HIV STATUS AND FACTORS ASSOCIATED AMONG HIV EXPOSED INFANTS UNDER PMTCT FOLLOW UP IN HEALTH FACILITIES IN, DIRE DAWA TOWN, EASTERN ETHIOPIA.

MPH THESIS

Nahom Abate Esayas (BSc)

May 2018.

HARAMAYA UNIVERSITY, HARAR.

HIV STATUS AND FACTORS ASSOCIATED AMONG HIV EXPOSED INFANTS UNDER PMTCT FOLLOW UP IN HEALTH FACILITIES IN, DIRE DAWA TOWN, EASTERN ETHIOPIA.

A thesis submitted to the School of Graduate Studies,

HARAMAYA UNIVERSITY

In Partial Fulfillment of the Requirements for the Degree of Masters of Public Health.

Nahom Abate Esayas (BSc)

College: Health and Medical Science

School: Public Health

Program: General public health

Major Advisor: Dr. LemessaOljira (PhD,Associate Professor)

Co-advisor: Dr. TesfayeGobena (PhD,Associate Professor)

May 2018.

HARAMAYA UNIVERSITY, HARAR.

APPROVAL SHEET

HARAMAYA UNIVERSITY

POSTGRADUATE PROGRAM DIRECTORATE

I hereby certify that I have read and evaluated this thesis,**"HIV status and factors associated among HIV exposed infants under PMTCT follow up in health facilities in, Dire Dawa town, Eastern Ethiopia"**By NAHOM ABATE I recommend that it will be submitted as fulfilling the thesis requirement.

Major Advisor

Dr. Lemessa Oljira (PhD, Associate Professor) _____ _____

Signature Date

Co-Advisor

Dr. Tesfaye Gobena (PhD, Associate Professor) _____ _____

Signature Date

As a member of the Board of Examiners of MPH Thesis Open Defense Examination, I certify that I have read and evaluated the thesis prepared by NAHOM ABATE and examined the candidate. I recommend that the thesis be accepted as fulfilling the thesis requirement for the master degree of General public health.

_____ _____ _____

Chairperson Signature Date

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Internal Examiner Signature Date

_____ _____ _____

External Examiner Signature Date

Final approval and acceptance of the thesis is contingent upon submission of its final copy to the Council of Graduate Studies (CGS) through the candidate's school graduate committee (SGC)

STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis.

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School/Department: School Of Public Health/General Public Health

BOGRAPHICAL SKETCH

My Name is Nahom Abate Esayas.I was born and raised in Haramaya Town, Eastern Hararge Zone, Oromia in 1991 G.C.I attended elementary school in Haramaya Model School, Ras mekonen Elementary School and SOS Herman Gminner school. Having completed my preparatory school in Harar SOS School, I joined Haramaya University, Collage of Health and Medical Science, Department of Public Health officer and stayed there until my graduation in 2014.In my stay in collage of health and medical science ,I have got the opportunity to read and practice various clinical and public health concepts and practices in different hospitals and field sites. Later on I was placed in Gursum woreda, Gursum Health center and have been working there for the past four years.

Acknowledgment

First of all I would like to acknowledge Haramaya University, School of Graduate Studies, for the initiation and close follow up of this research.

Next, I express my deepest gratitude for my advisors, Dr. Lemessa Oljira(PhD) and Dr. Tesfaye Gobena (PhD) in school of public health for their genuine support and advice.

My special thanks go to the data collectors of each health institution, members of Dire Dawa health bureau, my staff members and Gursum woreda health office.

Last but not least I thank my families and friends for their love and cooperation in every walks of my academic life.

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Acronyms and Abbreviations

ANC	Ante Natal Care
AIDS	Acquired Immune Deficiency Syndrome
DBS	Dried Blood Sample
DNA	Dribonuclic Acid
ETB	Ethiopian Birr
HAART	Highly Active Anti Retroviral Therapy
HAPCO	HIV/AIDS prevention and control office
HIV	Human Immune Deficiency Virus
HTC	HIV Testing and Counseling
HU	Haramaya University
Kms	Kilometers
MCH	Maternal and Child Health
MTCT	Mother to Child Transmission
MOH	Ministry of Health
NVP	Nevirapine
PCR	Polymerase Chain Reaction
PHCU	Primary Health Care Unit
PLHIV	People Living With HIV
PMTCT	Prevention of Mother to Child Transmission
UNICEF	United Nations Infants Children Education Fund
WHO	World Health Organization

ABSTRACT

Background: Mother to child transmission of Human Immunodeficiency Virus has resulted in 20% of an estimated 170,000 children which were found to be infected in the year 2014.In the absence of any intervention, among 100 infants born from an HIV infected mother, there is an overall 20 to 45 % risk of transmission from 18 to 24 month. Although, studies have shown the prevalence of human immunodeficiency virus among exposed infants in Ethiopia range from 4% to 17%,there is limited available study that has been done that show the status of exposed infants and therefore this study show the overall status of the exposed infants in Dire Dawa town.

Objective: The objective of the study was to assess the Human Immunodeficiency Virus status and factors associated among exposed infants under prevention of mother to child transmission follow up in health facilities in Dire Dawa Town from February 5 -15/2018.

Methods: Institution based retrospective cross-sectional study design using quantitative method was conducted. The source population for the study was all Human Immunodeficiency Virus exposed infants on follow from January 1, 2014 to December 31, 2017 and study population were those with complete registration. Sample of 653 complete charts were included in the study based on the criteria of completeness of the charts. Nurses were selected for data collection. Possible associations and statistical significance between variables was measured using crude and adjusted odds ratio, P value <0.05 was used to declare statistical significance.

