatter plot and by calculating Pearson's correlation coefficients. The scatter plot in

figure 4.6 shows a linear positive association. Pearson's correlation coefficients were calculated because both the dependant and independent variables were continuous and followed normal distributions. Accordingly, as the CD4 count at the commencement of ARVs increased, the most recent CD4 count also increased. Similarly, when the CD4 count at the commencement of ARVs decreased, the most recent CD4 count also decreased. This was statistically significant at 0.05 P value ($r=0.613$; $P<0.01$). Hence, the following linear regression model could predict the most recent CD4 count based on CD4 count when ARVs were commenced:

- the most recent CD4 count = 154+0.665 (CD4 count when ARVs commenced)
- thus when CD4 count at commencement of ARVs increased by 1cells/mm^3, then the most recent CD4 count increased by 0.665cells/mm^3.

Table 4.24: Correlation of CD4 counts when ARVs were commenced versus the most recent CD4 counts (N=384)

		CD4 count most recent	CD4 count when antiretrovirals was commenced
Most recent CD4 count	Pearson Correlation	1	.613**
	Sig. (2-tailed)		.000
	N	384	384
CD4 count when ARVs were commenced	Pearson Correlation	.613**	1
	Sig. (2-tailed)	.000	
	N	384	384

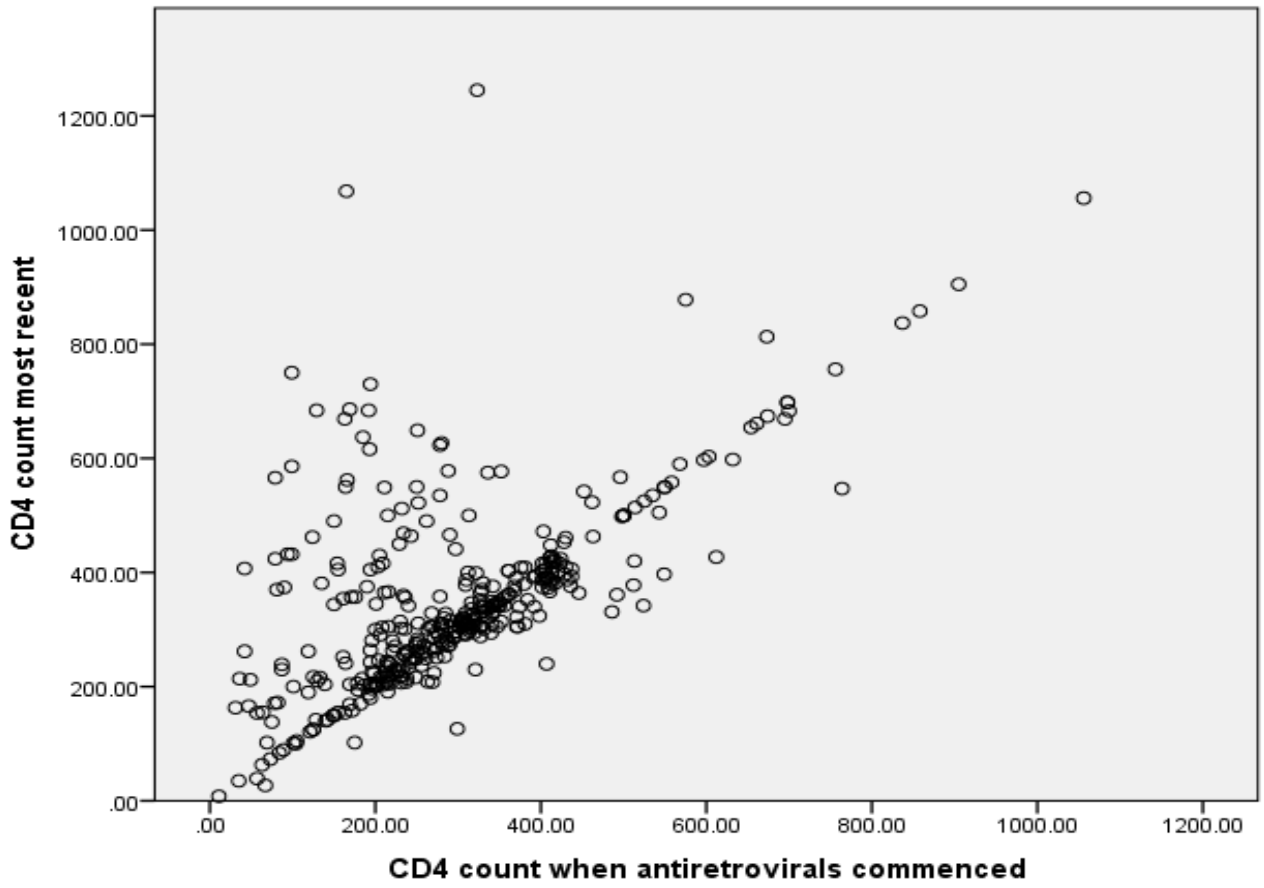


Figure 4.6: Scatterplot: most recent CD4 count versus CD4 count when ARVs commenced (N=384)

Table 4.25: Linear regression of most recent CD4 count versus CD4 count when ARVs were commenced

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	153.734	14.544		10.571	.000
	CD4 count when antiretrovirals was commenced	.665	.044	.613	15.177	.000

A study conducted in Cote D'Ivoire also reported increments in CD4 counts after exposure to ARVs but there was no significant difference based on type of ARVs used in response to HAART following treatment for PMTCT. A total of 247 women started 3TC containing HAART with either NVP or EFV. Their median CD4 count was 188 cells/mm^3. Among 88 women, not exposed to ARVs but who had undergone 36 months of follow-up, the median absolute CD4 count increment was +359cells/mm^3. Among 112 women who had been exposed to at least one ARV the absolute increase in CD4 count was +363cells/mm^3. When analysis was restricted to among those not switched to PIs during the follow up, the absolute CD4 count increase was 361cells/mm^3. Overall 49 of the 247 women who initiated HAART met immunological failure criteria at least once during the follow up period (Ekouevi et al 2010:2).

A collaborative analysis of prospective studies in SSA, Latin America and Asia showed similar findings that CD4 counts increased after the initiation of ART. The median CD4 count increased from 114 cells/uL to 395 cells/uL after five years of follow up. Patients who initiated ART at higher CD4 counts tended to maintain higher CD4 counts (Nash, Katyal, Brinkho, Keiser, May, Hughes, Dabis, Wood, Sprinz, Schechter & Egger 2008:2294-2295). A study conducted in Lusaka, Zambia, investigated the mortality, virological and clinical outcomes among a cohort of women who used PMTCT services. The study reported similar findings of women responding well to ART. Mortality was reduced by half among the cohorts after ART became available. Out of 161 women who were exposed to single dose NVP and who were on treatment for six months, 70.8% achieved a viral load <400 copies/ml and 40.4% a viral load <50 copies/ml (Kuhn, Samrau, Ramachandran, Sinkala, Scott, Kasonde, Mwiya, Kandasa, Decker, Thea & Aldrovandi 2009:136). A study which was conducted in Zambia also reported similar findings. The study attempted to determine early clinical and immunological responses to NNRTI-based ART among women with prior exposure to single dose NVP. Among 229 women exposed to NVP, the mean increase of CD4 cell count was 202 cells/uL from baseline at 6 months. Of the 1530 NVP unexposed women the mean CD4 count

increase was 182cells/uL (Chi, Sinkala, Stringer, Cantrell, Mtonga, Bulterys, Zulu, Kankasa, Wilfertz, Weidle, Vermund & Stringer 2007:960)

4.5.2.3 Illnesses diagnosed during the utilisation of PMTCT services

Illnesses that had been diagnosed at enrollment into PMTCT programmes and during the follow-up periods are addressed in this section. A total of 34 illnesses had been diagnosed among women at enrollment into PMTCT services and 19 illnesses were diagnosed during their follow-up visits to the PMTCT services. The number of diagnoses does not necessarily mean the number of women since a single woman might have more than one illness and several women might have been diagnosed with the same illness. To understand the prevalence of these illnesses, the top 12 diagnoses are presented. The nature of the prevalence of the illnesses, made it impossible to list only the top 10 most prevalent illnesses because those illnesse ranked 10, 11 and 12 had the same frequencies. The most prevalent illness at enrollment into the PMTCT service was oral candidiasis (*f*=89) which was followed by pulmonary TB (*f*=39). The least prevalent illness was angular cheilitis (*f*=6). The most prevalent illness during follow-up PMTCT service was urinary tract infection (UTI) (*f*=25) which was followed by upper respiratory tract infection (URTI) (*f*=22). The least prevalent illness during follow up was typhoid fever (*f*=4).

Five new illnesses were among the top 12 during follow-up which had not initially been diagnosed among the top at enrollment into the PMTCT service. These illnesses were acute bronchitis (*f*=7), tonsillitis (*f*=6), anaemia (*f*=4), typhoid fever (*f*=4) and acute gastroenteritis (*f*=13). Five illnesses which were among the top 12 at enrollment into the PMTCT service vanished from the top 12 illnesses during the follow-up visits. These were pulmonary TB (*f*=39), seborrhoea (*f*=12), prurigo (*f*=9), oral hairy leukoplakia (*f*=6) and angular cheilitis (*f*=6). The incidence of oral candidiasis was reduced by 76 cases during the follow-up visits. The incidence of URTI decreased by 17 cases. The incidence of herpes zoster decreased by 14 while pneumonia decreased by three and

cellulitis by six cases. However, the incidence of UTI increased by 18 cases and diarrhoea by one. This shows that the women who used PMTCT did not benefit from the service in terms of preventing diarrhoeal diseases, UTIs, acute bronchitis, tonsillitis, anaemia, typhoid fever and acute gastro-enteritis. However, the overall prevalence of illnesses reduced during the follow-up visit of the women who used PMTCT services. The PMTCT treatment cured all TB cases and prevented new ones from developing.

Table 4.26: Top 12 Illnesses diagnosed at enrollment and during follow-up attendance of PMTCT services

S.no	**Illnesses diagnosed at enrollment into PMTCT service**	***f***	**Illnesses diagnosed during follow-up visits to PMTCT service**	***f***
1	Oral candidiasis	89	UTI	25
2	Pulmonary TB	39	URTI	22
3	URTI (*f*=39)	39	Pneumonia	20
4	Herpes zoster	34	Herpes zoster	20
5	Pneumonia	23	Acute gastroenteritis	13
6	Seborrhoea	12	Oral candidiasis	13
7	Cellulitis	10	Diarrhoea	7
8	Prurigo	9	Acute bronchitis	7
9	UTI	7	Tonsillitis	6
10	Oral hairy leukoplakia	6	Anaemia	4
11	Diarrheoa	6	Cellulitis	4
12	Angular cheilitis	6	Typhoid fever	4

Five of the six publications, addressing the impact of other illnesses on women's health during their utilisation of PMTCT services, indicated that PMTCT programmes had no

effect on the treatment of sexually transmitted infections (STIs). None of these publications mentioned the effect of PMTCT programmes on the treatment of severe anaemia (Both & Roosmalen 2010:1445-1447). A study from Thailand, assessed pregnancy outcomes among women using ART. Out of 204 women, 22 developed anaemia. Out of these 22 women, 13 did so six weeks after exposure to ARVs and nine before exposure to ART. Nausea and vomiting were documented in only four of the pregnant women's records (Areechokchai et al 2009:10). A study from the USA examined the association of latest CD4 counts with risk of non-AIDS diseases in a cohort of 1 397 patients who initiated ART. Non-AIDS diseases considered by the study were liver, cardiovascular, renal and cancer conditions. A total of 80 patients developed non-AIDS conditions but these declined with the highest most recent CD4 counts. Thus the higher the patients' CD4 counts were, the lower were their rates of non-AIDS events (Baker, Peng, Rapkina, Abrams, Silverberg, MacArthur, Cavert, Henry & Neaton 2008:841). A study which was conducted in Tanzania, reported haematological changes in women exposed to AZT-containing regimens for PMTCT. Two cohorts of women participated in the study group 1 (*f*=82) with AZT intake and group 2 (*f*=62) without AZT intake for PMTCT during pregnancy. It was found that among group 1 (with AZT) women had significant decreased red blood cell, white blood cell and granulocyte counts, as well as increased red cell distribution width and platelet counts (Ziske, Kunz, Sewangi, Lau, Dugange, Hauser, Kirschner, Harms & Theuring 2013:3).

4.5.3 HIV status of respondents' infants

This section presents the HIV status of the infants using the DNA-PCR test results. The MTCT rate of HIV was 6.0% (*f*=23) among children whose HIV-positive mothers used PMTCT services, implying that 94.0% (*f*=361) the infants were HIV-negative. By the time infants were ≤6 weeks of age, 65.6% (*f*=253) of them had been tested with the DNA-PCR test and when they were >6 weeks of age 34.4% (*f*=132) of them had been tested. Infants' HIV status was further categorised by the timing of DNA-PCR tests and it shows that among the 253 infants, 6.7% (*f*=17) tested HIV-positive and among 132

infants, 4.5% (*f*=6) tested HIV-positive. Those infants tested after six weeks of age could have acquired the infection either after six weeks or at ≤6 weeks of age. Accordingly, it was not possible to determine prenatal and post-natal HIV transmission rates because 132 infants did not get DNA-PCR test at ≤6 weeks and 236 infants did not get repeat tests after six weeks of age. It would have been possible to determine the prenatal and post-natal HIV transmission rates if all infants got DNA-PCR test results at ≤6 weeks and those tested HIV-negative got repeat tests after six weeks of age. The current PMTCT practice and record of DNA-PCR test result does not allow the calculation of transmission rates at these two periods. Rather the crude MTCT rate was calculated to be 6.0%.

Table 4.27: HIV status of the infants using DNA-PCR test (n=384)

HIV status of the infant	Frequency	Percent (%)
HIV-positive	23	6
HIV-negative	361	94
Total	384	100

According to the WHO (2010a:12), the use of recommended PMTCT interventions can reduce MTCT to less than 5% in the breast feeding population. The MTCT rate in this research is 1% higher than the WHO recommendation. Similar findings were reported in the Dominican Republic study with 6.4% MTCT rate. However, the latter study analysed the results of those infants' HIV status whose mothers used sdNVP (Lorenzo et al 2012:3-5). A lower MTCT rate of 2.1% had been documented by a Nigerian study (Esene & Omoigberale 2012:107-110).

A higher rate of MTCT of 15.86% was reported by a Kenyan study (Azcoaga-Lorenzo et al 2011:276-278). According to a study conducted in China, the rate of MTCT among

infants whose mothers used ARVs was 9.23% which is higher than the current study's finding of 6.0%. The finding revealed that PMTCT intervention did not reach an expected goal of less than 5% MTCT rate in China (Li, Zhao, Zhang, Wu, Chen, Liang, Xu & Yu 2013:3). A study conducted in Cameroon also presented HIV status of infants at 11.6% which is higher than the current study's finding (Noubiap, Bongoe & Demanou 2013:3).

4.5.4 FACTORS AFFECTING MOTHER TO CHILD TRANSMISSION OF HIV IN ADDIS ABABA

Factors that could have a significant effect on the rate of MTCT included nipple fissures, ARVs taken by the mother, ARV prophylaxis given to the infant, birth weight, gestational age during delivery and APGAR score. However, gender of the infant, mode of delivery and maternal age did not have significant association with the rate of MTCT. Each of these variables will be discussed in the following sections.

4.5.4.1 HIV status of the infant versus nipple fissures

Out of the 384 respondents, 6.8% (*f*=26) had nipple fissures. As many as 38.5% (*f*=10) of these women's infants were HIV-positive. Among those without nipple fissures, only 3.6% (*f*=13) had HIV infected infants. The rate of MTCT was higher among those mothers with nipple fissures. A chi-square test also showed an OF that was higher than the EF of women with nipple fissures by 7.4 among those with HIV infected infants. On the contrary, the OF was smaller than the EF among women without nipple fissures by 8.4 for those with HIV-infected infants. There was also a significant association between HIV status and nipple fissures at the 0.05 p value ($P<0.01$). The risk of acquiring HIV among infants whose mothers had nipple fissures was 10.59 times higher than for those whose mothers did not have nipple fissures (RR=10.59; 95%CI=5.15, 21.80).

Table 4.28: HIV status of the infants correlated with the presence or absence of respondents' nipple fissures (N=384)

Nipple fissure		HIV status		Total
		HIV-positive	HIV-negative	
Present	%	38.5	61.5	100
	f	10	16	26
Absent	%	3.6	96.4	100
	f	13	345	358
Total	%	6.0	94.0	100
	f	23	361	384

Table 4.29 Chi-square test of mothers' nipple fissures versus infants' HIV status (N=384)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	52.223	1	.000
N of Valid Cases	384		

According to a recent update on parent-to-child-transmission of HIV from India, the postpartum MTCT rate ranged from 5% to 15%. Mastitis, cracked nipples and abscesses of the breast were factors that predisposed infants to post natal MTCT. Furthermore decreased epithelial integrity of the oral cavity of the infant (oral thrush) could lead to maternal nipple thrush and fissures (Hazarika 2010:63-64). A study from Zimbabwe documented the relationship between abnormal breast conditions and vertical transmission of HIV. In this study mothers with abnormal breast conditions at enrollment in the PMTCT programme were four times more likely to transmit HIV to their children (Gumbo et al 2010:719). Another Zimbabwean cross-sectional study indicated that laboratory results of mastitis were associated with breast milk HIV 1 RNA but not

with HIV 1DNA loads. Thus HIV 1 DNA loads were not increased during mastitis (Gantt, Shetty, Seidel, Matasa, Musingwini, Woelk, Zijenah, Katzenstein & Frenkel 2007:570).

4.5.4.2 HIV status of the infant versus gender of the baby

There were 185 male and 199 female infants included in the current study. The proportion of male to female ratio of babies was 0.48:0.52. There were 14 HIV-positive male infants and 9 HIV-positive female infants. The MTCT rate of HIV among the male infants was 7.6% while the transmission was 4.5% among the females. The chi-square test showed an observed frequency that was higher than the expected frequency by 2.9 among male HIV infected infants. On the other hand the observed frequency was lower than the expected frequency by 2.9 among female HIV infected infants. Nevertheless this difference was not statistically significant at 0.05 P value using the chi-square test (P=.209). The gender of the infant was not significantly associated with MTCT. Therefore there was no significant difference in risk of acquiring HIV from their mothers between male and female infants (RR=1.67; 95%CI= 0.74, 3.77).

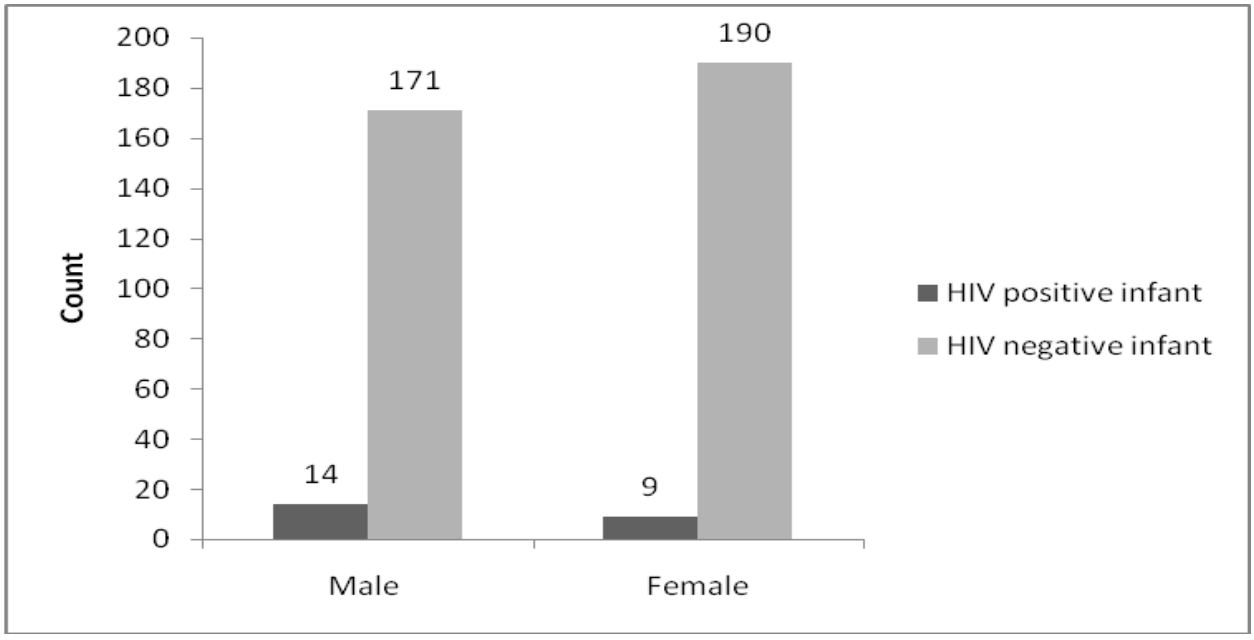


Figure 4.7: HIV status versus gender of the infant (N=384)

Table 4.30: Chi-square test: HIV status of the infant versus gender of the infant (N=384)

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.579[a]	1	.209		
N of Valid Cases	384				

The proportion of male to female was in line with the 2007 census statistics of Ethiopia. In Addis Ababa, Ethiopia, the total population was 2 739 551 with a male to female ratio of 0.48:0.52 (PSC 2007:7). A study which was conducted in northwestern Ethiopia reported similar findings. That study used 509 mother-infant pair for final analysis. Among these infants, 263 were male infants and 246 female infants making male to female ratio of 0.52:0.48. Sex of the infant was not significantly associated with MTCT. Nevertheless, among the 509 HEIs, 51 (10.0%) were HIV infected (Koye & Zeleke 2013:03).

This finding was also supported by another study conducted in an urban hospital in Kuwazulu-Natal, South Africa. The number of male HEIs was 122 and the number of female HEIs was 129 (Chetty et al 2010:5). Another study conducted in Zambia reported similar finding as to male to female ratio where out of 28 320 babies included in the study, half of them were males. However, the overall transmission of HIV among these HEIs was 12.2% (Torpey, Mandala, Kasonde, Bryan-Mofya, Bweupe, Mukundu, Zimba, Mwale, Lumno & Welsh 2010:3).

4.5.4.3 HIV status of the infant versus weight of the infant

All the infants (N=384), included in this study had the newborn weight measurements recorded in their files. Out of these 384 infants, 5.2% (*f*=20) were underweight with birth weights of less than 2.5kg, 91.7% (*f*=352) of them with normal birth weight ranging from

2.5 to 4.5kg and 3.1% (*f*=12) were overweight weighing 4.5kg or more at birth. The average birth weight was 3.44kg that ranged from 2kg to 5.5kg. The MTCT rate among those babies who were underweight was 15.0%. Among those with normal birth weight, the MTCT rate was 4.3% and among those who were overweight the MTCT rate was 41.7%. Therefore the MTCT rate was higher among overweight and underweight babies. The Chi-square test showed that the OF was higher than the EF among HIV infected infants with birth weight above 4.5kg by 4.3 and among those with birth weight less than 2.5kg birth weight by 1. The OF was lower than the EF among HIV infected infants with birth weights ranging from 2.5kg to 4.5kg by 6.1.

There was a significant association between HIV status of the infant and newborn weight at 0.05 P value (P<0.01). Underweight infants were 3.52 times more at risk than normal weight infants to acquire HIV (RR=3.52; 95%CI=1.11, 11.17) and overweight infants were 9.78 times more at risk than normal weight infants to acquire HIV (RR=9.78; 95%CI=4.25, 22.48).

During the first post natal follow-up visit, 380 (99.0%) infants had weight measurements recorded in their files. During the second visit 367 (95.6%), during third visit 305 (79.4%), during fourth visit 256 (66.7%), during fifth visit 232 (60.4%) and during the sixth visit 195 (50.8%) of the infants had weight measurements recorded in their files. The average weight increased from 4.5kg from the first visit to 8kg during the sixth visit. Since weight measurements of the infants were not normally distributed, the Friedman test was used to show that increments of the infants' weights were significant at p value of 0.05 (P<0.01).

Table 4.31: HIV status of the infant versus newborn weight (N=384)

Newborn weights		HIV status		Total
		HIV-positive	HIV-negative	
< 2.5kg	%	15	85	100
	f	3	17	20
2.5-4.5kg	%	4.3	95.7	100
	f	15	337	352
>4.5kg	%	41.7	58.3	100
	f	5	7	12
Total	%	6	94	100
	f	23	361	384

Table 4.32 Friedman test for babies' body weights in kilograms at subsequent clinic visits

Visits	1st weight	2nd weight	3rd weight	4th weight	5th weight	6th weight	df	Asymptomatic significance
Mean rank	1.04	2.00	3.02	3.99	5.02	5.93	5	0.000

A study, conducted in Zimbabwe, documented similar findings to those reported in the current study indicating that low birth weight infants were at increased risk of acquiring HIV. The study was prospective because it followed a cohort of mother-infant pairs for 15 months. Among infants with birth weight of ≥2500g, 30.2% (*f*=73) became HIV-positive. Among infants with birth weight of <2500g, 57.1% (*f*=12) became HIV-positive (Gumbo et al 2010:722).