Results: The anti body test result at 18 month show, 56(8.6%), (95% CI (6.4,11.0),infants were positive. Mothers who didn't start HAART early after diagnosis were 11.7 times more likely to be predisposed to have an infected child. (AOR=11.7:(95% CI,1.7,76.7). Mothers who had CD4 level below 350 were 3.1 times more likely to have an HIV infected infant when compared to those who have greater than 500 (AOR=3.1:95% CI: 1.5, 8.5).Home delivery is related with 10.74 times more likely for the mother to have an infected infant (AOR=10.74:95% CI, 2.2, 52.8).Mixed feeding practice was 12.1 times more likely of having an infected child (AOR=12.1:95% CI, 3.9, 36.4) and Sickness during follow up increases transmission of the HIV virus from the mother to infant by 3.5 times (AOR=3.5:95% CI, 1.5, 8.1)).

Conclusion: Even though positivity status has decreased considerably in the study area in comparison to other areas, this result is greater when compared to the national program to totally interrupt vertical transmission of the virus to less than 2%.

Recommendation: In order to avert this condition, ante natal care service including PMTCT at pregnancy, labor and delivery and PNC should be strengthened and implemented according to the national protocol. HIV positive mothers should be actively encouraged to take role in PMTCT program through mother support groups in the facilities. Care providers should follow the mothers and infants regarding child care and support. Home delivery should be strictly discouraged in all areas of the country even in the presence of traditional birth attendants. Dire dawa health bureau should play roles in providing necessary human resource, financial and material support for care providers and health institutions as well.

Key Words: Prevention of Mother to Child Transmission, Human Immune deficiency virus, exposed infant, dried blood sample, Status of Human Immune Virus.

1. INTRODUCTION

1.1 Background

Mother to child transmission of HIV refers to when the virus passes from an HIV positive mother to her baby which can happen during pregnancy, during labor and delivery or during breastfeeding. (global health,2012).Since its advent in 1980s, the HIV pandemic has created a multi dimensional challenge to the survival of mankind (Hoffmann and Rock Stroh,2013).According to a global world report, about 170,000 children were found to be infected in the year 2014,of which over 20% of these infections took place during mother to child transmission of the virus was found to be the main route (WHO, 2015).

Globally, as of December 2012, over 900,000 pregnant women living with HIV received antiretroviral prophylaxis or treatment. Coverage of antiretroviral programs for prevention of mother to child transmission without, the less effective single dose NVP regimen increased from 57% inthe year 2011 to 62% in 2012 (UNAIDS, 2013).

Pediatric HIV disease can progress very rapidly and may require treatment before a positive diagnosis can be confirmed and client has been declared positive. Susceptibility of HIV infected infants increases to many opportunistic infections including PneumocysticCarini Pneumonia, Tuberculosis and other bacterial infections that are associated with high rates of mortality and morbidity (FMOH, 2014).

Factors including viral, maternal, obstetric, fetal and infant, influence the risk of mother to child transmission of the virus (UNICEF, 2009). The most important risk factor for MTCT is the amount of the virus in the mother's blood, known as the viral load. The risk of transmission to the infant becomes greater when the viral load is high (often greater than 1000 copies/ml), which is often the case with recent HIV infection or advanced AIDS (Lesotho MOH and social welfare, 2010).

Based on the South African 2010 PMTCT evaluation which is the first national evaluation of the PMTCT program in South Africa, the national PMTCT program resulted in 3.5% national MTCT rate in pregnancy and intrapartum. Transmission was reduced from the known 30% that would occur during pregnancy, labor and delivery in the absence of PMTCT interventions.

This could contribute towards a reduction in total HIV incident infection at a larger population level and to the expected pediatric HIV elimination, providing postnatal PMTCTinterventions to be intensified (AmenaGogga et al 2010).

Even though, Anti Retro Viral coverage among pregnant women living with HIV had reached 62% in 2012, and the number of children newly infected with HIV in 2012 was 35% lower than in 2009, achieving the global goal of reducing the number of children newly infected will require similar scale up of other prevention strategies, including primary HIV prevention for women and access to contraception and other family planning services. However, substantially greater efforts are needed to link pregnant women and children to HIV treatment and care; pregnant women living with HIV are less likely than treatment eligible adults overall to receive antiretroviral therapy, and treatment coverage among children living with HIV in 2012 was less than half the coverage for adults(UNAIDSGlobal report, 2013).

In Ethiopia, integrated service for the prevention of mother to child transmission of HIV/ AIDS was started in December 2011 and Option A service was taken in to consideration which recommends the use of single medication, following this, came the option B and recommended triple therapy until one week after the end of breast feeding. By the end of 2013, the currently operating option B^+ was implemented which addressed the four prongs of PMTCT and was found to be both clinically and economically feasible(EFMOH, 2013).

In Ethiopia, MTCT of HIV/AIDS ranges from 4% in Southern Ethiopia to 17 % in JimmaOromia region (Tariku Tadele, et al,2014;BelayBirlie. et al,2016).

According to Ethiopian ministry of health, the single point estimate was 1.14% and, 23,400 children under the age of 15 are taking ART medication (FrehiwotNigatu et al, 2014).