A study conducted in Cameroon reported birth weights of infants. A cohort of 587 HIV-positive mother-infant pairs were included in the study. The average birth weight was 3145.30 gram that ranged from 1300-4760 gram (Nlend et al 2011:4). A study conducted in China also reported a slightly different finding from the Cameroon study. The birth weight was measured for 194 single live births (excluding multiple births). The median birth weight was 2850 gram (range1450-4000 gram). Among these, 19.6% of the babies were classified as having low birth weights and 6.7% of the infants were diagnosed as HIV-positive. Further analysis revealed that factors associated with low birth weight included the mother's weight of less than 45 kg at antenatal clinic enrollment, gestational age of less than 37 weeks at delivery, CD4 count less than 100cells/ul at antenatal clinic enrollment and HI viral load of more than 100 000 copies/ml (Lan et al 2012:405).

4.5.4.4 HIV status of the infant versus ARVs taken by the mother

A total of 55 (14.3%) respondents took ARV prophylaxis and 329 (85.7%) took ART for PMTCT. Out of 55 respondents who took ARV prophylaxis, 85.5% (*f*=47) had HIV-negative infants while 14.5% (*f*=8) had HIV-positive infants, implying a MTCT rate of 14.5%. Out of the infants of 329 respondents who used ART, 95.4% (*f*=314) were HIV-negative and 4.6% (*f*=15) were HIV-positive, implying a MTCT rate of 4.6%. Out of 361 HIV-negative infants (384-23 HIV-positive infants), 87.0% (*f*=314) of their mothers were on ART and 13.0% (*f*=47) of their mothers took ARV prophylaxis.

A chi-square test showed that the OF was higher than the EF by 4.7 among HIV infected infants born from mothers who took ARV prophylaxis. The OF was lower than the EF by 4.7 among HIV-infected infants whose HIV-positive mothers took ART. There was a significant association between type of ARVs (ARV prophylaxis versus ART) given to the mother with HIV status of the infant at 0.05 p value (P=0.004). The risk of acquiring HIV among infants whose mothers used ARV prophylaxis was 3.19 fold higher than those whose mothers used ART (RR=3.19; 95%CI=1.42, 7.17).

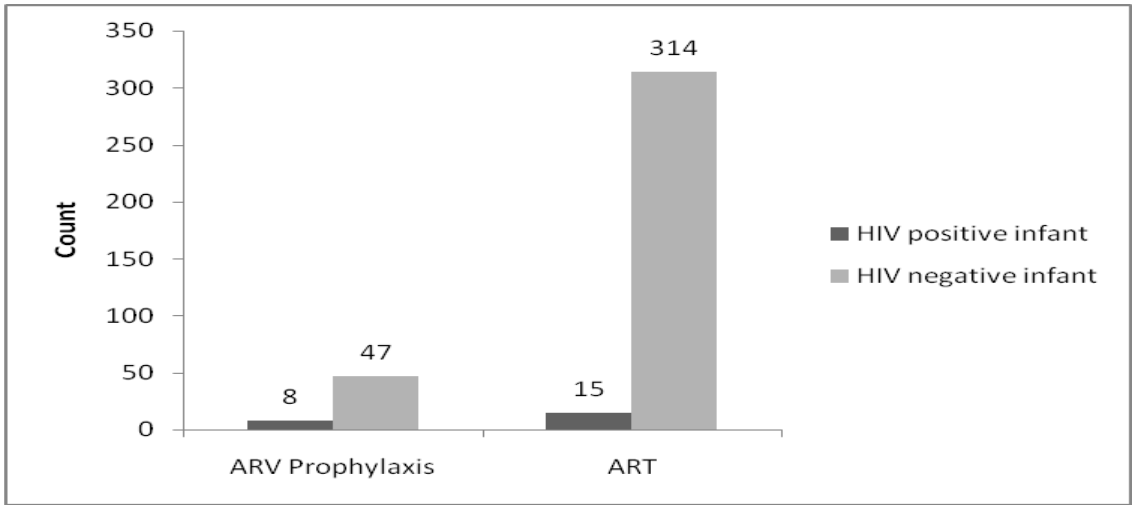


Figure 4.8: HIV status of infants versus ARVs taken by their mothers for PMTCT (N=384)

Table 4.33: Chi-square test: HIV status of the infants versus ARVs taken by their mothers for PMTCT (N=384)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.346	1	.004
N of Valid Cases	384		

A study form Cameroon reported a similar finding, showing that multi-drug ART could prevent MTCT. Out of the 418 mother infant pairs retained for data analysis, the overall MTCT rate of that Cameroonian study was 6.6% ((Tchendjou et al 2010:4). Another study from Burkina Faso reported a similar finding in terms of the rate of MTCT versus the type of ARVs received for PMTCT (ARV prophylaxis versus ART). That study reported that 326 women received short course ART (ARV prophylaxis) and 260 women received HAART. The rate of MTCT was higher among those who took ARV prophylaxis (short course ART) (6.2%) as compared to those who took HAART (0%) (Kouanda et al 2010:844-847).

A South African study reported about the effect of different HAART regimens and the duration on MTCT. Data were reported about 1142 women and 873 of their infants whose HIV status was determined at 4-6 weeks after birth. The overall MTCT rate was 4.9%. Women who became pregnant while on HAART had a MTCT rate of 0.7% and women who initiated HAART during pregnancy had a MTCT rate of 5.7%. Women with CD4 count >250cells/mm^3 who received sdNVP had a MTCT rate of 7.9% while women presenting to the clinic during or after the delivery of their infants with no ARV prophylaxis had a MTCT rate of 17.4% (Hoffman, Black, Technau, Van der Merwe, Currier, Coovadia & Chersich 2010:37-38).

4.5.4.5 HIV status of the infants versus ARV prophylaxis given to the infants

Out of the 384 infants that participated in the current study, 98.7% (n=379) had received ARV prophylaxis for PMTCT and 1.3% (n=5) of them did not receive it. Among those infants who received ARV prophylaxis, 376 of them received NVP, one infant received d4T+3TC and two infants received AZT+NVP. Among those infants who received ARV prophylaxis, the MTCT rate was 5.5% (*f*=21) and the rate among those who did not receive ARV was 40.0% (*f*=2). A chi-square test shows that among infants who took ARV prophylaxis and were HIV infected the OF was less than EF by 1.7. Among infants who did not take ARV prophylaxis and became HIV infected OF was higher than EF by 1.7. This was also statistically significant at 0.05 p value (P=0.001). Among those who received NVP the number of HIV infected infants were 19, among those who received d4T+3TC the number was one and the number among those who received AZT+NVP was one. Nevertheless, most of those who received ARV prophylaxis were those who took NVP. The risk of acquiring HIV among those infants who did not receive ARV prophylaxis was 7.22 fold more than for those infants who received ARV prophylaxis (RR=7.22; 95%CI= 2.28, 22.83). The result shows ARV prophylaxis given to the infants reduced their risk of acquiring HIV.

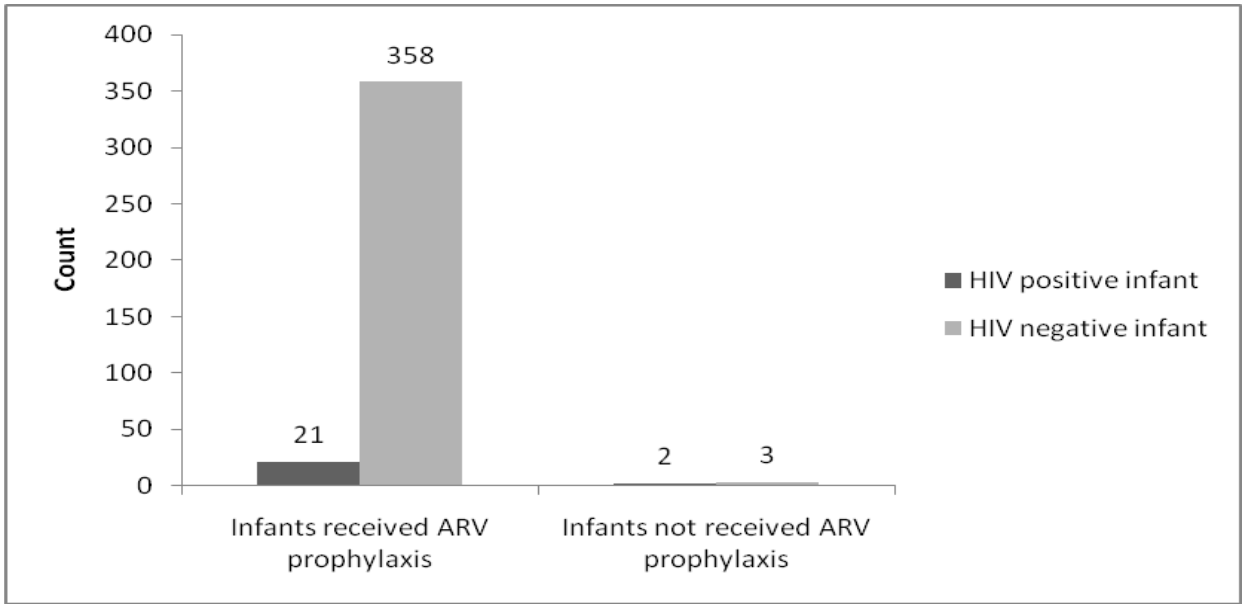


Figure 4.9: HIV status of the infants versus ARV prophylaxis taken by the infants (N=384)

A similar finding was reported by a study, conducted in Haiti, to assess improving outcomes in infants of HIV-infected women in a developing country. The Haiti study analysed data from 551 infants born to HIV-positive mothers. Those mothers and their infants were given short course monotherapy ARVs for prophalyxis. The MTCT rate without therapy was 13% and the rate after a single dose of NVP was 10.8% (Noel, Mehta, Zhu, Rouzier, Marcelin, Shi, Nolte, Severe, Deschamps, Fitzgerald, Johnson, Wright & Pape 2008:2-4). A study, conducted in Zambia, also reported that ARVs helped to lower the MTCT rate. The study analysed HIV early infant diagnosis to estimate rates of perinatal HIV transmission in Zambia. It analysed data of from 28 320 babies and 71.5% of them had received ARV prophylaxis. The MTCT rate at six weeks when ARVs prophylaxis was received by the baby was 15.8% (Torpey 2010:3-5). A Nigerian study also reported that ARV prophylaxis helped to lower the MTCT rate. The study analysed data from 702 babies, of whom 434 had received single dose NVP at birth plus AZT for four weeks. When both mother and baby received ARVs, the MTCT rate was 4.8% at zero to six weeks of age, and 6.6% at six weeks to six months of age.

When both mother and baby had not received ARVs, the MTCT rate was 19.5% at zero to six weeks of age, and 39.8% at six week to six months of age (Anoje et al 2012:304).

4.5.4.5 HIV status of the infant versus mode of delivery

There were 272 vaginal deliveries, four assisted vaginal deliveries, six deliveries by episiotomies and 102 deliveries by caesarean sections. The rate of MTCT among infants delivered vaginally was 7.0% (*f*=19), among those delivered by assisted vaginal delivery it was 25.0% (*f*=1), among those born by episiotomy 16.7% (*f*=1) and among those delivered by caesarean section 2.0% (*f*=2). The rate of MTCT was highest among those infants born by assisted vaginal deliveries. The rate of MTCT was lowest among those infants delivered by caesarean sections. Nevertheless, there was no statistically statistical significant difference in risk of acquiring HIV among infants born vaginally and by caesarean section (RR=3.56; 95%CI=0.84, 15.02).

Even though the RR was greater than one, 95% CI contains one which shows no significant association. Likewise there was no significant difference in risk of acquiring HIV among infants born vaginally and by other kinds of delivery. The only difference in risk of acquiring HIV among infants was noted among those born by assisted vaginal deliveries and caesarean sections (RR=12.75; 95%CI=1.44, 113.10). This implies that infants born by assisted vaginal deliveries were 12.75 fold more at risk of MTCT than those delivered by caesarean sections. Out of four infants delivered by assisted vaginal deliveries, 75% (*f*=03) of their mothers took ART and 25% (*f*=01) took ARV prophylaxis. Out of 102 infants delivered by caesarean sections, 93.1% (*f*=95) of their mothers took ART and 6.9% (*f*=7) took ARV prophylaxis. Hence, more mothers of infants delivered by caesarean sections took ART than those of infants born by other means.

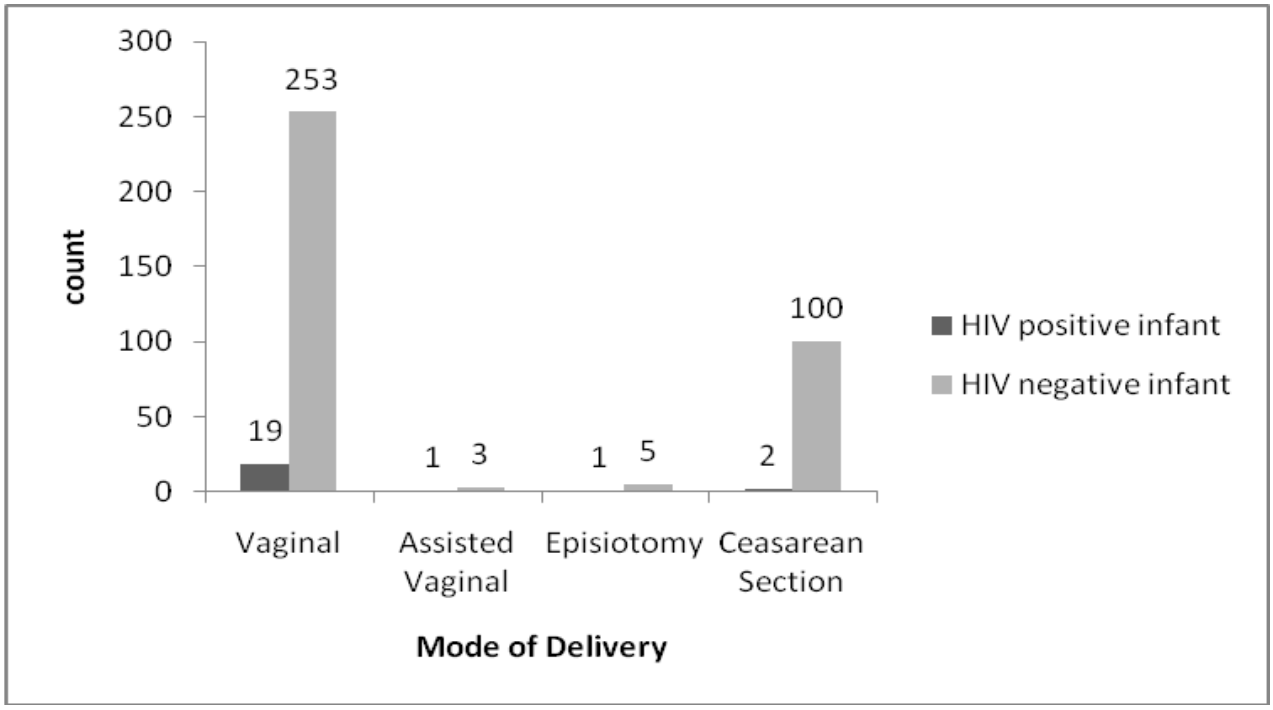


Figure 4.10: HIV status of infant versus mode of delivery (n=384)

Findings were reported by a study conducted in Western Europe, indicated that caesarean sections reduced the chances of MTCT. As many as 5 238 mother-child pairs were enrolled in the study. Among premature infants, the crude MTCT rate among those delivered by elective caesarean section, emergency caesarean sections and vaginal deliveries were 2.8%, 6.2% and 21.6% respectively (European Collaborative Study 2010:370).

However, inconclusive findings have been reported by other studies. A study from Cameroon reported that the majority of the deliveries were normal (91.4%). Mode of delivery, either normal or by caesarean section was not significantly associated with HIV status of the infant ((Tchendjou et al 2010:5). Another study from Thailand reported a similar finding. It included 246 women of whom 72% had normal deliveries, 19% had caesarean sections, 2.8% had vacuum extractions and 0.8% had forceps extractions (Areechokchai et al 2009:9-12).

4.5.4.6 HIV status of the infant versus gestational age at delivery

Among 384 infants, pre-term deliveries at gestational age of less than 37 week were 12.5% (*f*=48), term deliveries 85.4% (*f*=328) and post-term deliveries 2.1% (*f*=8). Among pre-term deliveries, the MTCT rate was 22.9% (*f*=11), among term deliveries the MTCT rate was 3.7% (*f*=12) and among post term deliveries the MTCT rate was 0%. The MTCT rate was highest among those infants who were born pre-term. A chi-square test showed that the OF was higher than the EF by 8.1 for HIV infected infants born at pre-term whereas the OF was lower than the EF by 7.6 for HIV infected infants born at term. This was also statistically significant at 0.05 p value (P<0.01). The risk of acquiring HIV among infants born pre-term was 10.74 fold more than for infants born at term (RR=10.74; 95%CI=5.22, 22.09).

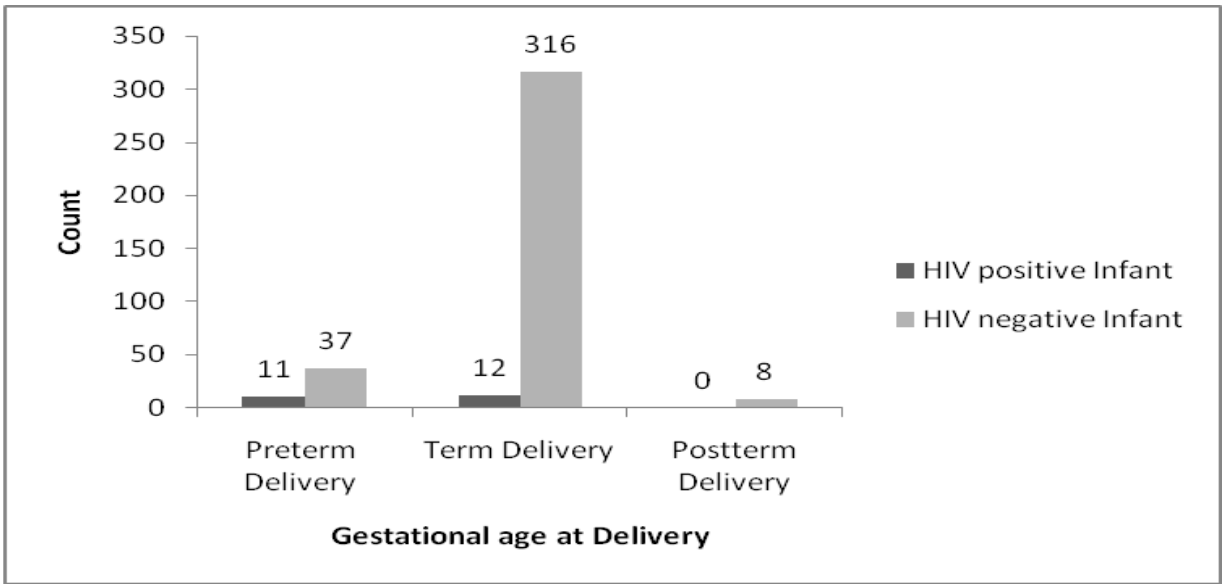


Figure 4.11: HIV status of the infant versus gestational age at delivery (N=384)

Table 4.34: Chi-square test: HIV status of the infants versus gestational age at birth

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	28.100	2	.000
N of Valid Cases	384		

A study from Thailand documented findings about the prevalence of mode of delivery among women who took ART. Among 246 women, 84.6% had full term deliveries and 10.2% pre-term deliveries. Pre-term delivery was significantly higher among pregnant women on combined ART and among those who started PMTCT during labour (Areechokchai et al 2009:9-12). A study from China reported that the gestational age at delivery for infants born from HIV infected women was 39 weeks (range 31-42 weeks). Therefore 9.79% of the deliveries were pre-term and 90.21% were deliveries at full term. Among the pre-term deliveries, one baby became HIV-positive and 18 remained HIV-negative, yielding an HIV infection rate of 5.3%. Among the full term deliveries, 12 became HIV-positive and 163 remained HIV-negative, yielding an HIV infection rate of 6.9% (Lan 2012:405-406). Thus the Chinese study reported a slightly higher incidence of HIV infection among babies born at full term than among prematurely born babies.

4.5.4.7 HIV status of the infant versus maternal age

The median age of the women was 28.1 years, ranging from 19 to 38 years. Many women (*f*=180; 46.9%) fell within the age group of 26-30 years old. On the other hand, few women (1.3%; *f*=5) fell within the 16-20 age group. The MTCT rate among different for various age groups:

- 0% in the 16-20 year group
- 5.4% in the 21-25 year group
- 6.1% in the 26-30 year group
- 4.3% in the 31-35 year group
- 21.4% in the 36-40 year group.

The highest rate of MTCT was observed among those infants born from mothers in the age group of 36-40 and the lowest MTCT rate was among those infants born from mothers in the age group of 16-20. Among mothers with age group of 36-40, 92.9% (*f*=13) took ART and 7.1% (*f*=1) took ARV prophylaxis. Among mothers with age group of 16-20, 60% (*f*=3) took ART and 40% (*f*=2) took ARV prophylaxis. The chi-square test also showed that the OF was higher than the EF by 2.2 among HIV-infected infants whose mothers fell within the age group of 36-40 years and by 0.2 among HIV-infected infants whose mothers' age group was 26-30. On the other hand, the OF was lower than the EF by 0.3 among HIV-infected infants whose mothers fell within the age group of 16-20, by 0.5 among HIV-infected infants whose mothers were 21-25 years old and by 1.6 among HIV-infected infants whose mothers were 31-35 years old. Nevertheless this difference was not statistically significant showing no association between HIV status of the baby and maternal age at 0.05 p value (P=0.149).

Table 4.35: HIV status of the infants versus their mothers' ages (N=384)

Maternal age		**HIV-positive**	**HIV-negative**	**TOTAL**
16-20	%	0	100	100
	f	0	5.0	5.0
21-25	%	5.4	94.6	100
	f	5	87	92
26-30	%	6.1	93.9	100
	f	11	169	180
31-35	%	4.3	95.7	100
	f	4	89	93
36-40	%	21.4	78.6	100
	f	3	11	14
Total	%	6.0	94.0	100
	N	23	361	384

Table 4.36 Chi-square test of HIV status of the infant versus maternal age

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.771	4	.149
N of Valid Cases	384		

A study which was conducted in Zimbabwe reported similar findings as no significant risk of HIV transmission was based on differences of maternal age. The mean maternal age among those who transmitted HIV to their infants was 26.24 years old (*f*=192). The mean maternal age among those who did not transmit HIV to their infants was 26.91 years (*f*=89) (Gumbo et al 2010:719). However, a different finding had been reported from a study conducted in South Africa. The study included a sample size of 658 mother-infant pairs. The overall rate of MTCT was 8.8% (*f*=535). It reported that women aged >25 years were more likely to transmit HIV to their infants. The association between maternal age and MTCT could be a function of the advancement of the disease (Coetzee, Hilderbrand, Boulle, Draoer, Abdullah & Goemaere 2005:491-492).

4.5.4.9 HIV status of the infants versus their APGAR scores

The APGAR scores, presented in this study, were assessed during childbirth and used for evaluating the infants' appearance, pulse rate, grimace, activity and respiration. Each part was assessed from zero to two. A child who got two for every aspect had an APGAR score of 10. The mean APGAR score was 8.44, ranging from 5 to 10. Only six of the neonates got APGAR scores of less than seven. The number of neonates with normal APGAR scores of ≥ 7 were 378. Among the newborns, 52.1% (*f*=200) had recorded APGAR scores of 9, 39.6% (*f*=152) had APGAR scores of 8 and 6.0% (*f*=23) obtained 7. The other scores combined were 2.4% (*f*=9). Among those infants with low APGAR score of less than seven, the MTCT rate was 66.7% (*f*=6). Among infants with

normal APGAR scores, the MTCT rate was 5%. The rate of HIV transmission was higher among those infants with APGAR scores below 7. A chi-square test showed that the OF was higher than the EF by 3.6 among HIV infected infants with low APGAR score while the OF was lower than the EF by 3.6 among HIV-infected infants with normal APGAR scores. This difference was statistically significant showing an association between APGAR score and HIV status of infants at 0.05 p value (P<0.01). Infants with low APGAR scores were 13.26 times more at risk than infants with normal APGAR scores to acquire HIV (RR=13.26; 95%CI=6.48, 27.13).

Table 4.37: HIV status of the infants versus their APGAR scores (N=384)

APGAR score		**HIV status**		**Total**
		HIV-positive	**HIV-negative**	
< 7	%	66.7	33.3	100.0
	f	4	2	6
≥ 7	%	5.0	95.0	100.0
	f	19	359	378
Total	%	6.0	94.0	100.0
	N	23	361	384

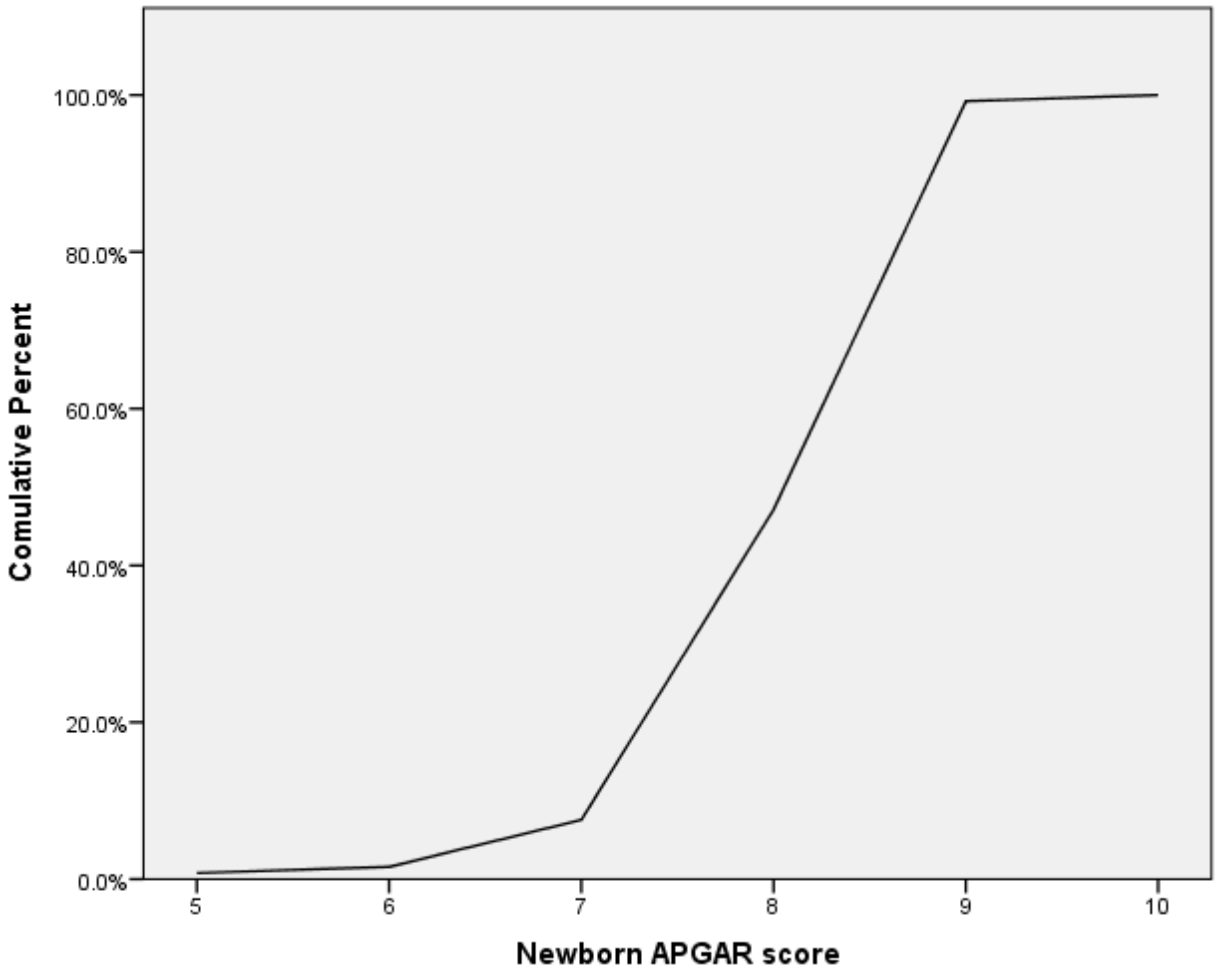


Figure 4.12: Cumulative percent of newborns' APGAR scores (n=384)

Table 4.38: Chi-square test: HIV status of the infants versus APGAR scores (N=384)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39.854	1	.000
N of Valid Cases	384		

A study which was conducted in Kwazulu-Natal, South Africa, reported a different finding as there was no statistically significant difference of APGAR scores among HIV infected and uninfected babies. That study used a total of 55 mother-baby pairs'

peripheral blood samples for analysis. The median APGAR score was nine and 10, one and five minutes after delivery respectively. The pooled rate of transmission of HIV-1 infected mothers to their babies was 0.27 (Moodley 2009:17-18). A study from Poland also reported few infants born from HIV infected mothers got low APGAR scores. The study group consisted of 35 infants. APGAR scores were 10 for 21 infants, 9-7 for 13 infants and only one child scored 5 (Mania, Kemnitz, Mazur-Melewska, Figlerowicz, Cudnoch, Sluzewski, Kowala-Piaskowska & Mozer-Lisewska 2012:181).

A Nigerian study conducted a prospective matched case control study. The study population comprised of 406 women of whom 203 were HIV-positive pregnant women receiving HAART for PMTCT and the other 203 negative controls. Their infants' APGAR scores of less than 7 were comparable between the two groups (Olagbuji, Ezeanochie, Ande & Oboro 2009:991-992). Another study conducted in Nigeria reported similar finding as to APGAR score. A total of 446 baby-mother pairs were followed for minimum period of 6 months and 4.5% of the neonates had an APGAR score of 1-6 and 95.5% had an APGAR score of 7-10 (Chama, Bello, Ajayi, Sarma & Gashau 2010:363-364). Thus studies from different countries did not provide conclusive evidence that HIV-positive women's babies would have APGAR scores below 7.

4.5.4.10 Logistic regression of factors affecting mother to child transmission of HIV

Since the HIV status of the infant is a dichotomous categorical outcome variable (HIV-positive versus HIV-negative), binary logistic regressions were calculated. A forced entry method was used to place all the predictors onto the regression model with significant association to HIV status of the infant. The bivariate analysis indicated that there was a significant difference in the odds of infants being HIV infected if their mothers had nipple fissures compared to those infants whose mothers did not have nipple fissures (COR=16.59; 95%CI=6.32, 43.53). Likewise the odds of an infant being HIV-positive is increased significantly among those with birth weights of less than 2.5kg

as compared to those weighing 4.5kg or more (COR=3.97; 95%CI=1.05, 15.02). This implies that both infants weighing less than 2.5kg and those weighing more than 4.5kg at birth, had a somewhat greater risk of being HIV-positive than infants with normal birth weights ranging from 2.5kg to 4.5 kg.

There was a significant difference as to the odds of an infant becoming HIV infected among those born from mothers who took ARV prophylaxis as compared to those who took ART (COR=3.56; 95%CI=1.43, 8.86). The odds of an infant to contract HIV were significantly reduced among infants who took ARVs as compared those who did not take ARVs (COR=0.88; 95%CI=0.14, 0.56). The odds of an infant to have HIV was significantly higher among those with low APGAR scores (below 7) as compared to those with higher APGAR scores of at least 7 (COR=37.79; 95%CI=6.51, 219.4).

In the multivariate analysis, the odds of an infant with a birth weight of less than 2.5kg to acquire HIV was not significantly different from that for infants with birth weights of 4.5kg or more (AOR=1.78; 95%CI=0.27, 11.10). The odds of an infant to contract HIV was not significantly different among those born from mothers who took ARV prophylaxis as compared to those who were born from mothers who took ART (AOR=3.31; 95%CI=0.87, 12.59). The interaction effect of the exposure variables did not have significant effects on the odds of an infant to acquire HIV (p=695). The logistic regression model correctly predicted the HIV status of 95% of the infants. The model to predict the HIV status of infants used those independent variables that had significant associations in the multivariate analysis.

$Y = -4.87+10.99(X_1)+0.05(X_2)+28.8(X_3)$.

Symbols Y and X represent the dependent and independent variables as: Y=HIV status of the infant; X_1=Nipple fissure; $X_{2=}$ ARVs given for the baby; X_3= APGAR score. Thus the odds of infants born from mothers with nipple fissures to become HIV infected is 10.99 times higher than those infants born from mothers without nipple fissures

(AOR=10.99; 95%CI=3.03, 39.93). The odds of infants who took ARV prophylaxis to become HIV infected is 0.05 times higher than those infants who did not take ARV prophylaxis (AOR=0.05; 95%CI=0.002, 1.02). In other words ARV prophylaxis given to the infants protected them from HIV infection. The odds of infants with low APGAR scores to contract HIV was 28.8 times higher than for infants with high APGAR scores (AOR=28.8; 95%CI= 2.88, 287.7).

Table 4.39: Bivariate logistic regression: factors affecting MTCT (N=384)

Exposure Variables		**HIV status of the Infant**		**COR**	**p-value**	**95%(CI)**
		Positive	**Negative**			
Nipple fissure	Present	10	16	16.59	0.00	(6.32, 43.53)
	Absent	13	345			
Newborn weight	<2.5kg	3	17	3.97	0.043	(1.05, 15.02)
	2.5-4.5kg	15	337	0.25	0.10	(0.05, 1.33)
	>4.5kg	5	7			
ARVs given for the mother	ARV Proph.	8	47	3.56	0.006	(1.43, 8.86)
	ART	15	314			
ARV given for the infant	Yes	21	358	0.88	0.01	(0.14, 0.56)
	No	2	3			
APGAR score	<7	4	2	37.79	0.00	(6.51, 219.4)
	≥7	19	359			

Table 4.40: Multivariate logistic regression: factors affecting MTCT (N=384)

Exposure Variables		HIV status of the Infant		AOR	p-value	95%(CI)
		Positive	Negative			
Nipple fissure	Present	10	16	10.99	0.00	(3.03, 39.93)
	Absent	13	345			
Newborn weight	<2.5kg	3	17	1.78	0.55	(0.27, 11.10)
	2.5-4.5kg	15	337	0.117	0.06	(0.12, 1.13)
	>4.5kg	5	7			
ARVs given for the mother	ARV Proph.	8	47	3.31	0.08	(0.87, 12.59)
	ART	15	314			
ARV given for the infant	Yes	21	358	0.045	0.052	(0.002, 1.02)
	No	2	3			
APGAR score	<7	4	2	28.80	0.004	(2.88, 287.7)
	≥7	19	359			
Interaction				0.45	0.695	(0.01, 23.88)

4.6 SUMMARY

In this chapter data of 384 mother–infant pairs were analysed, presented and discussed. At the beginning socio-demographic features of the mothers were analysed. This was followed by factors affecting PMTCT service utilisation. These factors were analysed based on the major tenets of HBM. Perceived susceptibility was analysed in line with women's HIV status knowledge at presentation for ANC versus educational

levels, marital status and employment status. The highest percentage of women who attended university/college level education, 94.6% (*f*=53) knew their HIV status before presentation for ANC. Percentage of women based on their marital status from highest to lowest who knew their HIV status before presentation for ANC were widows (100%), living in union (90.0%), married (86.5%), never married (80.0%), separated (66.7%) and divorced (0%). The highest percentage of women who knew their HIV status at presentation for ANC based on employment status were self-employed (19.0%: *f*=73).

Perceived severity was assessed in relation to HIV status of respondents' partners versus awareness of respondents' partners that they were using PMTCT services. Out of 313 partners who were HIV-positive, 97.8% (*f*=306) were aware of their partners' utilisation of PMTCT services while 2.2% (*f*=7) did not know. Perceived barriers were explained in relation to marital status versus disclosure of HIV status, stigma and discrimination and employment status versus monthly income. Most of the women who used PMTCT services were married and most respondents attained grades 9-12 educational levels. The respondents earned a monthly income whether they were employed or not. They experienced limited stigma and discrimination.

PMTCT services were also evaluated in relation to HCT, ARVs for PMTCT and infant feeding counseling and practices. Most of the women used HCT services and ethical standards were maintained such as privacy and confidentiality. Approximately 20% of the respondents initiated ART before they were eligible to do so and 25% were receiving ARV prophylaxis when they were in fact eligible for ART. Most respondents preferred exclusive breast feeding. Patients who used PMTCT services in Addis Ababa were satisfied with the infrastructure, accessibility, availability and affordability of PMTCT services as well as with the nurses/midwives.

Health outcomes of the mothers were assessed using CD4 counts, WHO stage and illnesses diagnosed during PMTCT services. CD4 counts increased during the course of PMTCT but this was not complemented by improvements in the WHO clinical stages.

Different illnesses had been diagnosed at enrollment and during follow up of PMTCT services. The average rate of MTCT was 6.0% which was higher than the WHO recommendation of 5.0% for breastfed infants. Significant factors that could affect the rate of MTCT were nipple fissures, ARV prophylaxis versus ART given to the mothers, infants' ARV prophylaxis, infants' birth weights, gestational age and APGAR scores.

The next chapter focuses on conclusions, limitations and recommendations so that the final objective of the study can be addressed by providing recommendations based on the findings of the study.

CHAPTER 5

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter presents a summary of the study's findings, the conclusions based on these findings, limitations of the study and recommendations for improving PMTCT service in Addis Ababa and for conducting future studies. Making recommendations to enhance women's utilisation of PMTCT services in Addis Ababa was one of the objectives of the study, which will be addressed in this chapter, as the other objectives were addressed in chapter 4.

This study used a quantitative research approach with a retrospective cohort design. The data were collected retrospectively from 384 mother-infant pairs who used PMTCT services at 12 healthcare centers in Addis Ababa. Both structured interviews and document reviews were used to gather data. Stratified random sampling was used to sample individual women-infant pairs who used PMTCT services. The health facilities comprised public hospitals, public health centers and private hospitals. Both descriptive and inferential statistics were used during data analysis.

5.2 SUMMARY OF RESEARCH FINDINGS

The research findings, as discussed in Chapter 4, are summarised in this section.

5.2.1 Summary of the respondents' demographic characteristics

The largest number of respondents (46.9%; *f*=180) fell within the 26-30 year age group, but almost all (95.1%; *f*=365) participating mothers' ages ranged from 21 to 35. Most respondents (88.5%; *f*=340) were married, and belonged to Christian religions (81.0%; *f*=311). Only 37.8% (*f*=145) had attained grades 9-12 while 14.6% (*f*=56) had acquired university or college education. This implies that 47.7% (*f*=183) of the respondents had no schooling or only progressed up to grade 8 at school. The respondents' average monthly income was 2533.7birr but ranged from 100 to 9200birr (when 1USD was equivalent to 19birr). There was a positive correlation between the respondents' monthly incomes and their levels of qualifiations (ANOVA $P<0.01$).

The baseline CD4 counts of 69.5% (*f*=267) of the respondents was below 350 cells/mm^3, but this percentage dropped to 58.3% (*f*=224) for the most recently recorded CD counts. The percentage of respondents with CD4 counts greater than 350 cells/mm^3 increased from 30.5% (*f*=117) at baseline to 41.7% (*f*=160) at the most recently available CD4 counts.

Before their initial attendance of the ANC clinic as many as 84.9% (*f*=326) knew about their HIV-positive status, while 15.1% (*f*=59) were unaware of their HIV status. Reportedly 81.5% (*f*=313) of the respondents' partners were also HIV-positive.

5.2.2 Factors affecting the utilisation of PMTCT services in Addis Ababa

The different factors affecting the utilisation of PMTCT services in Addis Ababa were discussed in section 4.3 of this thesis according to the major tenets of HBM. These tenets are perceived susceptibility, perceived severity and perceived barriers.

5.2.1.1 Perceived susceptibility

As can be seen from table 4.1, only 5.7% (*f*=22) of the respondents never attended school. The others (94.3%; *f*=402) attained some level of education. Women with higher levels of education (grades 9-12 and university/college education) were more likely to know their HIV status before presenting at ANC clinics than women with lower educational levels (no schooling and up to level 8 schooling). Thus women with higher levels of education had a more realistic perceived susceptibility of transmitting HIV to their infants, and thus an increased likelihood of using PMTCT services, than women with lower levels of education.

Most respondents (88.5%; *f*=340) were married. Women who had male partners (being married, being widowed or living in union without being married) were more likely to know their HIV status at presentation for ANC than women without male partners. Although this correlation was statistically significant, Cramer's V (V=0.216) was weak. Nevertheless this finding seemed to indicate that women with male partners perceived themselves to be more susceptible to MTCT, and thus to use PMTCT services, than those without male partners.

The employment status of the respondents was classified into full time employed (39.6%; *f*=152); part time employed (7.3%; *f*=28); self-employed (19.0%; *f*=73); and unemployed (34.1%; *f*=131). The highest percentage of self-employed (91.8%; *f*=67) women knew their HIV status before presentation for ANC while 88.5% (*f*=116) of the unemployed, 82.9% (*f*=126) of the full time employed and 60.7% (*f*=17) of the part-time employed women had such knowledge. This could be attributed to self-employed and unemployed women's greater flexibility of their free time to attend health services. This finding could also be interpreted as indicating that self-employed women had a higher perceived susceptibility of MTCT than women from other employment categories, and thus a greater likelihood of implementing actions to prevent their infants from being HIV-positive by using PMTCT services.

5.2.1.2 Perceived severity

Perceived severity was assessed based on the possible consequences of their HIV-positive status, as perceived by the mothers. One of the consequences is transmission of HIV to their partners. Most of the respondents' partners were HIV-positive (81.5%; *f*=313). As can be seen from figure 4.1, 97.8% (*f*=306) of the 313 respondents' positive partners knew that the women used PMTCT services, while 18.6% (*f*=8) of those with unknown HIV status and, 92.9% (*f*=29) of the HIV-negative partners had such knowledge. There was an association between awareness of the partners' HIV status and the partners' knowledge that the women used PMTCT services. While more than 90% of the partners' with known HIV status were aware of the respondents' utilisation of PMTCT services, 18.6% (*f*=8) of partners with unknown HIV status had such knowledge.

This finding indicated that couples' HIV testing should be promoted as knowledge of their partners' HIV status (whether positive or negative) seemed to enable couples to perceive the severity of the consequences of HIV for themselves and for their children. Such perceived severity, shared by both partners, could enable more pregnant women to utilise PMTCT services.

5.2.1.3 Perceived barriers

Perceived barriers were examined in terms of obstacles that could make the utilisation of PMTCT services difficult for the women.

5.2.1.3.1 Marital status

Most respondents were married (88.5%; *f*=340). Married women were more likely to disclose their HIV-positive status and to use PMTCT services than unmarried women.

By disclosing their HIV status, it becomes possible to get support and encouragement to use PMTCT services.

5.2.1.3.2 Stigma and discrimination

Stigma and discrimination encountered by the respondents was classified as perceived stigma, internalised stigma and discrimination. Perceived stigma and discrimination deal with negative attitudes and practices by third persons towards these women. Internalised stigma concerned self-stigmatisation by the women. Section 4.3.3.2 of this thesis indicates that the most prevalent kind of stigma was internalised stigma. This implies that the women were stigmatising themselves as 66.7% (*f*=256) of the women felt worthless, 60.7% (*f*=256). 233) felt guilty and 36.7% (*f*=141) isolated themselves from friends or family during the preceding 12 months because they were HIV-positive.

Internalised stigmatisation posed a greater barrier to utilise PMTCT services than perceived stigma and discrimination. Thus the respondents' own perceptions influenced their utilisation of PMTCT services to a greater extent than those of their friends, family members and communities.

Women who reported internalised stigma had lower CD4 counts compared to those who did not face such stigma but this was not statistically significant.

5.2.1.3.3 Monthly incomes

Self-employed women earned higher incomes than unemployed or full time or part time employed women. These higher incomes could have afforded easier access to the healthcare facilities, explaining why more self-employed women, than the other categories of women, knew their HIV-positive status when they arrived at the ANC clinics. Economic constraints might have posed barriers to some respondents to access

healthcare facilities for their initial HIV-positive diagnoses, but all respondents managed to access the PMTCT services, irrespective of their financial incomes.

5.3.2 Process of PMTCT services in Addis Ababa

PMTCT services in Addis Ababa were discussed in section 4.4. The services discussed included HIV testing and counseling, ARVs for PMTCT and infant feeding counseling and practices.

5.3.2.1 HIV testing and counseling of pregnant women

In this study, the majority of the women (84.9%; *f*=326) knew their HIV status when they presented at ANC clinics and 58.9% (*f*=192) had received the pre-test information during group sessions. Out of those 58 women who did not know their HIV status when presenting themselves at the ANC clinics, 72.4% (*f*=42) received their pre-test information during individual sessions. Most respondents indicated that they could ask questions (97.7%; *f*=375) and that they had the right to refuse HIV testing (99.0%; *f*=380) during the pre-test information sessions. Almost all women (99.7%; *f*=383) believed that their privacy and confidentiality were maintained during the pre-test information sessions and 99.5% (*f*=382) indicated this to had been the case during HIV testing and counseling. From these responses it is evident the health care providers followed the national guideline during the provision of HIV testing and counseling. This is the case because Ethiopia's FMOH recommends three approaches to be followed as pre-test information. These are group sessions, individual sessions and couples' sessions. Individuals can ask questions and also have the right to refuse HIV testing without compromising their healthcare services (FMOH 2011:11-12).

5.3.2.2 Anti-retrovirals prescribed for the prevention of mother-to-child transmission of HIV

ARV prophylaxis or ART should be prescribed to women at PMTCT services according to the FMOH's guidelines by considering each woman's CD4 count and WHO stage.

5.3.2.2.1 Treatment prescribed in relation to respondents' CD4 counts

Table 4.16 shows the ARV interventions for PMTCT in terms of the respondents' CD4 counts and WHO stages. Respondents were expected to receive ARV prophylaxis when they were not eligible to receive ART as long as their CD4 counts were ≥350cell/mm^3. Women with CD4 counts <350cell/mm^3 required ART, in terms of the WHO guidelines (WHO 2013).

Out of 384 respondents, only 14.3% (*f*=55) received ARVs (prophylaxis) and 85.7% (*f*=329) received ART (treatment). However, out of the 55 respondents on ARV prophylaxis, 25.5% (*f*=14) started taking ARVs when their CD4 counts were below 350 cells/mm^3. Thus 25.5% of those respondents receiving ARV prophylaxis were supposed to receive ART. On the other hand 20.4% (*f*=67) of the 329 women receiving ART, were supposed to receive ARV prophylaxis and not treatment.

This finding indicates that the healthcare workers did not adhere to the FOH guidelines pertaining to providing ARV prophylaxis or ART according to the respondents' CD4 counts. However, each patient's WHO stage of the disease needs to be considered in addition to the CD4 count when deciding whether to prescribe ARV prophylaxis or ART.

Nevertheless, 25.5% (*f*=14) received ARV prophylaxis when they should have received ART in relation to their CD4 counts. Thus the healthcare workers did not follow the WHO's (2013:94) guidelines in prescribing ARV prophylaxis instead of ART to these 14 respondents with CD4 counts below 350mm^3.

5.3.2.2.2 Treatment prescribed in relation to respondents' WHO stage of illness

In terms of the WHO (2013:94) guideline ART should be prescribed for all persons with the WHO clinical stage of III of IV, regardless of the CD4 count. In this study all respondents (100%; *f*=7) in WHO stage IV received ART and of those in stage III 95.7% (*f*=89) received ART.

Thus only 4.3% (*f*=4) of respondents with WHO stage III disease received ARV prophylaxis instead of ART. The healthcare workers did not follow the WHO (2013:94) guideline in prescribing ARVs to these four respondents.

5.3.2.3 Infant feeding options

The three infant feeding options used by the respondents were discussed in section 4.4.3 of this thesis. The respondents received counseling from the healthcare workers about exclusive breast feeding (83.1%; *f*=319), mixed feeding (10.9%; *f*=42) and replacement feeding (5.5%; *f*=21).

Most respondents (87.0%; *f*=334) used exclusive breast feeding during the first six months of their infants' lives, while 3.0% (*f*=11) used mixed feeding and 10.0% (*f*=39) used replacement feeding such as cow's milk, formula feeds and/or porridge. Most respondents (98.5%; *f*=323) were counseled by nurses about their infant feeding options.

The WHO (2010b:6) recommends that infants of HIV-positive mothers should be exclusively breast fed until six months of age and then complementary feeding should be introduced. Based on the current study's findings, most respondents (87.0%; *f*=334) used exclusive breast feeding for the first six months of their infants' lives. Thus the healthcare workers seemed to meet the WHO recommendation concerning infant feeding in the majority of cases.

5.3.3 Outcomes of the utilisation of PMTCT services

The different outcomes of the utilisation of PMTCT services include patients' satisfaction, health status of the mothers and HIV status of the infants. Factors affecting MTCT are also summarised in this section.