As a result of significant efforts made with the support of various sectors there has been considerable progress made in implementation of PMTCT services through integration to ANC clinics which are also provided free of charge. As a result, the number of facilities providing PMTCT services reached 1,445. However, less than a third of all estimated eligible pregnant women, were provided with ARV prophylaxis to prevent mother-to-child HIV transmission (FDRE HAPCO, 2012)

1.2 Statement of the Problem

The world has committed to ending the AIDS epidemic by 2030 in accordance with sustainability development goals(Sugandhi,2016). In the world's most affected region, eastern and southern Africa, the number of people on treatment has shown increment in more than doubled since 2010, reaching nearly 10.3 million people. Although AIDS related deaths in the region have decreased by 36% since 2010, huge challenges lie ahead (UNAIDS, 2012).

ANC is the most common entry point for a pregnant woman into the healthcare system; enrolment should ensure access to necessary PMTCT interventions.A diverse range of maternal, cultural and economic challenges hinder the success of PMTCT in developingcountries(Sibanda EL et al,2013).PITC during pregnancy is the initial step in the service offered for pregnant women within the service provision. Yet, factors including personal, systemic barriers related to ANC, distance and cost e.t.c. are greatly considered to be a challenge as they still contribute for the generational transmission of the virus (Sibanda et al, 2013).

In the absence of any intervention, among 100 infants born from an HIV infected mother,5-10% will be infected during pregnancy, 10-15% will be infected during labor and delivery, and again 10-15% will be infected during breast feeding and over all there is 20 to 45 % risk of transmission from 18 to 24 month. Early diagnosis of infections among infants with HIV followed by prompt ART treatment can help reducemorbidity and mortality among them. Failing to do thiswill usually lead to rapid disea se progression and death.Almost 50% of the infants infe cted during pregnancy ordelive ry died within their one year age , while about 50% of the child ren infected during breastfeeding died within nine years of the infection (LesetoMOH,2010).

Even though many countries have shown remarkable historic achievements in expanding access to ARV medicine for pregnant women living with HIV, progress has been much slower in some other countries (Daniel, 2012.). As of December 2012,13countries with generalized epidemics, including five priority countries (Angola, Chad, Democratic Republic of the Congo,

Ethiopia and Nigeria) reached less than 50% of pregnant women living with HIV with antiretroviral medicines to prevent vertical transmission.

According to Ethiopian Demographic and Health Survey report in 2016, from the mothers who participated in Dire Dawa administration, only 60.7% of women reported that HIV can be transmitted by breastfeeding, and risk of MTCT can be reduced by mother taking special drugs during pregnancy,showing that there is greater knowledge gap. Skilled delivery attendance was found to be 56.2%and women who had a postnatal checkup after birth was 27.8% (Cental statistical Agency, 2016). Even those who utilize skilled delivery services most often go untested for HIV, with devastating consequences for themselves and their newborns. As a result of this, the new borns will not acess prophylaxis and timely diagnosis which inturn results in morbidity and mortality of the child(USAIDS,2013).

Although, studies have shown the prevalence of HIV among exposed infants in Ethiopia range from 4 to 17% (Tariku Tadele, et al, 2014;Belay Birlie. et al, 2016) , the effect of option B+ implementation after its launch in January 2014, on the transmission of the virus hasn't been shown yet and this study is believed to show that difference.

There is limited available study that has been done in only one hospital (Dilchora) in Dire Dawa town that show the status of human immune virus exposed infants and therefore this study show the overall status of the human immune virus exposed infants in the town.

1.3 Significance of the Study

The study helps to increase quality and focus of care given to HIV positive mothers in order to make a better and healthier future of their new born.

Based on the result of the study obtained, it is possible to determine the level of HIV status and factors associated among HIV exposed infants under PMTCT follow up in health facilities in Dire Dawa town.

The result of this study also helps Dire Dawa health Bureau and other supportive nongovernmental sectors to use the results of the study to design health strategies that are consistent with the program.

In addition, the study gives insight and serve as base line data for researchers and planning of other intervention plan like; health education and promotion regarding PMTCT and HIV exposed infants activities.

1.4.Objectives

1.4.1 General objective

The objective of the study was to assess the HIV Status and factors associated among HIV exposed infants under PMTCT follow up in health facilities in Dire Dawa town, from February 5–15/2018.

1.4.2 Specific Objectives

1. To assess the status of HIVamongexposed infants under PMTCT follow up.
2. To assessfactors associated with HIV status among HIV exposed infants under PMTCT follow up.

2.LITRATURE REVIEW

2.1 HIV status among PMTCT follow-up infants

A cross sectional study done in rural Kenya, in June, 2014, the proportion of enrolled infants who become HIV infected between 2009 and 2012 were from 19.4% in 2006 to 8.9% in 2012 from the total 634 infants, HIV test was available for 444(70%) infants. Overall, 57 infants became infected before the age of 18 months which is 12.8% from the overall prevalence. More than half of infants who were enrolled in to care after 6 months of age became HIV infected before 18 months of age (Eunice WambuiNduati et al, 2015).

According to a cross sectional study done in DireDawa City Administration,inNovember 2015,during the follow-up from 2005 to 2013, there was maternal to child HIV transmission in60 (15.7%) of HIV tested infants; most of them 55 (91.7%) were confirmed by DNA-PCR. The transmission was higher in females than in males (17.6% versus 13.8%) of the total infants born to HIV positive mothers, 298 (78.0%) took ARV prophylaxis at birth and 217 (56.8%) received Co-trimoxazole prophylactic treatment(FissehaWudinehand BereketDamtew, 2015).