5.3.3.1 Respondents' satisfaction levels with PMTCT services

Respondents' satisfaction levels were assessed for different domains, namely infrastructure, accessibility and availability of PMTCT services, affordability of PMTCT services and their perceptions about the nurses/midwives. The highest level of patients' satisfaction was found towards expectation about the infrastructure with a mean score of 3.67 out of 5.

The dissatisfied patients (with the health facilities' cleanliness and attractiveness) had significantly higher CD4 counts than the satisfied patients, but this was a weak association according to the Bonferroni test (P=0.076; 95%CI=317, 8). As patient's clinical conditions worsened (according to the WHO stages), their satisfaction with the cleanliness and attractiveness of the facilities decreased significantly (P<0.01, but Cramer's V showed a weak association (V=0.235).

5.3.3.1.1 Expectations about the infrastructure

As can be seen from table 4.18, most respondents were very satisfied or satisfied with seven expectations about the infrastructure. They were generally satisfied with the cleanliness, attractiveness, comfort and safety of the facility. The only aspect with which many respondents were dissatisfied was the reported wheelchair unfriendliness of the healthcare facilities. However, as most respondents (96.4%; *f*=370 – see table 4.2) were up to 35 years old, the reported lack of wheelchair friendliness at the

healthcare facilities could not have posed a major barrier to accessing PMTCT services. (However, no questions were asked about the respondents' possible disabilities so no definite conclusions could be drawn about this aspect).

5.3.3.1.2 Accessibility and availability of PMTCT services

As can be seen from table 4.19, most respondents (89.1%; *f*=342), reported that it took them 30 minutes or longer to reach the PMTCT clinic. Most respondents (82.6%; *f*=317) indicated that PMTCT services were provided at convenient hours and that they could access referral services when required (93.0%; *f*=357). However, 34.4% (*f*=132) indicated that the clinics were sometimes unable to supply their medications when the clinics' medicine stocks were depleted.

Thus most respondents were satisfied with the PMTCT services, but had to spend 30 minutes or longer to reach facilities and more than 34.4% (*f*=132) indicated that clinics could not always supply their prescribed medicines.

Those respondents, who were very satisfied with the accessibility and availability of PMTCT facilities, had higher CD4 counts than the dissatisfied patients, statistically significant at P=0.05 (ANOVA). As the respondents' clinical conditions deteriorated, the number of patients satisfied with the services also declined, significant at P=0.002, but Camer's V showed a weak association (V=0.162).

5.3.3.1.3 Affordability of PMTCT services

The affordability of PMTCT services was discussed in section 4.5.1.3. Of the respondents, 61.2% (*f*=235) agreed that they could afford to pay the fees for the PMTCT services whereas 26.6% (*f*=102) disagreed while 12.2% (*f*= 47) were uncertain. Although 61.2% (*f*=235) of the respondents were satisfied with the affordability but 26.6% (*f*=102) were dissatisfied with this aspect of the PMTCT services. However, as

most respondents (85.7%; *f*=329) indicated that they received healthcare services even if they were unable to pay for such services, the reported dissatisfaction of some respondents (26.6%; *f*=102) with the affordability of healthcare services could not be explained. Providing free PMCTCT services to women unable to pay is in line with Ethiopia's national policy to enhance free services for key maternal and child health issues (FMOH 2010b:4).

Most respondents (87.3%; *f*=335) regarded the care received to be worth the money they paid and also that the treatment was acceptable (96.9%; *f*=372). Few respondents indicated that healthcare workers discriminated against patients on the basis of race (4.2%; *f*=16), age (3.1%; *f*=12), or status (6.8%; *f*=26).

The very dissatisfied patients had higher CD4 counts than others (P=0.036). As the respondents' clinical conditions deteriorated, the number of satisfied patients decreased per WHO stage (P=0.06 and V=0.133).

5.3.3.1.4 Respondents' perceptions about nurses/midwives

Most respondents (91.1%; *f*=350) agreed that they felt comfortable talking to nurses, asking nurses questions (96.9%; *f*=372) and that nurses treated patients respectfully (85.4%; *f*=328). However, only 68.8% (*f*=264) of the patients reported that nurses/midwives explained the patients' problems, indicating that 31.2% (*f*=120) of the respondents reportedly did not get such explanations from nurses/midwives. As many as 51.6% (*f*=198) of patients agreed that there were too few nurses/midwives in the health facilities. In addition, 39.6% (*f*=152) of the respondents indicated that nurses/midwives sometimes ignored some of the patients' questions.

There was no significant correlation between respondents' perceptions of nurses/midwives and their most recent CD4 cell counts. The number of satisfied respondents decreased as their clinical conditions deteriorated.

5.3.3.2 Respondents' health outcomes

As discussed in section 4.5.2 of this thesis, the respondents' health outcomes were measured using CD4 counts, WHO disease staging and other illnesses diagnosed while using MTCT services. In this study these parameters were obtained from the patients' charts. The number of respondents, for whom both parameters had been documented, decreased overtime.

- *CD4 counts*

The mean (average) CD4 count increased from the first measurement (302.1cells/mm^3) up to the sixth measurement (414cells/mm^3), showing an average increase of 111.9cells/mm^3 which was statistically significant (per repeated measure ANOVA of P=0.008). However, this finding might have been confounded by the fact that only 5.7% (*f*=22) of the respondents' CD4 counts were recorded for six times. This implies that 94.3% (*f*=362) of the respondents' CD4 counts were missing at their sixth visit to the PMTCT facility.

- *WHO disease stage*

Despite the increased mean CD4 count, indicating immunological recovery, this did not result in improved clinical health outcomes of the respondents. This was the case because the percentage of women in WHO clinical stages III and IV did not decrease from the first to the sixth visits. This was probably the case because the CD4 counts did not increase sufficiently (to at least 500cells/mm^3) which would be the minimum required CD4 levels to restore the clinical health status of the respondents.

However, the small number of records of both CD4 counts and WHO stages of the respondents might have impacted on these findings. At the sixth visit, only 31.3% (*f*=120) of the respondents' WHO stages were recorded.

- *ARV prophylaxis versus ART in relation to maternal health*

Out of 384 respondents, only 14.3% (*f*=55) received ARVs and 85.7% (*f*=329) received ART. The mean CD4 count increased by 62 cells/mm^3 (from 267 to 329) among respondents on ART compared but only by nine cells/mm^3 (from 471 to 480) among those on ARV prophylaxis. Thus the average increment was almost seven times higher among those who took ART as compared to those who took ARV prophylaxis.

There was a statistically significant positive correlation ($r=0.613$, $P<0.01$) between the respondents' CD4 counts at commencement of treatment versus their most recent CD4 counts. Women who started ARVs with higher CD4 counts had higher most recent CD4 counts, irrespective of whether they were on ARV prophylaxis or on ART.

- *Other illnesses diagnosed during the PMTCT programme*

At enrollment into the PMTCT programme, oral candidiasis was the most prevalent illness reported by 89 respondents followed by 39 with pulmonary tuberculosis. The number of women diagnosed with oral candidiasis, at enrollment, decreased by 76 during follow up visits. All tuberculosis cases were cured and no new tuberculosis case occurred although 22 cases of upper respiratory tract infections were recorded during follow-up visits. The most prevalent complaint during follow-up visits was urinary tract infection (*f*=25).

Overall, maternal health status seemed to improve in terms of other illnesses by using PMTCT services, probably attributable to the respondents' increased CD4 counts.

- *HIV status of respondents' infants*

As presented in section 4.5.3, the crude MTCT rate was 6.0% (*f*=23). The WHO (2010a:12) maintains that PMTCT interventions could reduce MTCT to less than 5% in breast feeding populations and to less than 2% in non-breast feeding populations. In the current study 87.0% (*f*=334) of the respondents exclusively breast fed their babies while 2.9% (*f*=11) used mixed feeding (and only 10.2% or 39 mothers used replacement infant feeding). This implied that overall 89.9% (*f*=345) of the respondents were breast feeding and that the crude MTCT rate was 6.0%. It was impossible to calculate the MTCT rate before and after six weeks of age. This was the case because 132 infants were not DNA-PCR tested before the age of six weeks and 236 infants were not tested in this way after six weeks of age.

5.3.3.3 Factors affecting mother to child transmission of HIV in Addis Ababa

Nine variables had been analysed to assess factors affecting the rate of MTCT as discussed in section 4.5.4.

- *Infants' HIV status versus presence of mothers' nipple fissures*

The rate of MTCT among respondents who had nipple fissures was 38.5% (*f*=11) which was higher than 3.6% (*f*=13) among those without nipple fissures. The strength of association was also very high (RR=10.59). Nipple fissures increased the risk for MTCT, implying that an infant whose mother had nipple fissures had a 10.59 greater risk of becoming HIV-positive than an infant whose mother had no nipple fissures.

- *Infants' HIV status versus gender*

There were 185 male infants of whom 14 (7.6%) were HIV-positive. Out of the 199 female infants, nine (4.5%) were HIV-positive, indicating a higher MTCT rate among the male infants than among female infants. However, this difference was not statistically significant (P=0.209), implying that gender did not affect the infants' risk of MTCT.

- *Infants' HIV status versus birth weight*

Table 4.31 indicates that most infants (fell within the normal birth weight range of 2.5kg to 4.5kg (91.7%; *f*=352). The MTCT rate was highest among those infants who were overweight during birth (41.7%; *f*=5) and followed by low birth weight of less than 2.5kg (15%; *f*=85). Birth weight, above and below the normal range (2.5kg-4.5kg) increased the risk of MTCT.

- *Infants' HIV status versus ARVs taken by the mother*

The 2011 national PMTCT guideline of Ethiopia recommends ARV prophylaxis for the HIV infected pregnant woman as early as 14 weeks of gestation if she is not eligible for ART (FMOH 2011:28-29). In this study most respondents were eligible for and received ART (85.7%; *f*=329). Those respondents who received ART had a lower MTCT rate (4.5%; *f*=15) than the MTCT rate of 14.5% (*f*=8) of those who received ARV prophylaxis (RR=3.19; 95%CI=1.42, 7.17). Thus the infants of respondents on ARV prophylaxis had a 3.19 greater risk of being HIV-positive than the infants of respondents using ART.

- *HIV status versus ARV prophylaxis administered to the infant*

Most of the respondents' infants (98.7%; *f*=379) received ARV prophylaxis, implying that only 1.3% (*f*=5) did not receive ARVs. Out of the 379 infants who received ARV

prophylaxis, most (99.2% (*f*=376) received NVP. The MTCT rate was significantly higher among those who did not receive ARV prophylaxis (40.0%; *f*=2) as compared to those who had done so (5.5%; *f*=21). Providing infants with ARV prophylaxis reduced the risk of MTCT (RR=7.22; 95%=2.28, 22.83).

- *Infants' HIV status versus delivery method*

Most babies were delivered normally (70.8%; *f*=272). Only four (1.0%) respondents had assisted vaginal deliveries and one of these babies was HIV-positive. The MTCT rate among the 272 normally delivered babies was 7.0% and among those 102 babies delivered by caesarean sections it was 2.0% (*f*=2). Nevertheless there was no significant risk difference among those born vaginally and by ceasarean section (RR=3.56; 95%CI=0.84, 15.02).

- *Infants' HIV status versus gestational age at delivery*

Most babies (85.4%; *f*=328) were delivered at full term, but 12.5% (*f*=48) were delivered pre-term at less than 37 weeks' gestation and 2.1% (*f*=8) were delivered post-term. The MTCT rate was 22.9% (*f*=11) among pre-term delivered infants while it was 3.7% (*f*=12) among full term and 0% among post term babies. Babies delivered pre-term had a 10.74 times greater risk of MTCT than babies delivered at full term (RR=10.74; 95%CI=5.22, 22.09).

- *Infants' HIV status versus maternal age*

The highest MTCT rate of 21.4% was recorded among the respondents aged 36-40 (*f*=14) followed by the group aged 26-30 (*f*=180) with a MTCT rate of 6.1% while the MTCT rate was 0% among respondents aged 20 or younger. No statistical significant association was shown between maternal age group and HIV status of the infant by Fisher's exact test (P=0.149). This finding might have been affected by the small

number of respondents aged 36 or older and 20 or younger. Nevertheless increased maternal aged seemed to be correlated with an increased MTCT risk.

- *Infants' HIV status versus their APGAR scores*

Most neonates (98.4%; *f*=378) had normal APGAR scores of ≥7 (n=378). As shown in table 4.37, the MTCT rate was higher (66.7%; *f*=4) among those infants with APGAR scores below seven than among infants with APGAR scores of seven or higher (6.0%; *f*=23). This finding might have been influenced by the small number of infants (*f*=6) who had APGAR scores below 7. However, these infants with such lower APGAR scores had a relative risk of 13.26 of MTCT compared to those infants who had APGAR scores of 7 or more.

5.4 CONCLUSIONS

The conclusions are based on the findings of the current study as presented in chapter 4 and summarised in sections 5.2 and 5.3 of this chapter. The statistical findings agreed for descriptive statistics using percentages and frequencies, chi square calculations, relative risk determinations. Calculated logistic regressions, including bivariate and multivariate analyses (see section 4.5.4.10) supported the descriptive statistics and were thus not emphasised in this final chapter.

5.4.1 Conclusions: factors affecting the utilisation of PMTCT services in Addis Ababa

These factors affecting the respondents' utilisation of PMTCT services in Addis Ababa were grouped according to the major tenets of the HBM, namely perceived susceptibility, perceived severity and perceived barriers.

5.4.1.1 Perceived susceptibility

Respondents, who had more realistic perceptions of the risk of MTCT and were more likely to know their HIV-positive status before attending the ANC clinics, were those who:

- had higher levels of education
- had male partners
- were self-employed.

5.4.1.2 Perceived severity

Most respondents' male partners who knew their own HIV status (more than 90.0% whether positive or negative), were aware of the fact that the respondents utilised PMTCT services but only the minority (18.6%) of male partners with unknown HIV status had such knowledge.

5.4.1.3 Perceived barriers

Barriers that made the utilisation of PMTCT services difficult, included:

- being unmarried
- stigma (but internalised stigma to a greater extent than perceived stigma and discrimination)
- economic constraints.

5.4.2 Evaluation of PMTCT services in Addis Ababa

- *HIV testing and counseling*

The health care workers reportedly followed Ethiopia's guidelines when providing HIV testing and counselling services to the respondents. Privacy and confidentiality were

maintained, the respondents could ask questions and knew that they could refuse to be tested.

- *ARV prophylaxis versus ART*

Ethiopia's guidelines were not strictly followed by health care workers when prescribing ARV prophylaxis or ART to pregnant women. As the CD4 counts of 25.5% of the respondents on ARV prophylaxis were below 350cells/mm^3, they should have been on ART. Of the respondents on ART, 20.4% should have received ARV prophylaxis.

- *WHO stage of illness*

The health care workers did not follow the WHO (2013:94) guideline in prescribing ART as four respondents in WHO stage III did not receive ART.

5.4.3 Infant feeding

The WHO (2010b:6) guidelines were applied because 87% of respondents used exclusive breastfeeding for the first six months of their infants' lives.

5.4.4 Respondents' satisfaction with PMTCT services

The respondents were satisfied with the cleanliness, attractiveness, comfort and safety of the health facilities but mentioned that the clinics were not wheelchair friendly.

Although most respondents required more than 30 minutes to reach a PMTCT clinic, they regarded the clinic hours to be convenient.

Clinics could not always supply medications (ARVs) to the respondents (mentioned by 34.4%).

Most respondents could afford to pay for their PMTCT services, but knew that they could access these services free of charge if they should be unable to pay. This is according to Ethiopia's guidelines (FMOH 2010b:4).

The respondents had favourable perceptions about the nurses/midwives although they considered the number of nurses/midwives to be too small. Some respondents (39.6%) indicated that nuses/midwives sometimes ignored patients' questions.

There were no consistent correlations between respondents' levels of satisfaction with the PMTCT services and their CD4 counts, but generally their satisfaction levels declined as their WHO stage of the disease deteriorated.

5.4.5 Respondents' health outcomes

The respondents' average CD4 count increased statistically significantly (from a baseline of 302.1cells/mm^3 to 414cells/mm^3 at the most recent results, showing an average increase of 111.9cells/mm^3).

Improved clinical health outcomes (improved WHO stage of illness) did not occur, despite the improved CD4 counts. (This might be due to the fact that the CD4 cell counts did not increase to at least 500cells/mm^3).

The respondents mean CD4 cell counts increased by 62 if they were on ART compared to an average increase of 9 if they were on ARV prophylaxis.

Irrespective of whether the respondents were on ARV prophylaxis or on ART, women who started treatment with higher CD4 counts had higher most recent CD4 counts than others.

The most common other illnesses among the respondents were oral candidiasis and pulmonary tuberculosis which were treated effectively.

The crude MTCT rate was 6.0%.

5.4.6 Factors affecting the MTCT rate

These factors were discussed in section 4.5.4 and summarised in section 5.3.3.4 of this thesis. The following conclusion are based on these previously discussed and summarised findings, indicating that the MTCT rate was:

- higher among infants whose mothers had nipple fissures (RR10.59)
- not significantly affected by the infants' gender because there was no significant difference in the MTCT rate between males and females
- higher amongst infants with birth weights above and below the normal range of 2.5-4.5kg
- higher among infants whose mothers were on ARV prophylaxis compared to infants whose mothers were on ART
- significantly higher among infants who did not receive ARV prophylaxis than among those who received such medication (RR7.22)
- not significantly different for infants born by caesarian section compared to those who had normal vaginal deliveries
- significantly higher for babies born preterm than for babies born full term or post term (RR10.74)
- not statistically correlated with the mothers' ages
- significantly higher among infants with APGAR scores below 7 (RR13.26)

5.5 RECOMMENDATIONS

In this section recommendations will be provided based on the research findings and conclusions. One of the research objectives was to make recommendations to enhance women's utilisation of PMTCT services in Addis Ababa. Hence, this objective will be addressed in this section.

5.5.1 Recommendations to address women's perceived susceptibility, perceived severity and perceived barriers to utilise PMTCT services

5.5.1.1 Perceived susceptibility

Better education for women should be promoted. Women with higher levels of education earned higher incomes, were self-employed and could make independent decisions (about HIV testing and about the utilisation of PMTCT services). HIV testing and counselling directed at couples should continue as most respondents had male partners. However, these services should also target women without male partners.

5.5.1.2 Perceived severity

The male partners of all women attending HIV and/or ANC clinics should know their (the men's) HIV status. This will enable HIV prevention and PMTCT actions to be taken to reduce the severity (reduced risk of MTCT) to the infant and to reduce the risk of infection or re-infection of both partners, reducing the severity of HIV for the partners.

5.5.1.3 Perceived barriers

HIV testing and counselling and the availability of PMTCT services must be promoted among all women irrespective of their marital status.

Health education efforts must address issues of stigma and discrimination, but especially self-stigmatisation among HIV-positive women, to enable more women to use PMTCT services.

Women must be informed about the availability of free PMTCT services if they cannot afford to pay for these services.

5.5.2 Recommendations to improve the PMTCT services in Addis Ababa

Health care workers must continue to adhere to the national guidelines during HIV testing and counselling, and for maintaining privacy and confidentiality during these procedures.

The health care workers must adhere to the national guidelines (concerning CD4 counts and the WHO stage of illness) when prescribing ARV prophylaxis versus ART during PMTCT. Prescribing ARV prophylaxis, when ART should have been prescribed, will not provide the maximum benefits to the pregnant woman nor to her infant, and could endanger both their lives.

Health education should continue to emphasise the importance of exclusive breastfeeding while also informing the pregnant women about replacement feeding options.

The cleanliness, attractiveness, comfort and safety of the PMTCT clinics should be maintained.

All clinics should ensure that they have sufficient supplies of ARVs. Clinics' reported inability to supply ARVs to pregnant women and their infants could jeopardise the success of the entire PMTCT programme in Ethiopia.

Nurses/midwives should not ignore patients' questions.

Patients' CD4 counts and WHO stage of illness must be recorded as specified in the national guideline. Regular audits of patients' PMTCT records should be done so that shortcomings can be identified and addressed.

In order to reduce the MTCT rate, health care providers must:

- prevent nipple fissures, treat any nipple fissure effectively and educate mothers about the increased risk of MTCT in the presence of nipple fissures
- provide adequate ANC care to reduce the number of infants born with birth weights below 2.5kg as these infants had a higher rate of MTCT than others
- ensure that all pregnant women who qualify to get ART do get the correct treatment as infants whose mothers were on ART had a lower MTCT rate than those whose mothers were on ARV prophylaxis
- administer ARV prophylaxis to every infant whose mother is HIV-positive as this reduces the MTCT rate markedly
- monitor women in labour effectively to enhance every baby's chances of having an APGAR score of at least seven as these babies had a lower MTCT rate than those with APGAR scores below seven.

5.5.3 Recommendations to increase the utilisation of PMTCT services in Addis Ababa

HIV counseling and testing services should target people of all ages and both genders, irrespective of marital status. During VCT counseling, the benefits of using PMTCT services should be mentioned to all persons so that the people of Addis Ababa could become more knowledgeable about PMTCT services. Couples' testing and sharing of information about one's HIV status should also be encouraged because this will facilitate the utilisation of PMTCT services, if they have the support of significant others, when required.

Girls' education levels must be improved because better educated women can earn better salaries and make independent decisions to use PMTCT services, unlike women with limited or no education.

Women who benefitted from PMTCT services could be recruited to work as volunteers to inform other women about the benefits of PMTCT services.

The clinics providing PMTCT services should continue to be clean, safe and comfortable. Patients' waiting times at these clinics should be monitored and managed so that patients do not get discouraged by having to wait many hours at the clinics.

Clinics should never encounter shortages of ARVs as women could get discouraged if they have to visit a clinic more than once for one prescription. The effectiveness of ART, and indeed of the entire PMTCT programme could be annihilated, if ARVs cannot be supplied to a woman at every clinic visit.

Stigma and discrimination must be addressed during health education sessions. However, the negative effects of self-stigmatisation must be also be addressed during all HIV-related health education sessions, and in all such printed materials. Women

experiencing self-stigmatisation while using PMCTC services must be identified and counseled or referred to appropriate health care workers. All types of stigmatisation and discrimination might impact negatively on women's likelihood of utilising PMTCT services.

5.5.4 Recommendations to enhance the PMTCT services rendered by nurses/midwives

Most respondents were pleased with the nurses/midwives' services and attitudes. However, all patients' questions should be answered.

Management should ensure that there are sufficient numbers of nurses/midwives on duty to attend to all patients within reasonable periods of time.

Regular audits of patients' records should be done and cases where the CD4 counts and/or WHO stages were not recorded should be addressed.

All instances of the unavailability of ARVs should be recorded and investigated to prevent similar future shortages.

Nurses/midwives should receive regular in-service education on PMTCT service provision, research being conducted in this field, and the health outcomes of women and infants who were treated by specific facilities.

The basic curriculum of nurses/midwives should be revised regularly to ensure that the nurses/midwives are conversant with the latest country-specific guidelines.

5.5.5 Recommendations for future research

Future studies should compare the situation in the capital city of Ethiopia, Addis Ababa, with that occurring in other cities, towns and rural areas where women might perceive susceptibility, severity and barriers in different ways, requiring different interventions to enhance the utilisation of PMTCT services.

Structured interviews were conducted with women and data were collected from the women's and from their babies' records. Future studies could use focus-group interviews and/or individual in-depth interviews to yield more in-depth information about the women's lived experiences of using PMTCT services.

Future observations of the PMTCT services rendered to women, could yield information about the real life occurrences of patients and health care providers in these clinics.

HIV-positive women who did not use PMTCT services should be targeted by future studies to identify reasons why these women failed to utilise the available PMTCT services in Ethiopia. Similarly, women who discontinued using PMTCT services should be targeted for future studies to identify reasons why they did so. The CD4 counts and WHO stage (and VL if possible) of these women should be compared to those of women who continued using PMTCT services for the duration of the programme. The HIV-status of the infants of these three groups of women should also be compared to reveal the potential benefits of the PMTCT programme for mothers and infants.

Effective contraception utilisation among HIV-positive women should be investigated by future studies, including the women's potential willingness to agree to surgical sterilisation. If HIV-positive women use effective temporary or permanent contraception, their number of future pregnancies could be reduced with potential benefits for these women themselves and for their children. Reduced numbers of pregnancies among HIV-positive women could contribute to huge savings of health care costs.

Condom use among HIV-positive women prior to and during their pregnancies as well as during the period of breastfeeding should be examined by future studies. Condoms should be used during and after pregnancies, not only by serum-discordant couples but also in cases where both partners are HIV-positive to prevent possible re-infection and increased VL with increased risk of MTCT for the infant. Unless HIV-positive mothers use condoms effectively throughout their pregnancies and periods of breastfeeding, all efforts of the PMTCT programme might be useless.

Future studies must endeavor to determine the HIV status of HIV-positive mothers' infants when breastfeeding stopped altogether (probably at the age of 12-24 months) and compare these findings for infants whose mothers used PMTCT services with those whose mothers did not do so. Such findings would be able to demonstrate the realistic potential long term benefits of the costs of PMTCT services in Ethiopia in relation to the infants' HIV status.

Future research should determine how the pregnant women became HIV-positive, and how they realised that they were indeed HIV-positive. This knowledge should be incorporated into HIV prevention programmes.

The possibility that replacement (formula) fed babies' risk of MTCT could be limited should be investigated in areas where water supplies are safe and accessible. These findings should be compared to the MTCT risk of breastfed babies in similar areas.

Researchers should identify reasons why the respondents' CD4 counts and WHO stages were reported irregularly and suggest ways of improving these records. Simultaneously the absence of VL counts should also be addressed. Such knowledge could help to enhance the quality of PMTCT services rendered to women and their infants, while also improving the quality of future research results.

Further research should be conducted among women whose CD4 counts did not improve and/or those with deteriorated WHO stages while using PMTCT services. These cases actually indicate PMTCT failure and the reasons for such failure should be identified and addressed to render PMTCT services more effectively in future. Such failure could possibly be attributed to service factors (inaccessibility, unaffordability, unavailability of ARVs, poor records, prescribing ARV prophylaxis instead of ART) or to patient factors (low CD4 count, non-adherence to ARVs, other infections including TB, high VL, failure to use condoms, severe anaemia, severe malnutrition, breastfeeding during pregnancy).

5.6 LIMITATIONS OF THE STUDY

The study was conducted in Ethiopia's capital city, Addis Ababa. Thus the findings cannot be generalised to other geographic areas of Ethiopia, without conducting similar studies in randomly selected other regions of this country.

Only women who used PMTCT services participated in this study, making it impossible to compare the findings from this group of women with women who did not use PMTCT services and/or with women who discontinued using these services.

This study did not address contraceptive issues.

This study did not enquire how the respondents became HIV-positive as no questions that might have been interpreted as indicating any blame to the respondents could be asked during the structured interviews.

No questions were asked about condom used before, during and after their pregnancies to avoid embarrassment to the respondents.

The HIV status of the babies remained unknown when breastfeeding stopped altogether.

No comparisons could be made between breastfed babies and babies who were on replacement feeding, because the latter number of infants was too small.

Some records were incomplete. For example, the respondents' CD4 counts and WHO stages were not recorded regularly and decreased over time. This might have impacted on the quality of the statistics. No VL records were available.

Reasons were not identified to explain some respondents' decreased CD4 counts and/or deteriorated WHO stage of illness.

5.6 CONTRIBUTIONS OF THE STUDY

The study used the HBM and Donabedian's model. The different tenets of these models were applied in this study. The reasons behind PMTCT service use were explained by the HBM while patient satisfaction, factors affecting MTCT rate and health status of mother were explained by Donabedian's model.

From a clinical and public health perspective, the study's findings could help to improve PMTCT services, maternal health outcomes and reduction of the MTCT rate among infants.

The findings can also help the country to improve its PMTCT prorgramme, develop appropriatae guidelines, design policies and conduct further research based on these findings and recommendations. Therefore PMTCT programme managers, health care providers, health science students, researchers and HIV/AIDS patients could possibly benefit by taking note of this study's findings.

This study's findings indicate that the rate of MTCT can be reduced if nipple fissures are avoided, infants are born at full term, infants are not under- or over weight at birth, and have normal APGAR scores. Based on the identified limitations of this study, possible directions for future studies were recommended that could help to expand the knowledge about PMTCT services in Addis Ababa. Two important aspects relate to the unavailability of information about the HIV status of infants after the cessation of breastfeeding, whose mothers used PMTCT services compared to those whose mothers discontinued using these services and those whose mothers did not use PMTCT services at all. Information is also lacking about the HIV status of infants after the cessation of breast feeding compared to the HIV status of infants who received mixed and supplemental feeding at the same age. These findings should be cross tabulated according to the three infant groups' feeding methods with their mothers' utilisation, non-utilisation or cessation of PMTCT services.

5.7 CONCLUDING REMARKS

The study set out to identify factors influencing women's decisions to use PMTCT services. The findings indicated that better educated, self-employed women who had male partners were more likely to know their HIV-positive status and to utilise these services than other women. Most male partners who knew their own HIV status (whether positive or negative) knew that the women used PMTCT services but only the minority of males whose HIV status was unknown had this knowledge. Barriers that influenced women's decisions negatively to utilise PMTCT services included being unmarried and experiencing stigma and financial constraints.

Most respondents were satisfied with the PMTCT services, but recommended that more nurses/midwives should be employed and that all the patients' questions should be answered. Reportedly health care providers followed the national guidelines during HIV counseling and testing but not always in prescribing ARV prophylaxis versus ART, with potential adverse consequences for the health of the women and their infants. Clinics

could not always provide ARVs, with potential negative consequences for the entire PMTCT programme's outcomes.

Although the respondents' average CD4 counts improved while using PMTCT services, their WHO stages of illness did not improve. Both these parameters were progressively poorer recorded in the respondents' files as time went on.

The MTCT rate could be significantly reduced if mothers' nipple fissures could be prevented, babies could be borne at full term with average weight and APGAR scores of 7 or more and if all infants could get ARV prophylaxis.

During the course of this study it became evident that the ultimate measure of success of PMTCT services is the HIV-negative status of an infant who has an HIV-positive mother. Infants' HIV status in Ethiopia is usually determined before or at six weeks and sometimes at six months. Many babies are breastfed for longer than six months, up to 24 months, in Ethiopia. It is vital to determine the HIV status of infants at the final cessation of breastfeeding and to compare these findings for babies whose mothers are HIV-positive and used PMTCT services, discontinued these services and never used these services at all. These findings should be compared to those of infants who were never breastfed but who had HIV-positive mothers, by performing multivariate analyses.

The wisdom of providing PMTCT services to pregnant women and infants for many months, without knowing the HIV status of these infants after breastfeeding had been stopped finally, became questionable. As HIV-negative women could become HIV-positive during pregnancy and while breastfeeding, replacement feeding for infants might have benefits for all infants exceeding the potential benefits of PMTCT services. However, this would require adequate access to safe water supplies and to formula (milk powder). Providing safe water supplies would benefit entire communities, not only pregnant women and their infants. The future directions of PMTCT services should be re-considered, based on the HIV-status of infants after the cessation of breastfeeding.

LIST OF REFERENCES

Adedimeji, A, Abboud, N, Merdekios, B & Shiferaw, M. 2012. A qualitative study of barriers to effectiveness of interventions to prevent mother to child transmission of HIV in Arba Minch, Ethiopia. *International Journal of Population Research*: 1-7.

Agadjanian, V & Hayford, SR. 2009. PMTCT, HAART and child bearing in Mozambique: an institutional perspective. *AIDS Behaviour* 13:103-112.

Ahonkhai, AA, Bassett, IV, Ferris, TG & Freedberg, KA. 2012. Improving HIV outcomes in resource limited countries: the importance of quality indicators. Available from: http://www.biomedcentral.com/1472-6963/12/427 (accessed 29 January 2013).

Alemayehu, YK, Bushen, O & Muluneh, AT. 2009. Evaluation of HIV/AIDS clinical care quality: the case of referral hospital in North West Ethiopia. *International Journal for Quality in Health Care* 21(5):356-362.

Anoje, C, Aiyenigba, B, Suzuki, C, Badru, T, Akpoigbe, K, Odo, M, Odafe, S, Adedokun, O, Torpey, K & Chabikuli, ON. 2012. Reducing mother-to-child transmission of HIV. Available from: http://www.biomedcentral.com/1471-2458/12/184 (accessed 12 April 2012).

Areechokchai, D, Bowonwatanuwong, C, Phonrat, B, Pitisuttithum, P & Maek-a-Nantawat, W. 2009. Pregnancy outcomes among HIV-infected women undergoing antiretroviral therapy. *The Open AIDS Journal* 3:8-13.

Assefa, F, Mosse, A & H/Michael, Y. 2011. Assessment of clients' satisfaction with health service deliveries at Jimma University Specialised Hospital. *Ethiopian Journal of Health Science* 21(2):101-109.

Azcoaga-Lorenzo, A, Ferreyra, C, Alvarez, A, Palma, PP, Velilla, E & del Amo, J. 2011. Effectiveness of a PMTCT programme in rural western Kenya. *AIDS Care* 23(3):274-280.

Bacchieri, A & Cioppa, GD. 2007. *Fundamentals of clinical research* edited by Gail, M, Krickeberg, K, Samet, J, Tsiatis, A & Wong, W. Milano: Springer-Verlag.

Baker, JV, Peng, G, Rapkina, J, Abrams, DI, Silverberg, MJ, MacArthur, RD, Cavert, WP, Henry, WK & Neaton, JD. 2008. CD4 count and risk of non-AIDS diseases following initial treatment for HIV infection. *AIDS* 22(7):841-848.

Balcha, TT, Lecerof, SS & Jeppsson, AR. 2011. Strategic challenges of PMTCT program implementation in Ethiopia. *Journal of the International Association of Physicians in AIDS Care* 10(3):187-192.

Belachew, T & Jira, C. 2007. Awareness about feeding options for infants born to HIV positive mothers and mother to child transmission of HIV in Gurage zone, South Ethiopia. *Ethiopian Journal of Health Development* 21(1):40-47.

Bekele, A, Taye, G, Mekonnen, Y, Girma, W, Gegefu, A, Mekonnen, A & Dejene, A. 2008. Levels of outpatient satisfaction at selected health facilities in six regions of Ethiopia. *Ethiopian Journal of Health Development* 22(1):42-48.

Bonnenfant, YT, Hindin, MJ & Gillepsie, D. 2012. HIV diagnosis and fertility intentions among couple VCT clients in Ethiopia. *AIDS Care* 24(11):1407-1415.

Both, J & Roosmalen, JV. 2010. The impact of prevention of mother to child transmission programmes on maternal healthcare in resource poor settings: looking beyond the PMTCT programme - a systematic review. *International Journal of Obstetrics and Gynaecology* 117: 1444-1450.

Burns, N & Grove, SK. 2005. *The practice of nursing research: conduct, critique, and utilization*. 5th edition. St Louis: Elsevier-Saunders.

Car, LT, Brusamento, S, Elmoniry, H, Velthoven, MH, Pape, UJ, Welch, V, Tugwell, P, Majeed, A, Rudan, I, Car, J & Atun, R. 2013. The uptake of integrated perinatal prevention of mother to child transmission programs in low and middle-income countries: a systematic review. *PLoS One* 8(3):1-16.

Central Statistical Agency of Ethiopia & Inner City Fund International .2012. *Ethiopia demographic and health survey 2011*. Available from: http://www.measuredhs.com/pubs/pdf/FR255/FR255.pdf (accessed 16 April 2012).

Chama, CM, Bello, M, Ajayi, BA, Sarma, S & Gashau, W. 2010. The use of highly active antiretroviral therapy for the prevention of mother-to-child transmission of the human immunodeficiency virus in Nigeria. *Journal of Obstetrics and Gynaecology* 30(4):362-366.

Champion, VL & Skinner, CS.2008. *Health behaviour and health education: theory, research and practice, edited by Glanz, K, Rimer, BK & Viswanath, K*. 4th edition. San Francisco: Jossey-Bass. pp45-62.

Chekol, A. 2011. Birth outcome and HIV infection among labouring women in Assosa Hospital, South west Ethiopia. *Ethiopian Journal of Health Development* 25(1):10-16.

Chetty, T, Knight, S, Giddy, J, Crankshaw, TL, Butler, LM & Newell, ML. 2010. A retrospective study of human immune deficiency virus transmission, mortality and loss to follow up among infants in the first 18 months of life in a prevention of mother to child transmission programme in an urban hospital in KuwaZulu-Natal, South Africa. Available from: http://www.biomdecentral.com/1471-2431/12/146 (accessed 28 December 2012).

Chi, BH, Sinkala, M, Stringer, EM, Cantrell, RA, Mtonga, V, Bulterys, M, Zulu, I, Kankasa, C, Wilfertz, C, Weidle, PJ, Vermund, SH & Stringer, JS. 2007. Early clinical and immune response to NNRTI-based antiretroviral therapy among women with prior exposure to single-dose nevirapine. *AIDS* 21(8):957-964.

Chow, SC, Shao, J & Wang, H. 2008. *Sample size calculations in clinical research.* 2nd edition. London: Chapman & Hall.

Cliffe, S, Townsend, CL, Cortina-Borja, M & Newell, M. 2011. Fertility intentions of HIV infected women in the United Kingdom. *AIDS Care* 23(9):1093-1101.

Cocu, M, Thorne, M, Matusa, R, Tica, V, Florea, C, Asandi, S & Giaquinto, C. 2013. Mother-to-child transmission of HIV infection in Romania: results from an education and prevention programme. *AIDS Care* 17(1):76-84.

Coetzee, D, Hilderbrand, K, Boulle, A, Draoer, B, Abdullah, F & Goemaere, E. 2005. Effectiveness of the first district-wide programme for the prevention of mother-to-child transmission of HIV in South Africa. *Bulletin of the World Health Organization* 83(7):489-494.

Creek, T, Ntumy, R, Mazhani, L, Moore, J, Smith, M, Han, G, Shaffer, N & Kilmarx, PH. 2009. Factors associated with low early uptake of a national programme to prevent mother to child transmission of HIV. *AIDS Behaviour* 13:356-364.

Darak,S, Panditrao, M, Parchure, R, Kulkarni, V, Kulkarni, S & Janssen, F. 2012. Systematic review of public health research on prevention of mother to child transmission of HIV in India with focus on provision and utilization of cascade of PMTCT services. Available from http://www.biomedcentral.com/1471-2458/12/320 (accessed 06 December 2012).

Delva, W, Mutunga, L, Quaghebeur, A & Temmerman. 2006. Quality and quantity of antenatal HIV clounselling in a PMTCT programme in Mombassa, Kenya. *AIDS Care* 18(3):189-193.

Delvaux, T, Konan, JD, Ake-Tano, O, Gohou-Kouassi, V, Bosso, PE, Buve, A & Ronsmans. 2008. Quality of antenatal and delivery care before and after the implementation of a prevention of mother-to-child HIV transmission programme in Cote d'Ivoire. *Tropical Medicine and International Health* 13 (8):970-979.

Demissie, A, Deribew, A & Abera, M. 2009. Determinants of acceptance of voluntary HIV testing among antenatal clinic attendees at Dil Chora Hospital, Diredawa, East Ethiopia. *Ethiopian Journal of Health Development* 23(2):141-147.

Desmonde, S, Coffie, P, Aka, E, Amani-Bosse, C, Messou, E, Debis, F, Alioum, A, Ciaranello, A & Leroy, V. 2011. Severe morbidity and mortality in untreated HIV-infected children in a paediatric care programme in Abidjan, Cote dIvoire. Available from: http://www.biomedicentral.com/1471-2334/11/182 (accessed 12 April 2012).

Doherty, T, Chopra, M, Nsibande, D & Mngoma, D. 2009. Improving the coverage of the PMTCT programme through a participatory quality improvement intervention in South Africa. Available from: http://www.biomedcentral.com/1471-2458/9/406 (accessed 17 April 2012).

Donabedien, A. 2003. *An introduction to quality assurance in healthcare*, edited by Bashshur, R. New York: Oxford University Press.

Duff, P, Kipp, W, Wild, TC, Rubaale, T & Okech-Ojony, J. 2010. Barriers to accessing highly active antiretroviral therapy by HIV-positive women attending an antenatal clinic in a regional hospital in western Uganda. Available from: http://www.jiasociety.org/content/13/1/37 (accessed 22 November 2013).

Ekouevi, DK, Coffie, PA, Beckuet, R, Tonwe-Gold, B, Horo, A, Thiebaut, R, Leroy, V, Blanche, S, Dabis, F & Abrams, EJ. 2008. Antiretroviral therapy in pregnant women with advanced HIV disease and pregnancy outcomes in Abidjan, Cote dIvoire. *AIDS* 22(14):1815-1820.

Ekouevi, DK, Coffie, PA, Chaix, ML, Tonwe-Gold, B, Amani-Bosse, C, Leroy, V, Abrams, EJ & Dabis, F. 2010. Immunological response to highly active antiretroviral therapy following treatment for prevention of mother to child transmission of HIV-1: a study in Cote dIvoire. *Journal of the International AIDS Society* 13(38):1-5.

Ekouevi, D, Abrams, EJ, Schlesinger, M, Myer, L, Phanuphak, N & Carter, RJ. 2012(a). Maternal CD4 cell count decline after interruption of antiretroviral prophylaxis for the prevention of mother to child transmission of HIV. *PLoS One* 7(8):1-10.

Ekouevi, DK, Stringer, E, Coetzee, D, Tih, P, Creek, P, Stinson, K, Westfall, AO, Welty,T, Chintu, N, Chi, BH, Wilfert, C, Shaffer, N, Stringer, J & Dabis, F. 2012(b). Health facility characteristics and their relationship to coverage of PMTCT of HIV services across four African countries. *PLoS one* 7(1):1-7.

Ekwempu, AI, Ekwempu, CC, Ikeh, E, Olabode, A & Agaba, E. 2012. Comparison of CD4 cell counts in pregnant HIV sero positive and HIV sero negative Nigerian Women. *Lab Medicine* 43(5):168-171.

Esene, H & Omoigberale, AI. 2012. Prevalence of HIV among exposed infants in University of Benin teaching hospital, Benin city, Edo state, Nigeria. *Journal of Medicine and Biomedical Research* 11(1):105-115.

European collaborative study. 2010. Mode of delivery in HIV-infected pregnant women and prevention of mother to child transmission: changing practices in Western Europe. *HIV Medicine* 11:368-378.

Fanta, W & Worku, A. 2012. *Determinants of refusal for HIV testing among women attending antenatal care in Gambela Region, Ethiopia*. Available from: http://www.reproducitve-health-journal.com/content/9/1/8 (accessed 18 January 2013).

Fauci, AS & Lane, HC. 2005. *Harrison's principles of internal medicine*, edited by Kasper, DL, Longo, DL, Braunwald, E, Hauser, SL & Jameson, JL. 16th edition. New York: McGraw-Hill: 1076-1139.

Federal Ministry of Health (of Ethiopia). 2007. *Guidelines for HIV counseling and testing in Ethiopia*. Addis Ababa: HIV/AIDS Prevention and Control Office.

Federal Ministry of Health (of Ethiopia). 2008(a). *Quality management framework for HIV/AIDS services in Ethiopia*. Addis Ababa: Prevention and Control Office.

Federal Ministry of Health (of Ethiopia). 2008(b). *Guidelines for Paediatric HIV/AIDS care and treatment in Ethiopia.* Addis Ababa: HIV/AIDS Prevention and Control Office.

Federal Ministry of Health (of Ethiopia). 2010a. *Health and health related indicators*. Addis Ababa.

Federal Ministry of Health (of Ethiopia). 2010b. *Health Sector Development Program IV*. Addis Ababa.

Federal Ministry of Health (of Ethiopia). 2011. *Guideline for prevention of mother-to-child transmission of HIV in Ethiopia.* Available from http://www.etharc.org/resources/download/finish/59/707 (accessed 27 November 2012).

Federal Ministry of Health (of Ethiopia). 2012. *Country progress report on HIV/AIDS response*. Addis Ababa: HIV/AIDS Prevention and Control Office.

Federal Ministry of Health (of Ethiopia). 2013. *Reference manual for PMTCT option B+ update training*. Addis Ababa.

FMoH – see Federal Ministry of Health (of Ethiopia)

Firth, J, Jeyaseelan, L, Christina, S, Vonbara, V, Jeyaseelan, V, Elan, S, Abraha, S, Joseph, I, David, S, Cu-Uvin, S, Lurie, M, Wanke, C & Lionel,J. 2010. HIV-1 seroprevalence and awareness of mother to child transmission issues among women seeking antenatal care in Tamil Nadu, India. *Journal of the International Association of Physicians in AIDS Care* 9(4):206-213.

Gantt, S, Shetty, AK, Seidel, KD, Matasa, K, Musingwini, G, Woelk, G, Zijenah, LS, Katzenstein, DA & Frenkel, LM. 2007. Laboratory indicators of mastitis are not associated with elevated HIV-1 DNA loads or predictive of HIV-1 RNA loads in breast milk. *The Journal of Infectious Diseases* 196:570-576.

Gaur, AS & Gaur, SS. 2009. Statistical methods for practice and research. 2nd edition. Thousand Oaks: Sage.

Glanz, K, Rimer, BK & Viswanath, K (eds). 2008. *Health behaviour and health education: theory, research and practice.* 4th edition. San Francisco: Jossey-Bass.

Goga, AE, Doherty, T, Jackson, DJ, Sanders, D, Covin, M, Chopra, M & Kuhn, L. 2012. Infant feeding practices at routine PMTCT sites, South Africa: results of a prospective observational study amongst HIV exposed and unexposed infants birth to 9 months. Available from: http://www.internationalbreastfeedingjournal.com/content/7/1/4 (accessed 15 April 2012).

Gourlay, A, Birdthistle, I, Mburu, G, Lorpenda, K & Wringe, A. 2013. *Barriers and facilitating factors to the uptake of antiretroviral drugs for prevention of mother to child transmission of HIV in sub-Saharan Africa: a systematic review.* Available from: http://www.jiasociety.org/index.php/jias/article/view/18588 (accessed 15 January 2014).

Gumbo, FZ, Duri, K, Kandawasvika, GQ, Kurewa, NE, Mapingure, MP, Munjoma, MW, Rusakaniko, S, Chirenje, MZ & Stray-Pedersen, B. 2010. Risk factors of HIV vertical transmission in a cohort of women under a PMTCT program at three peri-urban clinics in a resource-poor setting. *Journal of Perinatology* 30:717-723.

Gupta, A, Singh, G, Kaushik, P, Joshi, B, Kalra, K & Chakraborty, S. 2012. Early diagnosis of HIV in children below 18 months using DNA PCR test assessment of the effectiveness of PMTCT interventions and challenges of early initiation of ART in a resource limited setting. Available from: http://dx.doi.org/10.1093/tropej/fms063 (accessed 22 March 2013).

Hamanda, K. 2013. Vertical transmission of HIV in sub-Saharan Africa: applying theoretical frameworks to understand social barriers to PMTCT. Available from: http://dx.doi.org/10.5402/2013//420361 (accessed 29 January 2013).

Hahn, NT, Gammeltoft, T & Rasch, V. 2011. Early uptake of HIV counseling and testing among pregnant women at different levels of health facilities-experiences from a community based study in Northen Vietnam. Available from: http://www.biomedcentral.com/1472-6963/11/29 (accessed 19 November 2013).

Hardon, A, Vemooij, E, Bongololo-Mbera, G, Cherutich, P, Desclaux, A, Kyaddondo, D, ky-Zerbo, O, Neuman, M, Wanyenze, R & Obermeyer, C. 2012. Women's views on consent, counseling and confidentiality in PMTCT: a mixed-methods study in four African countries. Available from: http://www.biomedcentral.com/1471-2458/12/26 (accessed 19 November 2013).

Hazarika, D. 2010. Parent to child transmission and infant feeding in HIV: recent update. *Pediatric Infectious Diseases* 2:63-68.

Heidari, S, Mofenson, L, Cotton, MF, Marlink, R, Cahn, P & Katabira, E. 2011. Antiretroviral drugs for preventing mother to child transmission of HIV: a review of potential effects on HIV exposed but uninfected children. *Journal of Acquired Immune Deficiency Syndromes* 57(4):290-296.

Hoffman, R, Black, V, Technau, K, van der Merwe, K, Currier, J, Coovadia, A & Chersich, M. 2010. Effects of highly active antiretroviral therapy duration and regimen on risk of mother-to-child transmission of HIV in Johannesburg, South Africa. *Journal of Acquired Immune Deficiency Syndromes* 54(1):35-41.

Holme, S. 2007. *Research methodology in the medical and biological sciences*, edited by Laake, P, Benedtad, HB & Olsen, BR. London: Elsevier.

Hussain, A, Moodley, D, Naidoo, S & Esterhuizen, TM. 2011. Pregnant women's access to PMTCT and ART services in South Africa and implications for universal antiretroviral treatment. *PLoS one* 6(12):1-7.

Hussein, M, Jira, C & Girma, B. 2011. Assessment of effective coverage of HIV prevention of pregnant woman to child transmission services in Jimma zone, South West Ethiopia. *Ethiopian Journal of Health Science* 21:1-7.