A study done in AselaTeaching and Referral Hospital, in December 2015,during the time period of February 2012- 2015,among one hundred thirty infants born to HIV positive mothers, ten (7.7%) tested positive for HIV at 18 months birth. The estimated HIV prevalence among HIV exposed infants at 6 weeks was 3.1%. The prevalence increased to 3.8% at 6 months and between 6weeks and 18months among infants who were still HIV free at 18 months 4.6% with 6 additional infants testing HIV positive (Mama Abdula,2015)

In another cross sectional study done in 17 health facilities from January to December 2012, in Amhara Region, Ethiopia, in 2014the prevalence of HIV infection among the infants bornto HIV positive mothers was 10.1% (44 out of 434 infants), with a 95% confidence interval between 7.3%and 13%.Infants born from a mother with an age group between 25-34 years were 1.4 times more likely to be positive, than the other age categories. Infants born from non educated mothers tend to be 8.4 times positive than those having educated mothers.DNA /PCR positivity was 10.6 times higher among infants who did not received ARV prophylaxis or ART at all. Those infants having a mixed feeding in the first six months of their lives were found to

be 12.4 times more DNA/PCR positive than those who receive exclusive breast feeding (ZelalemBerhan et al,2014).

A study on the outcome of HEIfrom September 2000 to August 2005 done in September 2016, in Hawassa and Yirgalem Hospitals show among 457 participants included under analysis, cumulative incidence rate of HIV positivity among infants was 19(4.16%)according to this study, an infant with mixed feeding option was 8.23 times at higher risk of developing HIV infection than infants on exclusive breast feeding counterparts. But there are no significant differences between exclusive replacements feeding and exclusive breast feeding.(Tariku Tadele,et al,2014).

According to a retrospective study done from September 2010 and December 2012 in JimmaUniversity Specialized Teaching Hospital,inJuly 2016, from a total of 146 infants born to HIV positive mothers 25 of them(17%) were found to be positive themselves. In this study some maternal and infant risk factors were found to be associated with mother to child HIV transmission (MTCT). On multivariable regression analysis, it was documented that mothers on late AIDS stage, absence of mothers PMTCT interventions, home delivery and mixed infant feeding were associated with increased risk of mother to child HIV transmission(Belay Birlie. et al,2016).

2.2 Associated factors of Mother to child transmission

A systematic review done in Sub Saharan Africa, in October 2015 compared with HIV unexposed infants, HIV exposed uninfected infants experience 3.17 times higher 12 months mortality risk. However, the effect of maternal was modified by maternal disease severity. HIV exposed uninfected infants born to mothers with CD_4 cell count <200 cell/µl were at substantially 2.62 times higher risk ofdeath than those born to mothers with CD_4 ≥400 cell/µl. Compared with children who were exclusively breast feed, both partially breastfeed and never breast feed children were at 2.6 times higher risk of death before 12 months even after adjusted for HIV status and socioeconomic variable (StanziLe Roux,et al 2016).

In a study done in Southern Rift region,in Kenya, in 2017,infantsbetween 2009 and 2012, whose mothers received ART prophylaxishad significantly lower HIV vertical transmission rate (6.7%) compared to infants whose mothers did not receive prophylaxis. Mixed feeding

was associated with close to threefold increase in the risk of vertical transmission among infants aged less than six months(EverlineAshiono, 2017).

Another nationally representative household survey conducted in Rwanda in may2012,between March 2007 and June 2008, Children born to HIV positive women who receive HAART during pregnancy were 60% less likely, to be infected with HIV when compared with child whose mothers did not take any ARV. Of the total 1455 children born to HIV positive mothers, 61(4.2%) were reported dead, including 44(30%) by 9 months .Children whose mothers were members of PLHIV association were 30% less likely to be infected with HIV and or dead compared with children whose mothers received HAART for PMTCT were 40% less likely to have HIV infection than children whose mothers had not received HAART (HindaRuton,2012).

Another retrospective study conducted in Malawi, in 2009, follow up HIV testing for HIV exposed infants was poor, only 28% of exposed infants were followed and tested at least once with in18-20 months of age.The other associated finding of this study is that among all HIV infected mothers; only 18% were able to follow all current PMTCT recommendations (Monique van Letto W, 2011).

Cross sectional study done in Kenya in February 2010, found out ANC attendance was associated with a 42% lower infant HIV infection risk and previous partner testing with a 43% reduction. Infection risk remains over 40% lower for infants of women with male attendance and with reported prior partner testing.HIV-infected infants of women with male attendance had2.07 greatermortality risk compared to those born to women without male attendance (Adam Aluisio,2011).

A retrospective cross sectional study done in rural Kenya, in June 2015, age at enrollment, nutritional status, residential distance from the hospital and mothers HAART status at the time of delivery were independently associated. Infants enrolled in to care after 6 months age had 23.3 times much higher risk of HIV infection compared to those enrolled for care within 3 months of age infants who exhibited any of the malnutrition syndrome and associated infection were twice as likely to acquire HIV infection compared to those living within 5 Kms of the Hospital. Infants born to mothers who were not on HAART at the time of the infants birth had

more than six fold risk of HIV infection compared to those born to mothers who had been on HAART for more than 24 months prior to delivery(Eunice Wambui Nduati,2015).

In a retrospective cross sectional study during the follow-up from 2005 to 2013 done in DireDawa City Administration,Dilchora Hospital in 2015, being rural resident was 3.29 times more likely to facilitate the transmission of the virus,3.35 times in home delivery, those infant not receiving ARV prophylaxis at birth were 5.83 times more likely to be positive, mixed feeding practice was 42.21 fold more likely to receive the virus and mother child pairs not on PMTCT were found to be the most important significant determinants of mother-to-child HIV transmission (FissehaWudinehand&Bereket Damtew,2015).

According to a retrospective studydone in Asela Teaching and Referral Hospital, in 2015,during the time period of February 2012- 2015, the findings showed significant association in infant's birth weight, mothers illness during pregnancy, mothers ARV or ART status, place of delivery and breast feeding. Infants birth weight less than 2.5 Kg was 2.7 times more likely to have acquired the virus. Mothers' illness during pregnancy had 20.4 times more chance of contracting the virus, mothers who failed ARV prophylaxis had 17.2 times more risk of having a positive infant and mixed feeding has a 2 times more risk of transmitting the virus(Mama Abdula, 2015).

In the same study mentioned above, an infant born to a mother who had not CD4 count was 3.8 times less likely to be HIV free survival compared infant born to a mother whose CD4 count done, controlling for the other variables. An infant born to a mother whose CD4 count is $<350mm^3$and $350\text{-}500mm^3$was 3.7and 3.1times respectively less likely to be HIV free survival compared infant born to a mother whose CD4 count >500mm3(Mama Abdula, 2015).

In a study done in health facilities in Amhara region, Southern Gonder in 2014, during the follow up period ofJanuary 1st to 31st December 2012, infants whose DBS was tasted after 6 weeks were 2.3 times more likely to have results than otherwise. Mothers who were not enrolled to HIV care and support service had relatively 6.9 times higher risk of giving birth of DNA/PCR positive infants than their counter parts. Infants born from mothers who receive neither ART nor ARV prophylaxis were 16 times more likely to be DNA/PCR positive than otherwise. Moreover, infants were 23.8 times more likely to be DNA/PCR positive if their

mothers took the ART or ARV prophylaxis for less than 4 weeks. And finally Infants born at home were 8.8 times more likely to be DNA/PCR positive than those born in health facility(ZelalemBerhan et al, 2014).

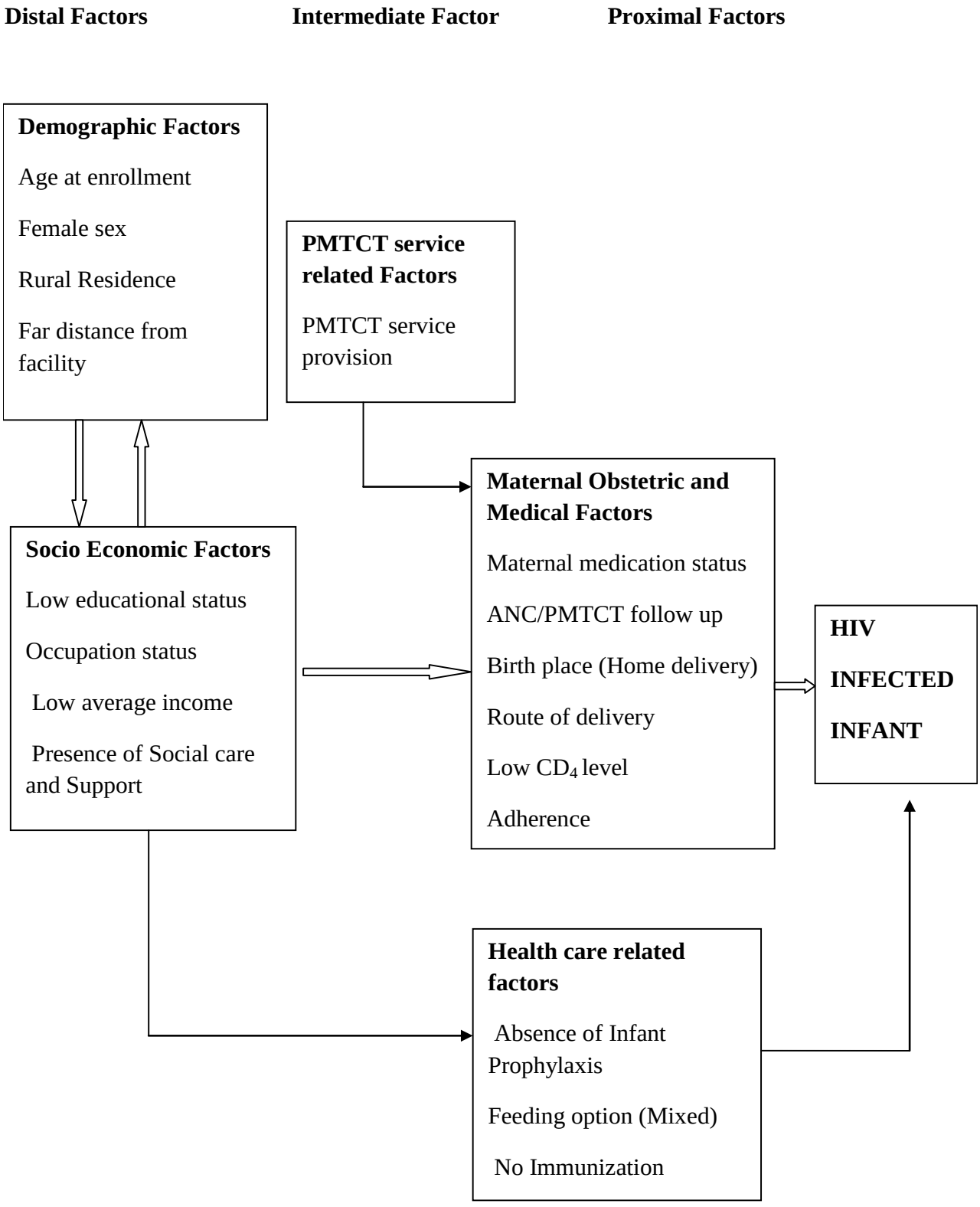
According to Central Statistical Agency, Ethiopian Demographic and Health Survey, 48 percent of women and 53 percent of men know that HIV can be transmitted by breastfeeding and that the risk of mother to child transmission can be reduced by taking special drugs. Knowledge regarding PMTCT is higher in urban than in rural areas, is lowest in Somali and highest in Addis Ababa, and increases with increasing education and wealth (Central Statistical Agency,2016).