Ismail, H & Ali, A. 2011. Pregnant women's satisfaction and comprehension level of information given during HIV counseling and testing for PMTCT in public health facilities in Addis Ababa. *Ethiopian Journal of Health Development* 25(2):126-134.

Ivers, LC, Appleton, SC, Wang, B, Jerome, JG, Cullen, KA & Fawzi, MC. 2011. HIV free survival and morbidity among formula fed infants in the prevention of mother to child transmission of HIV programme in rural Haiti. Available from http://www.aidsrestherapy.com/content/8/1/37 (accessed 17 January 2013).

Joint United Nations Progamme on HIV/AIDS and World Health Organization. 2009. *AIDS epidemic update*. Available from http://www.unaids.org (accessed 07 April 2012).

Joint United Nations Progamme on HIV/AIDS. 2010. *Global report on AIDS epidemic*. Available from http://www.unaids.org (accessed 12 April 2012).

Joint United Nations Programme on HIV/AIDS. 2011. *Global plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive.* Available from http://www.uniads.org (accessed 12 April 2012).

Joint United Nations Programme on HIV/AIDS. 2012. *Global report on AIDS epidemic*. Available from: http://www.unaids.org (accessed 05 December 2012).

Joint United Nations Progamme on HIV/AIDS. 2013. *Global report on AIDS epidemic*. Available from http://www.unaids.org (accessed 24 October 2013).

Joint United Nations Progamme on HIV/AIDS, World Health Organization and United Nations Human Rights. 2009. *Disability and HIV policy brief*. Available from: http://www.unaids.org (accessed 26 February 2014).

Kabiru, CW, Beguy, D, Crichton, J & Zulu, EM. 2011. HIV/AIDS among youth in urban informal (slum) settlements in Kenya: what are the correlates of and motivations for HIV testing*?* Available from: http://www.biomedcentral.com/1471-2458/11/685 (accessed 29 January 2013).

Kassaye, KD, Lingerh, W & Dejene, Y. 2005. Determinants and outcomes of disclosing HIV-sero positive status to sexual partners among women in Mettu and Gore towns, Illubabor zone, Southwest Ethiopia. *Ethiopian Journal of Health Development* 19(2):126-131.

Kikwood, BR & Sterne, JA. 2007. *Essential medical statistics*. Massachusetts: Blackwell Science.

Kim, YM, Banda, J, Hiner, C, Tholandi, M, Bazant, E, Sarkar, S, Andrade, AS & Makwala, C. 2013. *Assessing the quality of HIV/AIDS services at military health facilities in Zambia.* Available from: http://std.sagepub.com/content/early/2013/06/07/0956462412472811 (accessed 22 November 2013).

Kinuthia, J, Kiarie, JN, Farquhar, C, Richardson, BA, Nduati, R, Mbori-Ngacha, D & John-Stewart, G. 2011. Uptake of prevention of mother to child transmission interventions in Kenya: health systems are more influential than stigma. Available from: http://www.jiasociety.org/content/14/1/61 (accessed 15 January 2014).

Kishor, BV, Pal, DK, Rama, L & Vishal, B. 2011. Clients' satisfaction with antiretroviral therapy services at Hamidia Hospital Bhopal. *National Journal of Community Medicine* 2(2):241-243.

Kobayashi, H, Takemura, Y & Kanda, K. 2010. Patient perception of nursing service quality; an applied model of Donabedian's structure-process-outcome approach theory. *Scandinavian Journal of Caring Sciences* 25:419-425.

Koricho, AT, Moland, KM & Blystad, A. 2010. Poisonous milk and sinful mothers: the changing meaning of breast feeding in the wake of the HIV epidemic in Addis Ababa, Ethiopia. *International Breast Feeding Journal* 5(12):1-8.

Kothari, CR. 2004. *Research methodology*. New Delhi: New Age International.

Kouanda, S, Tougri, H, Cisse, M, Simpore, J, Pietra, V, Doulougou, B, Ouedraogo, G, Ouedraogo, CM, Soudre, R & Sondo, B. 2010. Impact of maternal HAART on prevention of mother to child transmission of HIV: results of an 18-month follow-up study in Ouagadougou, Burkina Faso. *AIDS Care* 22(7):843-850.

Koye, DN & Zeleke, BM. 2013. Mother-to-child transmission of HIV and its predictors among HIV-exposed infants at a PMTCT clinic in northwest Ethiopia. Available from: http://www.biomedcentral.com/1471-2458/13/398 (accessed 03 January 2014).

Kronenfeld, JJ (ed). 2007. *Access, quality and satisfaction with care: concerns of patients, providers and insurers*. Amsterdam: Elsevier.

Kuhn, L, Samrau, K, Ramachandran, S, Sinkala, M, Scott, N, Kasonde, P, Mwiya, M, Kandasa, C, Decker, D, Thea, DM & Aldrovandi, GM. 2009. Mortality and virological outcomes following access to antiretroviral therapy among a cohort of HIV-infected women who received single-dose nevirapine in Lusaka, Zambia. *Journal of Acquired Immune Deficiency Syndromes* 52(1):132-136.

Kurewa, EN, Gumbo, FZ, Munjoma, MW, Mapingure, MP, Chirenje, MZ, Rusakaniko, S & Stray-Pedersen, B. 2010. Effect of maternal HIV status on infant mortality: evidence from a 9 month follow-up of mothers and their infants in Zimbabwe. *Journal of Perinatology* 30:88-92.

Kyei, NA, Campbell, OM & Gabrisch, S. 2012. The influence of distance and level of service provision on antenatal care use in rural Zambia. *PLoS One* 7(10):1-6.

Lachman, VD. 2006. *Applied ethics in nursing*. New York: Springer.

Laher, F, Cescon, A, Lazarus, E, Kaida, A, Makangoza, M, Hogg, RS, Soon, CN, Miller, CL & Gray, G. 2012. Conversations with mothers: exploring reasons for prevention of mother to child transmission failures in the era of programmatic scale up in Soweto, South Africa. *AIDS Behaviour* 16:91-98.

Lan, Y, Wen-ying, L, Chen, RY, Zhi-rong, T, Jun, P, Xiu-zhi, G, Xiu-ning, M & Fu-jie, Z. 2012. Pregnancy outcomes and risk factors for low birth weight and preterm delivery among HIV-infected pregnant women in Guangxi, China. *Chinese Medical Journal* 125(3):403-409.

Landes, M, Lettow, MV, Bedell, R, Mayuni, I, Chan, AK, Tenthani L & Schouten, E. 2012. Mortality and health outcomes in HIV-infected and HIV-uninfected mothers at 18-20 months postpartum in Zomba District, Malawi. *PloS one* 7(9):1-6.

Lebon, A, Bland, RM, Rollins, NC, Coutsoudis, A, Coovadia, H & Newell, ML. 2007. Short communication: CD4 counts of HIV-infected pregnant women and their infected children-implication for PMTCT and treatment programmes. *Tropical Medicine and International Health* 12(12):1472-1474.

Lettow, MV, Bedell, R, Landes, M, Gawa, L, Gatto, S, Mayuni, I, Chan, AK, Tenthani, L & Schouten, E. 2011. Uptake and outcome of a prevention of mother to child transmission program in Zomba district, Malawi. Available from: http://www.biomedcentral.com/1471-2458//11/426 (accessed 12 November 2012).

Li, B, Zhao, Q, Zhang, X, Wu, L, Chen, T, Liang, Z, Xu, L & Yu, S. 2013. Effectiveness of prevention of mother to child transmission programme in Guangdon province. Available from: http://www.biomedcentral.com/1471-2458/13/591 (accessed 13 November 2013).

Linguissi, LS, Bisseye, C, Sagna, T, Nagalo, BM, Ouermi, D, Djigma, FW, Pignatelli, S, Sia, JD, Pietra, V, Moret, R, Nikiema, JB & Simpore, J. 2012. Efficiency of HAART in the prevention of mother to children HIV-1 transmission at the Saint Camille medical centre in Burkina Faso, West Africa. *Asian Pacific Journal of Tropical Medicine*: 991-994

Longo, DL & Fauci, AS. 2005. *Harrison's principles of internal medicine, edited by Kasper, DL, Faucy, AS, Longo, DL, Braunwald, E, Hausler, SL and Jameson, SL*. 16th edition. New York: McGraw-Hill.

Lorenzo, O, Beck-Sague, CM, Bautista-Soriano, C, Halpern, M, Roman-Poueriet, J, Henderson, N, Perez-Then, E, Veras, B, Connolly, M, Callender, GB & Nicholas, SW. 2012. Progress towards elimination of HIV mother to child transmission in the Dominican Republic from 1999 to 2011. *Infectious Diseases in Obstetrics and Gynecology* 2012:1-9.

Lussiana, C, Clemente, SV, Ghelardi, A, Lonardi, M, Tarquino, IA & Floridia, M. 2012. Effectiveness of a prevention of mother-to-child HIV transmission programme in an urban hospital in Angola. *PLoS One* 7(4):1-9.

Malaju, MT & Alene, GD. 2012. Determinant factors of pregnant mothers' knowledge on mother to child transmission of HIV and its prevention in Gondar town, North West Ethiopia. Available from: http://www.biomedcentral.com/1471-2393/12/73 (accessed 18 December 2012).

Mania, A, Kemnitz, P, Mazur-Melewska, K, Figlerowicz, M, Cudnoch, K, Sluzewski, W, Kowala-Piaskowska, A & Mozer-Lisewska, I. 2012. Human cytomegalovirus infection and clinical status of infants born to human immunodeficiency virus type 1 infected mothers. *The Journal of Maternal-Fetal and Neonatal Medicine* 25(2):180-186.

Marshall, PA. 2007. *Ethical challenges in study design and informed consent for health research in resource-poor settings*. Geneva: World Health Organization.

Marston, L. 2010. *Introductory statistics for health and nursing using SPSS*. London: Sage.

Merdekios, B & Adedimeji, AA. 2011. Effectiveness of interventions to prevent mother-to-child transmission of HIV in Southern Ethiopia. *International Journal of Women's Health* 3:359-366.

Mirkuzie, AH, Hinderaker, SG, Sisay, MM, Moland, MM & Morkve, O. 2011. Current status of medication adherence and infant follow up in the prevention of mother to child HIV transmission programme in Addis Ababa. *Journal of the International AIDS Society* 14(50):1-10.

Moodley, S 2009. Maternal viraemia and mother to child transmission of HIV. *Medical Technology South Africa 23(1)*:17-21.

Moges, Z & Amberbir, A. 2011. Factors associated with readiness for VCT service utilization among pregnant women attending antenatal clinics in North Western Ethiopia: a Health Belief Model approach. *Ethiopian Journal of Health Science* 21:107-115.

Morroni, C & Myer, L. 2007. *Epidemiology. A research manual for South Africa, edited by Joubert, G & Ehrlich, R*. 2nd edition. Cape Town: ABC Press.

Mugwaneza, P, Shema, NU, Ruton, H, Rukundo, A, Lyambabaje, A, Bizimana, J, Tsague, L, Wagner, CM, Nyankesha, E, Muita, J, Mutabazi, V, Nyemazi, JP, Nsanzimana, S, Karema, C & Binagwaho, A. 2011. Under-two child mortality according to maternal HIV status in Rwanda: assessing outcomes within the national PMTCT program. Available from: http://www.panafrican-med-journal.com/content/article/9/37/full (accessed 12 December 2012).

Muluye, D, Weldeyohannes, D, Gizachew, M & Tiruneh, M. 2012. Infant feeding practice and associated factors of HIV positive mothers attending prevention of mother to child transmission and antiretroviral therapy clinics in Gondar town health institutions, Northwest Ethiopia. Available from: http://www.biomedcentral.com/1471-2458/12/240 (accessed 20 December 2012).

Murphy, SW. 2009. *Clinical epidemiology: practice and methods, edited by Parfrey, P & Barrett, B*. New York: Humana Press. pp 19-38.

Muyindike, W, Fatch, R, Steinfield, R, Matthews, LT, Musinguzi, N, Emenyonu, NI, Martin, JN & Hahn, JA. 2012. Contraceptive use and associated factors among women enrolling into HIV care in Southern Uganda. *Infectious Diseases in Obstetrics and Gynecology* 2012:1-9.

Namukwaya, Z, Mudiope, P, Kekitiinwa, A, Musoke, P, Matovu, J, Kayma, S, Salmond, W, Bitarakwate, E, Mubiru, M, Maganda, A, Galla, M, Biamugisha, J & Fowler, MG. 2011. The impact of maternal highly active antiretroviral therapy and short-course combination antiretrovirals for prevention of mother to child transmission on early infant infection rates at the Mulago national referral hospital in Kampala Uganda, January 2007 to May 2009. *Journal of Acquired Immune Deficiency Syndromes* 56(1):69-75.

Nash, D, Katyal, M, Brinkho, MW, Keiser, O, May, M, Hughes, R, Dabis, F, Wood, R, Sprinz, E, Schechter, M & Egger, M. 2008. Long-term immunologic response to antiretroviral therapy in low-income countries: collaborative analysis of prospective studies. *AIDS* 22(17):2291-2302.

Nguyen, LT, Christoffersen, SV & Rasch, V. 2010. Uptake of prenatal HIV testing in Hai Phong Provinve, Vietnam. *Asia-Pacific Journal of Public Health* 22(4):451-459.

Nigatu, T & Woldegebriel, Y. 2011. Analysis of the prevention of mother-to-child transmission service utilization in Ethiopia. Available from: http://www.reproductive-health-journal.com/content/8/1/6 (Accessed 12 April 2012).

Nkwo, PO. 2012. Prevention of mother to child transmission of Human Immunodeficiency Syndrome Virus: the Nigerian perspective. *Annals of Medical and Health Sciences Research* 2(1):56-65.

Nlend, AE, Ekobo, CS, Junior, MB, Ekani, BB, Tchokoteu, P, Lyeb, S, Chewa, G, Moyo, SN & Takam, PT. 2011. Early outcomes of HIV exposed children in the first district-wide programme using extended regimens for the prevention of mother-to-child transmission of HIV, in Yaounde, Cameroon. Available from: http://tropej.oxfordjournals.prg (accessed 17 April 2012).

Noel, F, Mehta, S, Zhu, Y, Rouzier, PD, Marcelin, A, Shi, JR, Nolte, C, Severe, L, Deschamps, M, Fitzgerald, DW, Johnson, WD, Wright, PF & Pape, JW. 2008. Improving outcomes in infants of HIV-infected women in a developing country setting. *PLoS One* 3(11):1-10.

Noubiap, J, Bongoe, A &Demanou, SA. 2013. Mother-to-child transmission of HIV findings from an Early Infant Diagnosis program in Bertoua, Eastern Cameroon. Available from: http://www.panafrican-med-journal.com/content/article/15/65/full/ (accessed 13 November 2013).

Nyandiko, WM, Otieno-Nyunya, B, Musick, B, Bucher-Yiannoutsos, S, Akhaabi, P, Lane, K, Yiannoutsos, CT & Wools-Kaloustian, K. 2010. Outcomes of HIV-exposed children in Western Kenya: efficacy of prevention of mother to child transmission in a resource constrained setting. *Journal of Acquired Immune Deficiency Syndromes* 54(1):42-50.

Obermeyer, CM, Neuman, M, Hardon, A, Desclaux, A, Wanyenzes, R, Ky-Zerbo, O, Cherutich, P & Namakhoma, I. 2013. Socio-economic determinants of HIV testing and counselling: a comparative study in four African countries. *Tropical Medicine and International Health* 18(9):1110-1118.

O'Gorman, D, Nyirenda, LJ & Theobald, SJ. 2010. Prevention of mother to child transmission of HIV infection: views and perceptions about swallowing nevirapine in rural Lilongwe*, Malawi*. Available from: http://www.biomedcentral.com/1471-2458/10/354 (accessed 22 November 2013).

Okonji, JA, Zeh, C, Weidle, PJ, Williamson, J, Akoth, B, Masaba, RO, Fowler, MG & Thomas, TK. 2012. CD4, viral load response, and adherence among antiretroviral-naïve breast-feeding women receiving triple antiretroviral prophylaxis for prevention of mother to child transmission of HIV in Kisumu, Kenya. *Journal of Acquired Immune Deficiency Syndromes* 61(2):249-257.

Olagbuji, BN, Ezeanochie, MC, Ande, AB & Oboro, VO. 2009. Obstetric and perinatal outcomes in HIV positive women receiving HAART in urban Nigeria*. Archives of Gynecology & Obstetrics* 281:991-994.

Oliveira, AG. 2013. *Biostatistics decoded*. Chichester: Wiley.

Olsen, J, Christensen, K, Murray, J & Ekbom, A. 2010. *An introduction to epidemiology for health professionals*. New York: Springer.

Orlando, S, Marazzi, MC, Mancinelli, S, Liotte, G, Ceffa, S, Giglio, P, Alumando, E, Ziegler, I, Shawa, M & Palombi, L. 2010. Cost-effectiveness of using HAART in prevention of mother-to-child transmission in the DREAM-project Malawi. *Journal of Acquired Immune Deficiency Syndromes* 55(5):631-634.

Osinde, MO, Kakaire, O & Kaye, DK. 2012. Factors associated with disclosure of HIV serostatus to sexual partners of patients receiving HIV care in Kabale, Uganda. *International Journal of Gynecology and Obstetrics* 118:61-64.

Panditrao, M, Darak, S, Kulkarni, V, Kulkarni, S & Parchure, R. 2011. Socio-demographic factors associated with loss to follow up of HIV infected women attending a private sector PMTCT program in Maharashtra, India. *AIDS Care* 23(5):593-600.

Peltzer, K, Chao, L & Dana, P. 2009. Family planning among HIV positive and negative women: prevention of mother to child transmission clients in resource poor countries in Southern Africa. *AIDS Behaviour* 13:973-979.

Peltzer, K & Ramlagan, S. 2011. Perceived stigma among patients receiving antiretroviral therapy: a prospective study in KwaZulu-Natal, South Africa. *AIDS Care* 23(1):60-68.

Peltzer, K, Sikwane, E & Majaja, M. 2011. Factors associated with short-course antiretroviral prophylaxis (dual therapy) adherence for PMTCT in Nkangala district, South Africa. *Acta Paediatrica* 100:1253-1257.

Polit, DF & Hungler, BP. 2005. *Nursing research: principles and methods.* Philadelphia: JB Lippincott.

Population Census Commission. 2007. *Census report of Ethiopia*. Available from: http://www.csa.gov.et/pdf/cen2007_firstdraft (accessed 26 May 2012).

Preau, M, Protopopescu, C, Raffi, F, Rey, D, Chene, G, Marcellin, F, Perronne, C, Ragnaud, JM, Leport, C & Spire, B.2012. Satisfaction with care in HIV-infected patients treated with long term follow-up antiretroviral therapy: the role of social vulnerability. *AIDS Care* 24(4):434-443.

Press, I. 2006. *Patient satisfaction: understanding and managing the experience of care*. 2nd edition. Chicago: Health Administration Press.

PSC – see Population Census Commission

Rahangdale, L, Banandur, P, Sreenivas, A, Turan, JM, Washington, R & Cohen, CR. 2010. Stigma as experienced by women accessing prevention of parent to child transmission of HIV services in Karnataka, India. *AIDS Care* 22(7):836-842.

Rujumba, J, Neema, S, Tumwine, JK, Tylleskar, T & Heggenhougen, HK. 2013. Pregnant women's experiences of routine counseling and testing for HIV in eastern Uganda. Available from: http://www.biomedcentral.com/1472-6963/13/189 (accessed 19 November 2013).

Sayed, AR. 2007. *Epidemiology. A research manual for South Africa, edited by Joubert, G & Ehrlich, R*. 2nd edition. Cape Town: ABC Press.

Sendo, EG, Cherie, A & Erku, TA. 2013. Disclosure experience to partner and its effect on intention to utilise prevention of mother to child transmission service among HIV positive pregnant women attending antenatal care in Addis Ababa, Ethiopia. Available form: http://www,biomedcentral.com/1471-2458/13/765 (accessed 14 January 2014).

Singh, YK. 2006. *Fundamentals of research methodology and statistics*. New Delhi: New Age International.

Slogrove, A, Reiki, B, Naidoo, S, Beer, CD, Kevin, H, Cotton, M, Bettinger, J, Speert, D, Esser, M & Kollmann, T. 2012. HIV-exposed uninfected infants are at increased risk for severe infections in the first year of life. *Journal of Tropical Pediatrics* 58(6):505-508.

Sprague, C, Chersich, MF & Black, V. 2011. Health system weaknesses constrain access to PMTCT and maternal HIV services in South Africa. Available from: http://www.aidsrestherapy.com/content/8/1/10 (accessed 17 April 2012).

Stommel, M & Wills, CE. 2004. *Clinical research: concepts and principles for advanced practice nurses*. Philadelphia: Lippincott Williams & Wilkins.

Sword, W, Heaman, M, Brooks, S, Tough, S, Janssen, PA, Young, D, Kingston, D, Helewa, ME, Akhtar-Danesh, N & Hutton, E. 2012. Women's and care providers' perspectives of quality prenatal care: a qualitative descriptive study. Available from: http://www.biomedcentral.com/1471-2393/12/29 (accessed 29 January 2013).

Taylor, C, Wilkie, M & Baser, J. 2006. *Doing action research*. London: Paul Chapman.

Tchendjou, P, Same-Ekobo, C, Nga, A, Tejiokem, M, Kfutwah, A, Nlend, AN, Tsague, L, Bissek, AC, Ekoa, D, Orne-Gliemann, J, Rousset, D, Pouillot, R & Dabis, F. 2010. Effectiveness of multidrug antiretroviral regimens to prevent mother to child transmission of HIV-1 in routine public health services in Cameroon. *PLoS One* 5(4):1-8.

Torpey, K, Mandala, J, Kasonde, P, Bryan-Mofya, G, Bweupe, M, Mukundu, J, Zimba, C, Mwale, C, Lumno, H & Welsh, M. 2010. Analysis of HIV early infant diagnosis data to estimate rates of perintal HIV transmission in Zambia. *PLoS One* 7(8):1-8.

Tsague, L, Tsiouris, FO, Carter, RJ, Mugisha, V, Tene, G, Nyankesha, E, Koblavi-Deme, S, Mugwaneza, P, Kayirangwa, E, Sahabo, R & Abrams, E. 2010. Comparing two service delivery models for the prevention of mother-to-child transmission of HIV during a transition from single-dose Nevirapine to multidrug antiretroviral regimens. Available from: http://www.biomedcentral.com/1471-2458/10/753 (accessed 17 January 2013).

UNAIDS – see Joint United Nations Programme on HIV/AIDS

Vo, BN, Cohen, CR, Smith, RM, Bukusi, EA, Onono, MA, Schwartz, K, Washington, S & Turan, JM. 2012. Patient satisfaction with integrated HIV and antenatal care services in rural Kenya. *AIDS Care* 24(11):1442-1447.

Walburn, A, Swindells, S, Fisher, C, High, R & Islam, KM. 2012. Misssed visits and decline in CD4 cell count among HIV-infected patients: a mixed method study. *International Journal of Infectious Diseases* 16:779-785.

Wassertheil-Smoller, S. 2004. Biostatistics and epidemiology. New York: Springer.

WHO – see World Health Organization

Wills, J & Earle, S (eds). 2007. Theory and research in promoting public health, edited by Lliod, CE, Sidel, M & Spurr, S. London: Sage.

World Health Organization. 2005. *Interim WHO clinical staging of HIV/AIDS and HIV/AIDS case definitions for surveillance.* Available from: http://www.who.int/hiv/pub/guidelines/casedefinitions/en (accessed 10 September 2009).

World Health Organization. 2009. HIV testing, treatment and prevention; generic tools for operational research. Available from http://www.who.int (accessed 30 April 2012).

World Health Organization. 2010a. *Antiretroviral drugs for treating pregnant women and preventing HIV infections in infants*. Available from http://www.who.int (accessed 07 April 2010).

World Health Organization. 2010b. *Guidelines on HIV and infant feeding*. Available from http://apps.who.int/iris/bitstream/10665/44345/1/9789241599535_eng.pdf (accessed 27 November 2012).

World Health Organization. 2010c. *PMTCT strategic vision: 2010-2015*. Available from http://www.who.int/hiv/pub/mtct/strategic_vision.pdf (accessed 27 November 2012).

World Health Organization. 2010d. *WHO recommendations on the diagnosis of HIV infection in infants and children*. Available from http://apps.who.int/iris/bitstream/10665/44275/1/9789241599085_eng.pdf (accessed 27 November 2012).

World Health Organization. 2011a. *Global HIV/AIDS response*. Available from http://www.who.int (accessed 12 April 2012).

World Health Organization. 2011b. *Towards the elimination of mother-to-child transmission of HIV*. Available from http://www.who.int (accessed 07 April 2012).

World Health Organization. 2012a. *Global monitoring framework and strategy for the global plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive.* Available from http://apps.who.int/iris/bitstream/10665/75341/1/9789241504270_eng.pdf (accessed 27 November 2012).

World Health Organization. 2012b. *Measuring the impact of national PMTCT programmes*. Available from http://apps.who.int/iris/bitstream/10665/75478/1/9789241504362_eng.pdf (accessed 27 November 2012).

World Health Organization 2013. *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection*. Available from http://www.who.int/hiv/pub/guidelines/arv2013/en/index.html (accessed 12 July 2013).

Wringe, A, Isingo, R, Urassa, M, Mailseli, G, Manyalla, R, Changalucha, J, Mngara, J, Kalluvya, S & Zaba, B. 2008. Uptake of HIV voluntary counselling and testing services in rural Tanzania: implications for effective HIV prevention and equitable access to treatment. *Tropical Medicine and International Health* 13(3):319-327.

Youngleson, MS, Nkurunziza, A, Jennings, K, Arendse, J, Mate, KS & Barker, P. 2010. Improving a mother to child HIV transmission programme through health system redesign: quality improvement, protocol adjustment and resource addition. Available from: http://www.plosone.org (accessed 12 April 2012).

Yuvi, NE & Tronchin, DM. 2010. *Quality of maternal-child health care at a university hospital, according to the nurses' perspective*. Available from http://www.ee.usp.br/reeusp (accessed 29 January 2013).

Ziske, J, Kunz, A, Sewangi, J, Lau, I, Dugange, F, Hauser, A, Kirschner, W, Harms, G & Theuring, S. 2013. Hematological changes in women and infants exposed to an AZT-containing regimen for prevention of mother to child transmission of HIV in Tanzania. *PLoSONE* 8(2):1-9.

==========

Annexure 1: Data collection tool English version

Instrument 1. Structured interview schedule: mothers

Section A: Patient characteristics				
1. Interview number				
2. Medical Record Number (MRN)				
3. ART or Pre-ART number				
4. Health facility number				
5. Age of the mother				
6. Age of the baby (in months) at the time of interview				
7. Name of the data collector				
8. Name of the health facility				
9. Where do you live?	Region	Sub city	Woreda/Kebele	

Section B: Infant feeding counseling and practice				
1. How often was the mother counseled about infant feeding options before and after baby's birth?				
2. About which baby feeding options was the mother counseled?				
3. Which baby feeding option actually used?				
4. If the mother chose formula feeding, what kind of instruction did she receive?	I. Demonstration how to use a cup and spoon	II. Written instruction	III. Both	IV. No instruction

5. If the mother has chosen to stop breastfeeding, what type of feeding is she giving her baby?				
6. Who undertakes follow--up discussions and/or checks with the mother about the baby's feeding?	I. Health care provider, please specify	II. Community volunteer, please specify	III. Family member, please specify	IV. No body
7. For how long has the mother been feeding the baby in her chosen manner?				
8. What complementary foods are given to the child?				
9. At what age was complementary food introduced to the baby?				

Section C: Patient satisfaction						
Scoring, based on likert scale 1=strongly agree 2=agree 3=uncertain 4=disagree 5=strongly disagree						
I. Expectations about the infrastructure						
	1	2	3	4	5	Remark

1. The health facility is clean and attractive						
2. The waiting room is comfortable						
3. There are enough seats in the waiting room.						
4. The toilets are clean and in good, working order						
5. The health facility is a safe place for patients						
6. The health facility is a wheelchair friendly environment						
7. There are visible directions for patients to know where to go.						
8. There is a notice with the name and contact details of the person in charge for the day, should any problems arise or patients wish to contact the person in charge of the facility						
9. All things considered, I am satisfied with the infrastructure of the health facility.						
II. Accessibility and availability of the PMTCT services						
	1	2	3	4	5	Remark
1. It takes me more than 30 minutes to get to the health facility.						
2. The health facility renders services during convenient hours						
3. How many minutes do you have to wait before you are being attended to at this facility						
4. What do you think could be done to reduce these waiting times at this clinic?						
5. Sometimes I cannot get the prescribed medicines because of shortages (‘stock-outs’)						

6. I can reach a referral hospital when necessary						
7. After being seen at the clinic how many minutes do you have to wait at the pharmacy to receive your medicines?						
8. Why do you think patients have to wait so long at the pharmacy to receive their medicines?						
9. There is a visible suggestion box in the health facility to voice my opinions and concerns anonymously						
10. All things considered, I am satisfied with the accessibility and availability of the PMTCT services						
III. Affordability of PMTCT service						
	1	2	3	4	5	Remark
1. How much money do you have to pay for transport to reach the clinic (one way)?						
2. How much do you pay for the services of ANC at each visit?						
3. How much do you pay for the clinic's PMTCT service for yourself and your baby at each visit?						
4. How much do you spend on your family's food (groceries) per week?						
5. I do receive health care at this clinic even if I cannot pay the money asked						
6. The care I received is worth the money I paid						
7. Treatment given is of acceptable quality						
8. The healthcare workers discriminate among patients according to race						
9. The healthcare workers discriminate among						

patients according to age						
10. The healthcare workers discriminate among patients according to status						
11. I can afford to pay the fees for the PMTCT services						
IV. Perception of the patients about the nurses/midwives						
	1	2	3	4	5	Remark
1. There are too few nurses/midwives at this clinic						
2. I feel comfortable talking to the nurses/midwives						
3. The nurses/midwives treat me with respect						
4. The nurse/midwives explain to me what is wrong with me						
5. What risks the nurses/midwives explain to you could be involved with PMTCT						
6. What benefits the nurses/midwives explain to you could be involved with PMTCT						
7. I can ask question from the nurses/midwives without being afraid						
8. I am pleased with the way I am treated by the midwives at this health facility						
9. The nurses/midwives sometimes use words that I do not understand.						
10. The nurses/midwives ignored some of the questions I asked.						
11. All things considered, I am satisfied with the interaction between me and the nurses/midwives.						

Section D: HIV testing and counseling						
1. In which way was HIV information provided before you were tested ?	I. Group session	II. Couples	III. Individual			
2. I could ask questions during the HIV pre-test information session			I. Yes		II. No	
3. I was informed by the nurse/midwives, during the pretest information session, that I have the right to say “No” to HIV testing			I. Yes		II. No	
4. I received counseling after the HIV testing has been completed.			I. Yes		II. No	
5. What is the reason made you to test for HIV?						
6. Was your privacy maintained during HIV testing and counseling?			Yes		No	
7. Was your confidentiality maintained during HIV testing and counseling?			Yes		No	
8. Have you disclosed your HIV status? If yes to whom?			Yes If yes to whom		No	
Section E. Factors affecting PMTCT service utilisation						
1. Marital status of the	I. Never married	II. Live in union	III. Married	IV. Separated	V. Divorced	VI. Widowed

mother						
2. What is the highest level of education you have passed?	I. I have never attended school	II. Grade 1-6	III. Grade 7-8	IV. Grade 9-12	V. University/ College	
3. What is your employment status?	I.Full time employed	II.Part-time employed	III.Self employed	IV. Unemployed.		
4. My monthly income is ……. birr, per month						
5. I have to travel ……. Km from my home to this health facility						
6. What is religion of the mother	I. Christian	II. Muslim	III.Other, please specify			
7. Stigma and discrimination						
Perceived stigma						
7a. Some people are afraid to touch me once they know I have HIV				Agree	disagree	
7b. Some people have physically backed away from me once they learned I have HIV				Agree	Disagree	
7c. Some people act as if it is my fault I have HIV				Agree	Disagree	
7d. People seem uncomfortable being around me once they learn I have HIV				Agree	Disagree	

Internalised stigma					
7e. I sometimes feel worthless because I am HIV positive			Agree	Disagree	
7f. I feel guilty because I have HIV			Agree	Disagree	
7g. In the past 12 months, have you ever found yourself avoiding or isolating yourself from friends or family because of your HIV status			Yes	No	
Enacted stigma (discrimination)					
In the past 12 months, have you faced any of the following?					
7h. Excluded from social events			Yes	No	
7i. Abandoned by partner			Yes	No	
7j. Abandoned by other family members			Yes	No	
7k. Verbally abused or ridiculed			Yes	No	
7l. Physically assaulted			Yes	No	
7m. Fired from work			Yes	No	
7n. Expelled from your home			Yes	No	
7o. Had property take away			Yes	No	
7p. Denied health services			Yes	No	
8. What did you know about PMTCT before you were diagnosed with HIV positive?					
9. Who provided you with this knowledge about PMTCT?	I. Health extension worker	II. Community volunteer	III. Health care provider	IV. Mass media	V. Other, specify :

10. What is your partner's HIV test result?	I. HIV positive	2. HIV negative	3. Unknown by me		
11. Does your partner know that you use PMTCT services?	I. Yes	II. No			
12: In what ways does your partner make it easier or more difficult for you to use the PMTCT services?					
13. How many people know that you are HIV infected?					
14. Please list the people who know about your HIV status. (only list first three persons)					
15. In what ways do these persons (other than your partner) assist you to use PMTCT services?					

Instrument 2. Document review checklist: Mothers

Section A: Health status of the mother						
1. CD4 count (give also date)	1st count	2nd count	3rd count	4th count	5th count	6th count

2. CD4 count most recent (give also date)						
3. WHO clinical stage (give also date)	1st visit	2nd visit	3rd visit	4th visit	5th visit	6th visit
4. WHO clinical stage most recent	I. 1	II. 2	III. 3	IV. 4		
5. Other illnesses diagnosed at enrollment						
6. Other illnesses developed later on during follow up						
Section B: Factors affecting HIV status of the baby						
1. Weight of the mother	1st visit	2nd visit	3rd visit	4th visit	5th visit	6th visit
2. Weight of the mother most recently						
3. Height of the mother						
4. Number of pregnancies						
5. Number of live births						
6. Number of abortions						
7. Number of still births						

8. Nipple fissure	I. Present	II. Absent		
Section C: HIV testing and counseling of pregnant women				
1. What is HIV status at enrollment?	I. Known	II. Unknown		
2. If known what was the date of HIV test?				
3. If unknown what was gestational age at HIV positive test result?				
4. If unknown what was the date of HIV positive test result				
Section D: Antiretroviral for the mother				
1. What antiretrovirals the mother took for PMTCT?	I.ARV prophylaxis	II. ART		
2. Name of medication	Morning dose	Midday dose	Evening dose	Daily total
	(# of pills)	(# of pills)	(# of pills)	(# of pills)
a.				
b.				
c.				

3. At what gestational age antiretrovirals given?			
4. CD4 count when antiretrovirals was commenced			
5.WHO stage when antiretrovirals was commenced			
6. Where is the antiretrovirals given?	I. ANC clinic	II. Labour & Delivery unit	III. ART clinic
7. What ARV side effects observed?			
8. Is the mother receiving ARV as prescribed?	I. Yes		II. No
Section E: Family Planning			
1. Did the mother used family planning services?	I. Yes		II. No
2. If yes, when?	I.Before become pregnant		I. Currently
3. What was the type of contraceptive used?			
4. Any side effects of the contraceptive?			

Instrument 3. Document review checklist: baby

Section A: Back ground information						
1. Medical Record Number (MRN)						
2. ART/Pre-ART number						
3. Baby's date of birth						
4. Gender of the baby		I. Male		II. Female		
Section B: Factors affecting HIV status of the baby						
1. Mode of delivery	I. Vaginal	II. Assisted vaginal		III. Episiotomy		IV. Ceasarean section
2. Newborn APGAR score – give the actual score						
3. Age of the infant at subsequent visits		1st visit	2nd visit	3rd visit	4th visit	5th visit	6th visit
4. Newborn weight						
5. Weight of the baby during subsequent visits		1st visit	2nd visit	3rd visit	4th visit	5th visit	6th visit
6. Gestational age during delivery						
7. Any disease of the baby						
Section C: Antiretroviral prophylaxis for the baby						
1. Did the baby receive ARV prophylaxis		I. Yes		II. No		
2. If yes, name of ARV drug and dosage (according to the age of the child)		Birth to 6 weeks	6 weeks to 6 months	6 months to 9 months	>9 months to end of BF	

a. Name of ARV drug=				
3. Age of the baby when ARV prophylaxis started?				
4. For how long was ARV prophylaxis given?				
Section D: Infant HIV status				
1. What kind of HIV test was done for the baby? (if both tests done indicate as such)	I. DNA-PCR		II. Rapid test	
2. At what age did the baby receive the HIV test result?	I. When DNA-PCR done		II. When rapid test done	
3. What was the result of the test	I. DNA-PCR test result		II. Rapid test result	
	a. HIV positive	b. HIV negative	a. HIV positive	b. HIV negative

Annexure 2: Data collection tool Amharic version

መረጃ መሰብሰቢያ 1፡ ቃለ መጠይቅ፡ ለእናቶች

ክፍል ሀ፡ የህሙማን ባህሪያት				
1. የቃለ መጠይቅ ቁጥር				
2. ሜዲካል ሪከርድ ቁጥር (MRN)				
3. ኤአርቲ ወይም ፕሪኤአርቲ ቁጥር				
4. የጤና ተቋም ቁጥር				
5. የእናትየው ዕድሜ				
6. የልጅየው ዕድሜ (በወራት) ቃለ መጠይቅ በሚደረግበት ሰአት				
7. የቃለ መጠይቅ አድራጊው/ዋ ስም				
8. የጤና ተቋሙ ስም				
9. መኖሪያ አድራሻ	ክልል	ክፍለ ከተማ	ወረዳ/ ቀበሌ	

ክፍል ለ፡ የሕጻኑ አመጋገብና የምክር አገልግሎት				
1. ስለ ልጅ አመጋገብ አማራጮች ከመውለዶት በፊትና በሁዋላ ምን ያህል ጊዜ የምክር አገልግሎት አግኝተዋል?				
2. የትኛውን አይነት የልጅ አመጋገብ አማራጭ የምክር አገልግሎት አግኝተዋል?				
3. ሕጻኑ የትኛውን አይነት አመጋገብ አማራጭ ተጠቀመ/ች?				
4. እናትየዋ ፎርሙላ አመጋገብ ለሕጻኑ እየሰጠች ከሆነ ከጤና ተቋሙ ምን አይነት መመሪያ አግኝታለች?	ሀ. ብረጭቆንና ማንኪያን እንዴት መጠቀም እንዳለባት	ለ. የጽሁፍ መመሪያ	ሐ. ሁለቱንም	መ. ምንም አይነት መመሪያ አላገኘችም
5. እናትየዋ ጡት መመገብ አቁማ ከሆነ ህጻኑን በምን አይነት መልኩ እየመገበች ነው?				

6. ስለ ሕጻኑ አመጋገብ እናትየውን አየተከታተለ ያለው ማን ነው?	ሀ. የጤና ባለሙያ፤ እባክዎ ሙያውን ይግለጹ	ለ. የማሕበረሰብ በጎ ፈቃደኛ፤ እባክዎ በአይነት ይግለጹ	ሐ. የቤተሰብ አባል፤ እባክዎ ቅርበቱን ይግለጹ	መ. ማንም አይከታተልም

7. እናትየው የመረጠችውን የአመጋገብ አይነት ለምን ያህል ጊዜ ሕጻኑን መግባለች?
8. ለሕጻኑ የተሰጠ ተጨማሪ የምግብ አይነት ምን ነበር?
9. ሕጻኑ ስንት አመት ሲሞላው ተጨማሪ ምግብ አገኘ/ች?
ክፍል ሐ. የሕሙማን እርከታ
ላይከርት ስኬል ላይ መሰረት ተደርጎ የሚሞላ 1=በጣም እስማማለሁ 2=እስማማለሁ 3=ግልፅ አይደለም 4=አልስማማም 5=በጣም አልስማማም
ስለ ጤና ጣቢያው/ሆስፒታሉ አጠቃላይ ሁኔታ

	1	2	3	4	5	አስተያየት
1. የጤና ተቋሙ ንፁህና ሳቢ ነው						
2. ተራ መጠበቂያው ክፍል ምቾት አለው						
3. ተራ መጠበቂያው ክፍል በቂ መቀመጫዎች አሉት						
4. ሽንት ቤቱ ንፁህና ጥሩ ሁኔታ ላይ ይገኛል						
5. ጤና ተቋሙ ለህሙማን ደህንነት አስተማማኝ ቦታ ነው						
6. ጤና ተቋሙ ዊል ቼር መጠቀም ያስችላል						
7. ህሙማን ወደ ሚፈልጉበት ቦታ እንዲሄዱ አቅጣጫ ጠቋሚ ጽሁፍ አለ						
8. የእለቱ ተረኛ ጤና ባለሙያ ስምና አድራሻ የሚጠቁም ማስታወቂያ አለ						
9. ሁሉንም ነገሮች ከግምት ውስጥ በመክተት በአጠቃላይ የጤና ተቋሙ ሁኔታ						

ረክቻለሁ						
ከእናት ወደ ልጅ ኤችአይቪ እንዳይተላለፍ የሚሰጥ አገልግሎት ተደራሽነትና አቅርቦት						
	1	2	3	4	5	አስተያየት
1. ወደ ጤና ተቋሙ ለመምጣት ከ30 ደቂቃ በላይ ይወስዳል						
2. ጤና ተቋሙ ምቹ በሆኑ ጊዜያት አገልግሎት ይሰጣል						
3. አገልግሎቱን ከማግኘቶት በፊት ምን ያህል ደቂቃዎች መጠበቅ አለቦት?						
4. ምን ቢደረግ በዚህ ክሊኒክ ውስጥ አገልግሎት ለማግኘት የሚፈጀውን ጊዜ መቀነስ ይቻላል?						
5. የታዘዙትን መድሃኒቶች በእጥረት ምክንያት ማግኘት አይቻልም						
6. አስፈላጊ ሲሆን የሪፈራል ሆስፒታል አገልግሎት ማግኘት ይቻላል						
7. በክሊኒክ ውስጥ አገልግሎት ከገኙ በኃላ ከፋርማሲ መድሃኒት ለመውሰድ ምን ያህል ደቂቃ ይወስዳል?						
8. ህመማን ከፋርማሲ መድሃኒት ለመውሰድ ረጅም ጊዜ የሚወስድባቸው ለምን ይመስልዎታል?						
9. የሀሳብ መስጫ ሳጥን በሚታይ ቦታ ላይ ይገኛል						
10. ሁሉንም ነገሮች ታሳቢ በማድረግ ባገኘሁት አግልግሎት ረክቻለሁ						
ከእናት ወደ ልጅ ኤችአይቪ እንዳይተላለፍ የሚሰጥ አገልግሎት ክፍያ ተደራሽነት						

	1	2	3	4	5	አስተያየት
1. ወደ እዚህ ክሊኒክ ለመምጣት ለትራንስፖርት ምን ያህል ይከፍላሉ?						
2. በመጡ ቁጥር ለእርግዝና ክትትል ምን ያህል ይከፍላሉ?						
3. በመጡ ቁጥር ለእርሶም ለልጆትም ከእናት ወደ ልጅ ኤችአይቪ እንዳይተላለፍ ለሚሰጥ አገልግሎት ምን ያህል ይከፍላሉ?						
4. በሳምንት ለቤተሰቦት ምግብ ምን ያህል ወጪ ያደርጋሉ?						
5. ምንም እንኳን የተጠየቀውን ገንዘብ መክፈል ባልችል የህክምና አገልግሎቱን አገኛ ለሁ						
6. ያገኘሁት አገልግሎት ለከፈልኩት ገንዘብ የሚመጥን ነው						
7. ያገኘሁት የህክምና አገልግሎት ጥራቱን የጠበቀ ነው						
8. የጤና ባለሞያዎቹ ዘርን መሰረት በማድረግ አድልዎ ያደርጋሉ						
9. የጤና ባለሞያዎቹ ዕድሜን መሰረት በማድረግ አድልዎ ይፈፅማሉ						
10. የጤና ባለሞያዎቹ ማህበራዊ ደረጃን መሰረት በማድረግ አድልዎ ይፈፅማሉ						
11. ከእናት ወደ ልጅ ኤችአይቪ እንዳይተላለፍ ለሚሰጠው አገልግሎት የመክፈል አቅም አለኝ						

ህሙማን በነርሶች ወይም አዋላጅ ነርሶች ላይ ያላቸው አመለካከት						
	1	2	3	4	5	አስተያየት
1. በክሊኒኩ ውስጥ በጣም ጥቂት ነርሶች ወይም አዋላጅ ነርሶች ይገኛሉ						
2. ከነርሶች ወይም አዋላጅ ነርሶች ጋር ሳወራ ምቾት ይሰማኛል						
3. ነርሶች ወይም አዋላጅ ነርሶች ያከብሩኛል						
4. ነርሶች ወይም አዋላጅ ነርሶች ያስብኝን ችግር ያብራሩልኛል						
5. ከእናት ወደ ልጅ ኤችአይቪ እንዳይተላለፍ ከሚሰጠው አገልግሎት ጋር በተያያዘ ነርሶች ወይም አዋላጅ ነርሶች ያብራሩሎት ችግር ምንድን ነው?						
6. ከእናት ወደ ልጅ ኤችአይቪ እንዳይተላለፍ ከሚሰጠው አገልግሎት ጋር በተያያዘ ነርሶች ወይም አዋላጅ ነርሶች ያብራሩሎት ጥቅም ምንድን ነው?						
7. ነርሶችን ወይም አዋላጅ ነርሶችን ሳልፈራ ጥያቄ መጠየቅ እችላለሁ						
8. በነርሶቹ ወይም አዋላጅ ነርሶቹ አገልግሎት ተጠቃሚነት ደስተኛ ነኝ						
9. ነርሶቹ ወይም አዋላጅ ነርሶቹ አንዳንድ ጊዜ የማልረዳቸውን ቃላት ይጠቀማሉ						
10. ነርሶቹ ወይም አዋላጅ ነርሶቹ ከምጠይቃቸው ጥያቄ ውስጥ						

አንዳንዱን አይመልሱልኝም						
	1	2	3	4	5	
11. ሁሉንም ነገሮች ታሳቢ በማድረግ በኔና ነርሶቹ ወይም አዋላጅ ነርሶቹ መሃከል ባለው ግንኙነት ረክቻለሁ						

ክፍል መ. የኤች አይ ቪ የምክርና ምርመራ አገልግሎት

1. ከመመርመሮት በፊት ስለ ኤች አይ ቪ መረጃ ያገኙት እንዴት ነበር?	ሀ. በቡድን በሚሰጥ ትምህርት	ለ. ለባልና ሚስት በሚሰጥ ትምህርት	ሐ. በግለሰብ ደረጃ በሚሰጥ ምክር
2. ከኤች አይ ቪ ምርመራ በፊት መረጃ በሚሰጥበት ጊዜ ጥያቄ መጠየቅ እችል ነበር	ሀ. አዎ	ለ. አይደለም	
3. መረጃ በሚሰጥበት ጊዜ የኤች አይ ቪ ምርመራን አልፈልግም ማለት እንደምችል በባለሞያው/ዋ ተነግሮኝ ነበር	ሀ. አዎ	ለ. አይደለም	
4. የኤች አይ ቪ ምርመራ ከተከናወነ በኃላ የምክር አገልግሎት ተሰጥቶኝ ነበር	ሀ. አዎ	ለ. አይደለም	
5. ለኤች አይ ቪ ምርመራ ያነሳሳዎት ምንድን ነው?			
6. የኤች አይ ቪ ምክርና ምርመራ በሚደረግበት ሰአት ግላዊነቱ ተጠብቆሎት ነበር?	ሀ. አዎ	ለ. አይደለም	

7. የኤች አይ ቪ ምክርና ምርመራ በሚደረግበት ሰአት ሚስጥራዊነቱ ተጠብቆሎት ነበር?	ሀ. አዎ	ለ. አይደለም
8. የኤች አይ ቪ ውጤቶትን ለሶስተኛ ወገን ተናግረው ያውቃሉን?	ሀ. አዎ ለማን?	ለ. አይደለም