According to a cross sectional study done in Ambo Hospital Oromia region in 2014, to assess the knowledge of pregnant mothers attending ANC on MTCT of HIV, study assessed the knowledge on PMTCT of HIV/AIDS of the pregnant mothers attending the hospital. All the respondents knew PMTCT of HIV. Of these, 105 (44.4%) of the respondents knew ART drugs given for HIV-positive pregnant mothers could reduce the risk of HIV transmission, 84 (35.7%) and 50 (20.3%) claimed condom and other methods as method of reducing HIV transmission.Regarding method of PMTCT of HIV during breast feeding the study had showed that exclusive breast feeding are the major method that scores 164 (69.5%), Diluted cow milk, no Breast feeding15 (6.4%) and Good Breast care 57 (24.2%). Majorities, 204 (86.4%) were aware of Exclusive breastfeeding options of infant feeding, but only 12 (5.1%) of the respondents suggested infant formula as an infant feeding option (GurmuTesfaye,2014).

A study done in Jimma University referral Hospital, in 2016, during the time from September 2010 and December 2012, Mothers at late WHO clinical stage (AIDS stage 3 or 4) near delivery were 5.8 times at higher risk of transmitting HIV to their exposed infants compared to mothers who were at HIV stage 1 or 2 .Mothers PMTCT intervention (use of HAART or single dose NVP) during pregnancy or labor reduced the risk of MTCT. If the mother did not receive HAART or single dose NVP, there was a fivefold risk of MTCTas compared to a mother who received at least one form of PMTCTintervention. Infants delivered at home had eighttimes higher risk of MTCT compared to those delivered at health institution. Infants feeding option was also another important predictor in which the risk of MTCT was highest among infants practicing mixed feeding. The odds of mother to child HIV transmission among children who

were on mixed feeding was 5.6 times higher compared to children who were on exclusive breast feeding(Belay Birlie, et al, 2016).

A study done by Nurelign et al,in 2016 in Gojjam Zone North West Ethiopia,during January to December 2012 mothers who became pregnant after they knew their HIV serostatus were 0.22 times less likely to have HIV positive child compared to those who know their HIV status during ANC or post partum after delivery. Children who were born from older mothers had 5.4 times more risk; infants whose mothers didn't get PMTCT intervention were at after they were 0.22 times aware of their HIV status (NurilignAbebe Moges,2017).



SOURCE:From the literature reviewed.

3. METHODS AND MATERIALS

3.1 Study area and Study period

The study was conducted in Dire Dawa Town.Geographically Dire Dawa Administration is located in eastern part of Ethiopia. Total area coverage of the administration is about 128,802 hectare.

The Town is 515 Kms from Addis Ababa and 55Kms away from the historical city of Hararalong the main road stretched between Addis Ababa and Djibouti and its main destination area for long distance track drivers and uniformed services.

Dire Dawais one of two chartered cities in Ethiopia (the other being the capital,AddisAbaba). Based on the 2007 census conducted by Central Statistical Agency of Ethiopia (CSA),Dire Dawa has a total population of 342,827,of which 171,930 were men and 170,897 women; 232,854 or 67.92% of population are considered urban inhabitants.

There are five hospitals in Dire DawaTown,namely, DilchoraReferal, Sabian Primary, Bilal, Art general hospital and Yemaryam Work (Delt) Hospital. The latter three are Private while the former two are governmental and all of them give comprehensive ART/PMTCT care. The total number of Primary Health Care Unit (PHCU)/ health centers in the city administration is 15 and among these, 7 are located in the town.These areLegehare Health Center, Dechatu Health center, Addis Ketema Health center,GendeQore Health center,Goro Health Center, Dire Dawa Health center and GendeGerada Health center.Currently, all of the health centers render PMTCT service.DireDawa Dill Chora Referral hospital is governmental specialized hospital in the town established in 1952E.C. and it is a hospital with 220 beds and 12case teams to provide both in and outpatient services to residents of Dire Dawa town and people residing in the vicinity of the town (DireDawa Administration Council, 2015).

The study was conducted from February 5 -15/2018.

3.2 Study Design

Institutional based retrospective cross-sectional study design was conducted using complete registration of follow up and during the time period of January 1, 2014 to December 31, 2017.

3.3 Source Population

The source populations for the study were all HIV exposed infants under PMTCT follow up.

3.4 Study Population

The study populations were HIV exposed infantswho have been under PMTCTand who had their test results donefor DNA/PCR and Antibody in 18 months.

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

All HIV exposed infants and their mothers who have had complete registration of their follow up and during the time period of January 1, 2014to December 31, 2017.

3.5.2 Exclusion Criteria

The exclusion criteria were those incomplete cards of exposed infants, mothers, transfer out, lost and those who stopped treatment were excluded from the study.

3.6 Sample Size determination

Sample size estimation for the first objective.

Sample Size was determined using single population proportion formula,taking the Prevalence of HIV among exposed infants to be 17% (According toa study in Jimma town, Oromia Region, 2016) marginal error (d) 0.03, (since the case is rare) non-response rates 10%, 95% confidence Interval and alpha 0.05 was considered, based on these assumptions, a total sample size of which is shown as follows:

$$N= \frac{(Z\alpha/2)^2 * P(1-P)}{d^2} = \frac{(1.96)^2 * 0.17(1-0.17)}{(0.03)^2}$$

$$=\frac{3.8416 * 0.1411}{0.0009}$$

=602 and considering 10% non - respondent rate

=602*10/100

=602+60=662

Sample size estimation for second objective (associated factor).

To estimate the sample size for the associated factors, I used the study article in Dire Dawa,FissehaWudinehandBereketDamtew, 2015by using Epi info version 7.

factor	Confidence level	Power	Ratio (unexposed: exposed)	% outcome in unexposed	% outcome in exposed	Estimated Sample Size
Infant prophylaxis	95%	80%	106/328=0.32:1	30/106*100=28 %	14/328*100=4.3%	106
Place of delivery	95%	80%	38/344=0.11:1	19/38*100=50 %	41/344**100=14%	127
Residence	95%	80%	41/314=0.13:1	15/41*100=37 %	45/341*100=13%	250

Therefore, since the total sample size of the study for the first objective is greater than the second ones, I tookthe first one (662)**complete mother infant pairs of charts.**

3.7 Sampling Procedure

All mother-infant pairs enrolled in PMTCT service registered fromJanuary 1, 2014 to December 31, 2017in the health facilities (Five Hospitals and Sevenhealth centers) in Dire Dawa town were included. The health facilities were all health facilitieswhichwere providingcomprehensive ART/PMTCT service in the town.

According to the registration books and charts of the 12 health facilities, the total number of HIV positive mothers who have children age at least 18 month during January 1, 2014 to December 31, 2017 were 724. From the total 724, 23 were lost,29 died, 11 Transferred out and 8 stopped treatment. Since only 653 charts were found to be complete, a total of 653 complete motherinfant pair PMTCT registrations andchartswhich fulfill the inclusion criteriawere included in this study and were chosen based on their completeness (i.e. a chart will be included when it is found to be complete).

N.B. The numbers in the bracket show the complete charts that were included for study and this is shown as follows.