ክፍል ሠ. ከእናት ወደ ልጅ ኤች አይ ቪ እንዳይተላለፍ የሚሰጥ አገልግሎት ተጠቃሚነት ላይ ተጽዕኖ ያላቸው ሁነቶች

1. የእናት የዋ የጋብቻ ሁኔታ	ሀ. ያላገባች	ለ. ከወንድ ጋር አብራ የምትኖር	ሐ. ያገባች	መ. የተለያየች	ሠ. የፈታች	ረ. ባል የሞተባት
2. የት ምህ ርት ደረ ጃ	ሀ. ትምርት ቤት ፈፅማ ያልገባች	ለ. ከ1-6ኛ ክፍል የተማረች	ሐ. ከ7-8ኛ ክፍል የተማረች	መ. ከ9-12ኛ ክፍል የተማረች		ሠ. ዩኒቨርሲ ቲ/ ኮሌጅ የተማረች
3. በምን አይነት ስራ ይተዳደራሉ?	ሀ. ቋሚ ስራ	ለ. የትርፍ ጊዜ ሰራተኛ	ሐ. ራሱን ቀጥሮ የሚያሰራ	መ. ስራ የሌላት		
4. ወርሐዊ ገቢዎት በብር ምን ያህል ነው?						
5. ከቤቶት እስከ ጤና ተቋሙ ድረስ በኪሜ ምን ያህል ርቀት ይሄዳሉ?						
6. የእናትየው ሐይማኖት ምንድን ነው?	ሀ. ክርስቲያን	ለ. ሙስሊም	ሐ. ሌላ ከሆነ ይግለጹ			
7. አድልዎ እና መገለል						
የመገለል ስሜት						
7ሀ. አንዳንድ ሰዎች በኤች አይ ቪ መያዜን ሲያውቁ እኔን ለመንከት ይፈራሉ	እስማማለሁ	አልስማማም				
7ለ. አንዳንድ ሰዎች በኤች አይ ቪ መያዜን ሲያውቁ ይሸሹኛል	እስማማለሁ	አልስማማም				

7ሐ. አንዳንድ ሰዎች በኤች አይ ቪ መያዜን የእኔ ጥፋት አድርገው ይቆጥራሉ	እስማማለሁ	አልስማማም
7መ. ሰዎች በኤች አይ ቪ መያዜን ሲያውቁ በአጠገቤ መሆን ምቾት አይሰጣቸውም	እስማማለሁ	አልስማማም
ራስን ማግለል		
7ሠ. አንዳንድ ጊዜ ደስተኛ አልሆንም	እስማማለሁ	አልስማማም
7ረ. ኤች አይ ቪ በደሜ ውስጥ ስላለ ጥሩ ያልሆነ ስሜት ይሰማኛል	እስማማለሁ	አልስማማም
7ሰ. ባለፉት 12 ወራት ውስጥ በኤች አይ ቪ ምክንያት ራስዎን ከጓደኞችዎ ወይም ከቤተሰብ አግለው ያውቃሉን?	አዎ	አይደለም
መገለል		
ባለፉት 12 ወራት ውስጥ ከሚከተሉት የትኞቹ ደርሶቦት ያውቃል?		
7ሸ. ከማህበራዊ ድርጊቶች መገለል	አዎ	አይደለም
7ቀ. በትዳር ጓደኛ መባረር	አዎ	አይደለም
7በ. በሌላ የቤተሰብ አባል መባረር	አዎ	አይደለም
7ተ. መሰደብ	አዎ	አይደለም
7ቸ. አካላዊ ጥቃት	አዎ	አይደለም
7ነ. ከስራ መባረር	አዎ	አይደለም
7ኘ. ከራስ ቤት ውስጥ መውጣት	አዎ	አይደለም
7አ. ንብረትን መነጠቅ	አዎ	አይደለም
7ከ. የጤና አገልግሎት መከልከል	አዎ	አይደለም
8. ኤች አይ ቪ በደም ከመገኘቱ በፊት ስለ ኤች አይ ቪ ከእናት ወደ ልጅ እንዳይተላለፍ ስለሚሰጠው አገልግሎት የሚያውቁትን ቢነግሩን		

9. ኤች አይ ቪ ከእናት ወደ ልጅ እንዳይተላለፍ ስለሚሰጠው አገልግሎት	ሀ. የጤና ኤክስተንሽን ሰራተኛ	ለ. የማህበረሰብ በጎ ፈቃደኛ	ሐ. የጤና ባለሞያ	መ. ማስ ሜዲያ	ሠ. ሌላ ከሆነ ይግለጹ

መጀመሪያ መረጃ ያገኙት ከማን ነው?					
10. የባለቤትዎ/ ፍቅር ጓደኛዎት ኤች አይ ቪ ውጤት ምንድን ነው?	ሀ. ኤች አይ ቪ ፖዚቲቭ	ለ. ኤች አይ ቪ ኔጋቲቭ		ሐ. አይተወቅም	
11. ባለቤትዎ/ የፍቅር ጓደኛዎት ኤች አይ ቪ ከእናት ወደ ልጅ ንዳይተላለፍ የሚሰጠውን አገልግሎት መጠቀሞትን ያውቃል?	አዎ		አይደለም		
12. ባለቤትዎ/ የፍቅር ጓደኛዎት ኤች አይ ቪ ከእናት ወደ ልጅ አንዳይተላለፍ የሚሰጠውን አገልግሎት ንዲጠቀሙ በምን መልኩ ያግዞ ል ወይም ችግር ይፈጥርቦተል?					
13. አርሶ በኤች አይ ቪ መያዞትን ምን ያህል ሰው ያውቃል?					
14. አባክዎ ከእነዚህ ውስጥ የሶስቱን ስም ቢጠቅሱልን					
15. ከነዚህ ሰዎች ኤች አይ ቪ ከእናት ወደ ልጅ አንዳይተላለፍ የሚሰጠውን አገልግሎት አንዲጠቀሙ በምን መልኩ አያገዝዎት ነው?					

Annexure 3: Consent form English version

Consent form (English version)

You have been selected by chance to participate in a research titled Review of Prevention of Mother to Child Transmission of HIV in Addis Ababa, Ethiopia. I must read some information to you before we can begin with our interview. I will ask you to sign the form to indicate that I have explained the purpose of the study, and of the interview to you and that you have agreed to be interviewed out of your own free will. The signed form will be sealed in an envelope and placed in one container while the completed interview schedule will be placed into another container. Your name and your baby's name will not appear on the completed interview schedule.

The form just repeats what I have told you about the study, but I have to read it to you.

- I understand that I have been asked to participate in a research project exploring prevention of mother to child transmission of HIV services provided at hospitals and health centers in Addis Ababa, Ethiopia.

- I understand that during this study I will be asked questions about my own and my baby's health. My responses to these questions and my health information from the medical record, as well as my baby's information from the baby chart, will be recorded on the schedule.

- My participation in the study will be kept confidential, and our names will not be recorded on any form and our names will never be mentioned in relation to any information provided by me. Any report, based on the information obtained by conducting interviews with patients, will only contain numbers and statistics, no names of any patients.

- During the interview, I can refuse to answer any question that I do not want to answer and I may stop the interview at any time, without affecting my care or treatment, or my baby's care or treatment, in any way whatsoever.

- I realize that I will not benefit directly from this project, and will not be paid in money or in kind. However, with my participation, I hope to help investigators understand how to improve PMTCT services in Addis Ababa.

Declaration:

I have read this consent form (or have had it explained to me to my satisfaction). I understand what my participation will involve and agree to take part in this interview

under the terms of this agreement. I have had the opportunity to ask questions about it, and my questions have been answered to my satisfaction.

I voluntarily agree to participate in this study and I understand that I have the right to withdraw at anytime without affecting my and/or and my baby's care and treatment. On behalf of my baby, I also agree to answer questions concerning his/her health and that treatment information from the baby chart, and from my clinic chart, may be used to evaluate the services provided at this facility.

Respondent

Name----------

Date----------

Signature or thumbprint if appropriate----------

Researcher

Name----------

Date----------

Signature----------

Annexure 4: Consent form Amharic version

የጥናት ተሳትፎ ስምምነት ውል

ኤች አይ ቪ ከእናት ወደ ልጅ እንዳይተላለፍ በአዲስ አበባ ለሚደረገው ጥናት በፅድል ተመርጠዋል።ቃለ መጠይቃችንን ከመጀመራችን በፊት መረጃውን አነብሎታለሁ።በሙሉ ፈቃደኝነት ለዚህ ቃለ መጠይቅ መስማማቶትን ለመግለጽ እዚህ ፎርም ላይ ይፈርሙልኛል።ይህ ፎርምና ቃለ መጠይቅ የተሞላመበት ቅጽ ለየብቻ በሳጥን ውስጥ ተቆልፎባቸው ይቀመጣሉ።የሚሰጡን ምላሽ ከርሶ ስም ወይም ከልጅዎ ስም ጋር ሪፖርት አይደረግም።ስለዚህ ስምምነቱ የሚከተለውን ያከተተ ይሆናል።

- ኤች አይ ቪ ከፅናት ወደ ልጅ ፅንዳይተላለፍ በአዲስ አበባ ሆስፒታልና ጤና ጣቢያ ለሚደረገው ጥናት በፍቃደኝነት እነድሣተፍ ተጠይቂአለሁ።
- በቃለ መጠይቅ ወቅት ስለ ልጂ እና ስለ ራሴ ጤና እንደምጠየቅ አውቃለሁ።የምሰጠው ምላሽ እና ከጤና መዝገባችን ላይ የሚወሰደው መረጃም እንደሚመዘገብ አውቃለሁ።
- የእኔ በዚህ ጥናት ውስጥ መሳተፍ ሚስጥራዊነቱን የጠበቀ ስለሚሆን የእኔም ሆነ የልጂ ስም ሪፖርት አይደረግም።የጥናቱ ውጤት ከቁጥር ጋር ብቻ ሪፖርት ይደረጋል።
- መልስ መስጠት የማልፈልገው ጥያቄ ሲኖር አለመመለስ እችላለሁ።በፈለኩት ሰአት ቃለ መጠይቁን አቋረጬ መሄድ እችላለሁ።ይህም የእኔንም ሆነ የልጄን የጤና ክትትል በምንም መልኩ ችግር ውስጥ አይከትም።
- በዚህ ጥናት ውስጥ መሳተፌ የአይነትም ሆነ የገንዘብ ክፍያ አያስጠኝም።ነገር ግን ጥናት አድራጊዎቹን ኤች አይ ቪ ከእናት ወደ ልጅ እንዳይተላለፍ የሚደረገውን አገልግሎት ይበልጥ እንዲገነዘቡ እረዳቸዋለሁ።

ምስክርነት

ይህንን የስምምነት ውል አንብቤ ወይም ተነቦልኝ በሚገባ ተረድቻለሁ።የእኔ ተሳትፎ ምን እንደሚያከትት በሚገባ አውቄአለሁ።ያልገባኝን ነገር በመጠየቅ አጥጋቢ መልስ አግኝቻለሁ።በዚህ ጥናት ውስጥ ስለ ራሴም ሆነ ስለ ልጂ ጤና የማውቀውን ለመናገርና ከጤና መዝገባችን ላይ የህክምና መረጃ እንዲወሰድ በሙሉ ፈቃደኝነት ተስማምቻለሁ።

የጥናት ተሳታፊ	ጥናት አድራጊ
ስም.....	ስም.....
ቀን.....	ቀን.....
ፊርማ ወይም የጣት አሻራ.....	ፊርማ.....

Annexure 5: Information sheet English version

Information sheet (English version)

I am pleased to inform you that you are selected by chance to participate in our research that focuses on review of prevention of mother to child transmission of HIV in Addis Ababa, Ethiopia. You are selected to participate in this research by chance and it is totally voluntary to continue with this study. The interview takes you only 20 minutes to complete. There is no anticipated risk associated with this study. However, you can discontinue from participation at anytime you want. However, your participation helps us to understand PMTCT service, patient satisfaction, health status of the mother, factors affecting rate of transmission of HIV from mother to child, PMTCT service utilisation and HIV status outcome of babies. The research is planned with the following objectives to:

- Describe HIV status of infants whose mothers used PMTCT services in Addis Ababa
- Evaluate the health outcomes of mothers using PMTCT services in Addis Ababa
- Assess patients' satisfaction levels with PMTCT services in Addis Ababa
- Evaluate PMTCT services in Addis Ababa
- Identify factors affecting HIV status of infants and PMTCT service utilisation in Addis Ababa
- Compare PMTCT services and its outcomes at hospitals and health centres in Addis Ababa

No names will be written on the interview schedule and the report will be written anonymously. The information will be generated confidentially using numbers only. There is no direct financial incentive or other in kind benefit for participation into this research but your participation helps us to improve the service. If you have questions you can ask anytime using the following address. Tefera Girma; Tell: 0911382129; email: 42014735@mylife.unisa.ac.za

Annexure 6: Information sheet Amharic version

የጥናት መረጃ

በአዲስ አበባ ኤች አይ ቪ ከ ናት ወደ ልጅ ንዳይተላለፍ በሚሰጠው አገልግሎት ላይ ለሚደረገው ጥናት ንዲሳተፉ በዕድል ተመርጠዋል።ስለዚህ በዕዚህ ጥናት ውሥጥ መቀጠልዎ ሙሉ በሙሉ በርሶ በን ፈቃደኝነት ብቻ ይሆናል።ይህን ቃለ መጠይቅ ለማጠናቀቅ 20 ደቂቃ ያህል ይወስዳል።በ ዚህ ጥናት ውስጥ መሳተፍ የሚያስከትለው ምንም አይነት ችግር የለም ነገር ግን ርሶ ከፈለጉ ከጥናቱ ተሳትፎ በፈለጉት ሰዐት ማቋረጥ ይችላሉ።ይሁንና የ ርሶ ተሣትፎ ስለ ኤች አይ ቪ ከ ናት ወደ ልጅ ንዳይተላለፍ የሚሰጠውን አገልግሎት ይበልጥ ለመረዳትና ለማሻሻል ያግዘናል።ጥናቱም የሚከተሉትን ዓላማዎች የያዘ ነው።

- ናቶቻቸው ኤች አይ ቪ ከዕናት ወደ ልጅ ንዳይተላለፍ የሚሰጠውን አገልግሎት የወሰዱ ሕፃናት ኤች አይ ቪ ውጤት መተንተን
- ኤች አይ ቪ ከ ናት ወደ ልጅ ንዳይተላለፍ የሚሰጠውን አገልግሎት የወሰዱ ናቶችን ጤና መገምገም
- ኤች አይ ቪ ከ ናት ወደ ልጅ ንዳይተላለፍ የሚሰጠውን አገልግሎት የወሰዱ ናቶችን ርካቶ ማጥናት
- ኤች አይ ቪ ከ ናት ወደ ልጅ ንዳይተላለፍ የሚሰጠውን አገልግሎት መገምገም
- ኤች አይ ቪ ከ ናት ወደ ልጅ ንዳይተላለፍ ና የሚሰጠውን አገልግሎት ተጠቃሚነት ላይ ተጽዕኖ የሚያሳድሩ ሁነቶችን መለየት
- ኤች አይ ቪ ከ ናት ወደ ልጅ ንዳይተላለፍ የሚሰጠውን አገልግሎት ና ውጤቱን በጤና ጣቢያና በሆስፒተል ለይቶ ማነፃፀር

የዚህ ጥናት ሪፖርት በሚፃፍበት ወቅት የርሶ ስም አይፃፍም።መረጃው ከቁጥር ጋር ብቻ ይቀርባል።በዚህ ጥናት ውስጥ መሳተፍ ምንም አይነት ክፍያ አያሰጥም ነገር ግን የሚሰጡን መረጃ አገልግሎቱን ንድናሻሽል ይረዳናል።ጥያቄ ሲኖርዎት የሚከተለውን አድራሻ በመጠቀም በቂ ማብራሪያ ያገኛሉ።

ተፈራ ግርማ ስልክ: 0911382129 E-mail: 42014735@mylife.unisa.ac.za

Annexure 7: Ethical clearance letter from UNISA

UNISA university of south africa

UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE

HSHDC/122/2012

Date: 12 December 2012 Student No: 4201-473-5

Project Title: Review of Prevention of Mother To Child Transmission of HIV in Addis Ababa, Ethiopia

Researcher: Tefera Girma Negash

Degree: D Litt et Phil Code: DPCHS04

Supervisor: Prof VJ Ehlers
Qualification: D Litt et Phil
Joint Supervisor: -

DECISION OF COMMITTEE

Approved [√] **Conditionally Approved** [ ]

Prof L Roets
CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE

Dr MM Moleki
ACTING ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

Annexure 8: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee

Reference ጫ/ጫ/ክ/4564/127
Date 27/7/2005EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie Hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 9: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Zewditu Hospital

የአዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
The Addis Ababa City Administration Health Bureau

Reference ጤ/ኃ/ከ/4564/227
Date 22/8/2005 EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Friehailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 10: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Yekatit 12 Hospital

የአዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
The Addis Ababa City Administration
Health Bureau

Reference ጤ/ጽ/ጥ/4560/227
Date 27/7/2005EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 11: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Bethezata Hospital

Reference ጤ/ጽ/ጽ/4564/227
Date 27/7/2005 Ec

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 12: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to MCM Hospital

የአዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
The Addis Ababa City Administration
Health Bureau

Reference ጤ/ቢ/ኢ/4560/227
Date 22/7/2005 ዓ.ም

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 13: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Kadisco Hospital

Reference ጊ/ጽ/ኮ/4569/27
Date 22/7/2008 EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 14: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Gulele Health Center

Reference ጽ/ፋ/ሐ/4564/207
Date 27/7/2005 EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 15: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Bole 17 Health Center

የአዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
The Addis Ababa City Administration
Health Bureau

Reference ጽ/ጽ/ሰ/1456/227
Date 27/7/2005 E.C

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 16: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Yeka Health Center

የኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፐብሊክ
የአዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
The Addis Ababa City Administration
Health Bureau

Reference ጤ/ጽ/ኮ/4564/227
Date 27/7/2005 EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 17: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Meshualekia Health Center

የአዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
The Addis Ababa City Administration
Health Bureau

Reference ጤ/ኢ/ኮ/4564/07
Date 27/7/2005EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 18: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Kotebe Health Center

Reference [illegible]/4564/227
Date 27/7/2005EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health facilities staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 19: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Kolfe Health Center

የአዲስ አበባ ከተማ አስተዳደር ጤና ቢሮ
The Addis Ababa City Administration
Health Bureau

Reference ጤ/ጽ/ኮ/4564/227
Date 27/7/2008 ዓ.ም

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

Therefore we request the health center staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 20: Ethical clearance letter from Addis Ababa City Administration Health Bureau Ethical Committee to Addis Ketema Health Center

Reference ጨ/ጨ/ጤ/4564/227
Date 27/7/2008 EC

To Zewditu Memorial Hospital
To Yekatit 12 Hospital
To Bethezata Hospital
To MCM Hospital
To Kadisco Hospital
To Gulele Health Center
To Bole 17 Health Center
To Yeka Health center
To Meshualekia Health Center
To Kotebe Health Center
To Kolfe Health Center
To Addis Ketema Health Center
Addis Ababa

Subject: Request to access Health Facilities to conduct approved research

This letter is to support Tefera Girma to conduct research, which is entitled as "Review of prevention of mother to child transmission of HIV in Addis Ababa".

The study proposal was duly reviewed and approved by Addis Ababa Health Bureau IRB, the principal investigator is informed with a copy of this letter to report any changes in the study procedures and submit an activity progress report to the Ethical Committee as required.

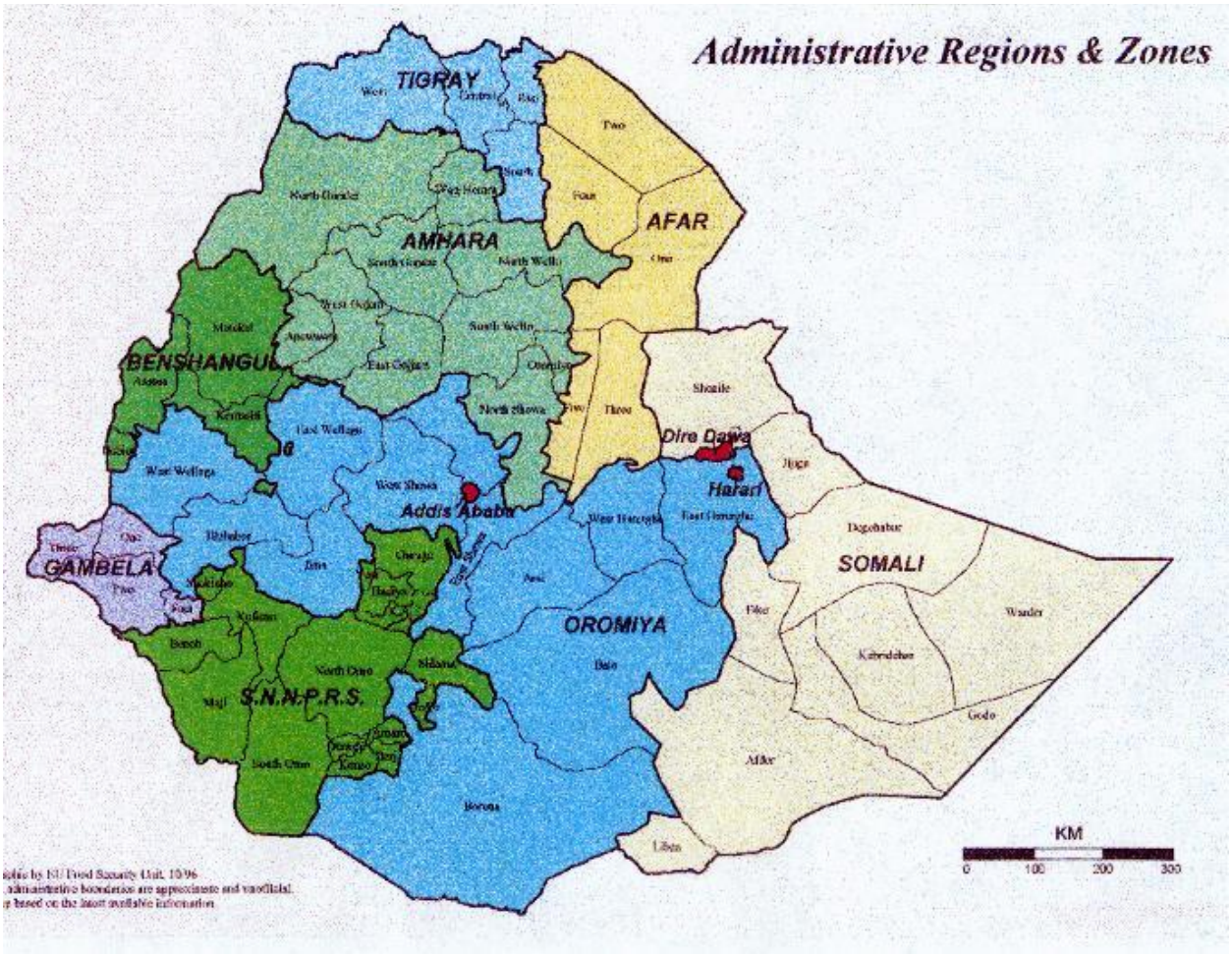
Therefore we request the health center staff to provide support to the Principal investigator.

With Regards

Frie hailu
Secretary, Ethical Clearance committee

Cc: - Tefera Girma
Addis Ababa
Ethical Clearance Committee
Addis Ababa

Annexure 21: Map of Ethiopia



Annexure 22: Letter of confirmation from English-Amharic translator

አዶናይ የትርጉም ጽ/ቤት
ADONAY TRANSLATION OFFICE
☎ 0911-52-37-35
አድራሻ: - ስታዲየም ከፔፕሲው ማዞ ፊትለፊት
Address: Stadium In front of Pepsi Watch
Email : adonytranslation2013@gmail.com
አዲስ አበባ-ኢትዮጵያ
ADDIS ABABA- ETHIOPIA

Letter of Confirmation from English – Amharic Translator

This is to confirm we have supported Tefera Girma Negash during the translation of his data collection tool from English to Amharic. The translated data collection tool is structured interview schedule for the thesis titled **"Review of Prevention of Mother to Child Transmission of HIV in Addis Ababa, Ethiopia".** We made sure that the meaning of English in the structured interview schedule is similar to the meaning of the Amharic structured interview schedule. Hence, we confirm that the meaning of the English and Amharic Structured interview schedule is the same.

With kind regards,

ታዘባቸው ዳኘው
Tazebachew Dagnew
አርታኢና ተርጓሚ
Editor & Translator

06-12-2013

አዶናይ የትርጉም ጽ/ቤት
0911 523735
102199
አዲስ አበባ
Addis Ababa
ADONAY TRANSLATION OFFICE

T. Dec 6,2013

Annexure 23: Letter of confirmation from a statistician

Letter of confirmation from a statistician

This is to confirm that I have assisted Tefera Girma Negash during analysis of his thesis titled **"Review of prevention of mother to child transmission of HIV in Addis Ababa, Ethiopia".** I helped him to make sure that appropriate statistical techniques and tests are used. I assisted him to determine kind of variables, make assumptions before analysis and select the right tests. Descriptive statistics used prior to using inferential statistics. Inferential statistics used during analysis of association between different variables such as kind of ARV versus HIV status of the baby, APGAR score versus HIV status of the baby and monthly income versus educational level of the women who used PMTCT service. Statistical Package for Social Sciences (SPSS version 20) was used to aid in the analysis.

Sincerely,

Tsegaye Hailu, MSc

Date: December 07, 2013

Signature: _____