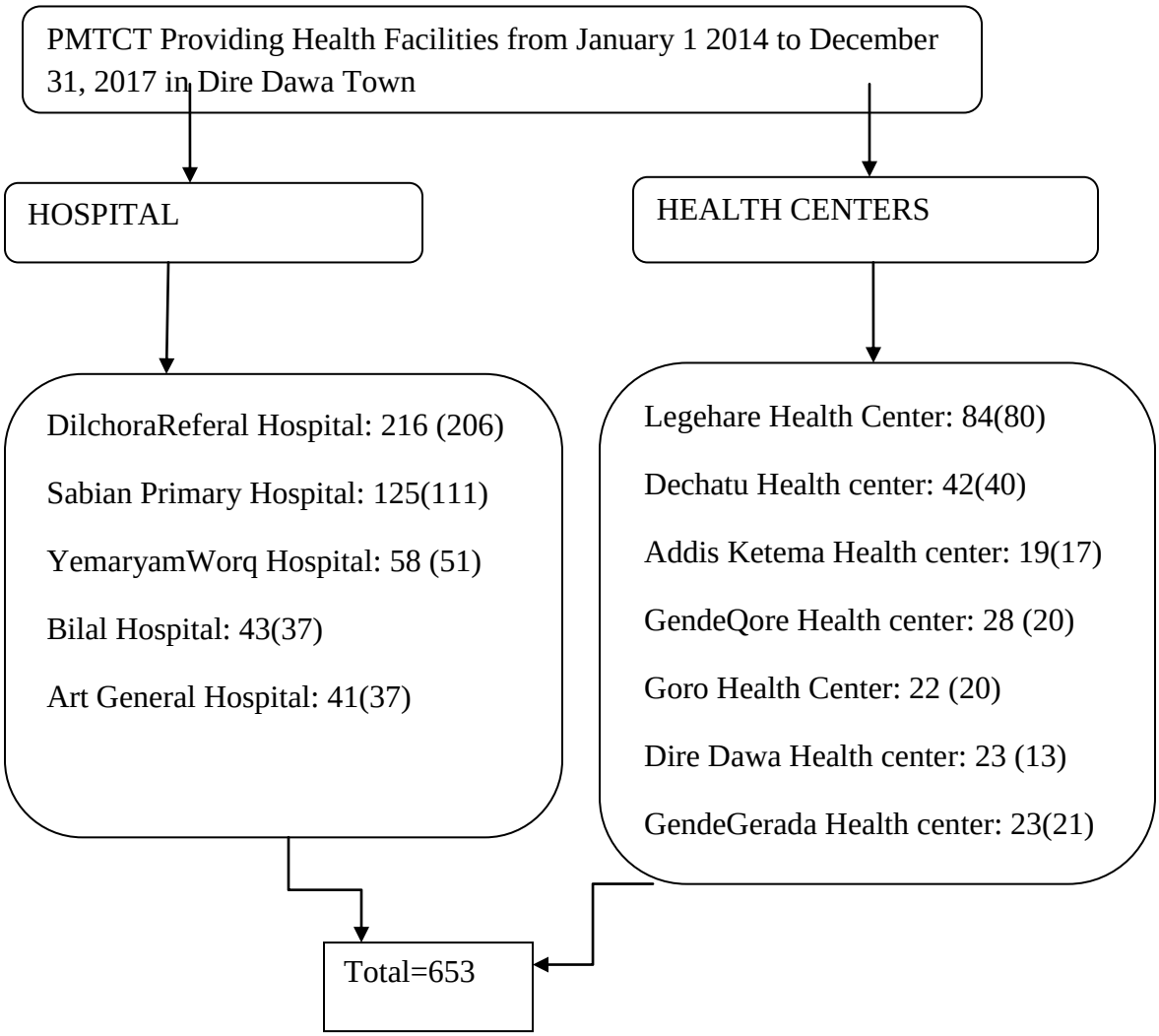


Figure 2.Schematic presentation of sampling procedure forthe assessment of HIV status and factorsassociated among the HIV exposed infants under PMTCT follow up.

3.8 Data Collection Method

Data wascollected using astructured data abstraction format pretested in 5% in Jugal Hospital, Harar. The questionnaire contained socio demographic, maternal medical and obstetric status and neonatal and infant status. A two days theoretical and practical orientation was given for data collectors, on how to select and properly fill the questionnaires.Data was collected by one senior diploma nurse who has already been trained on ART /PMTCT and working at ART/PMTCT clinic in every health facility. Day to day supervision was carried out forthe entire length of the data collection period.

The collected data was reviewed daily for completeness, accuracy, clarity, and consistency by a trained Senior BSc Nurse supervisor. Data was collected from those clients charts which wereeligible and give consistent information.A total of 653 charts were used and 71 were excluded Codes were given to the completed questionnaires.Questionnaires with incomplete information were presented back to the respective data collector to complete it bymaking repeated revisits.

3.9 Variables

3.9.1 Dependent Variables

- ✓ HIV status amongHIVexposed infants under PMTCT follow up.

3.9.1 Independent Variables

- ✓ Age
- ✓ Sex
- ✓ Immunization status
- ✓ Residence
- ✓ Distance from health facility
- ✓ Educational status
- ✓ Occupational status
- ✓ Social care and support
- ✓ Average income
- ✓ Mothers ANC/PMTCT follow up
- ✓ Maternal AIDS stage near delivery
- ✓ Infant Prophylaxis (NVP)
- ✓ Place of Delivery
- ✓ Mode of Delivery
- ✓ Complications during delivery
- ✓ Breast Feeding Practice

- ✓ Mothers Medical condition
- ✓ Maternal CD_4 level
- ✓ Maternal ART follow up(Duration)
- ✓ Maternal nipple status

3.10 Operational Definitions

OPTION B$^+$strategy: A comprehensive WHO program to prevent mother to child transmission of HIV during pregnancy, labor and delivery and breast feeding.

Neonate: The first 28 days of human life.

Infant: The period from birth to 12 months of age.

HIV Exposed infant: An infant who was born from the HIV positive mother.

Exclusive breastfeeding: giving the infant only the mother's milk for the first six months of life.

Mixed feeding: Feeding breast milk as well as other milks (including commercial formula or home–prepared milk), foods, or liquids in the first 6 months.

Social Support: Refers to a support given by the government that is meant to help clients to avert their socioeconomic problem.

Provider-initiated counseling and testing (PICT): A routine, opt-out process in which health care personnel offer group information and HIV-testing, with the patient / client always retaining the option to decline.

Vertical Transmission: Is when the HIV virus passes from an HIV positive mother to her baby which can happen during pregnancy, during labor and delivery or during breastfeeding.

Serostatus:The result of theDBS or antibody test that indicated positive or negative for HIV at 18 month.

DBS(DNA/PCR): Avirological test done using a blood sample taken from a foot of an infant to detect for the virus.(Global Health,2012).

Level of Adherence:Good if,>=95%,Fair if 85-94% and poor if below 85% of the HAART medication is taken.

Fully Immunized :an Infant who has taken all the vaccinations as per the national EPI program (Birth,6,10,14 weeks and 9 month).(FMOH, 2014).

3.11 Data Quality Control

So as to maintain the quality of data, onesenior diploma nurse who have already been trained on ART /PMTCT and working at ART/PMTCT clinic were selected for data collection in every health facility. A two days theoretical and practical orientation was given for data collectorsregarding the objective of the study, variables on the questionnaire, and on how to carefully collect the necessary data from the existing charts. During data abstraction there was close supervision by supervisor and principal investigator. Completed questionnaire were checked for completeness of information and any gap identified was immediately communicated to the data collectors.

3.12 Method of Data analysis

The collected data was checked and rechecked for consistency and data was entered using Epi Data version 3.02 software, then exported into SPSS version 20 software for data processing and analysis.Data description was done through frequency, percentage and cross tabulations. Bivariate and multivariable logistic regression analysis was used to identify factors associated with HIV transmission from the mother to the child. A 95% confidence interval of crude and adjusted odds ratio and a p-value less than 0.05 were used to determine the statisticalsignificance of the independent with the dependent variables.

3.13 Ethical Consideration

Ethical clearance was obtained from Institutional Health Research Ethics Review Committee (IHRERC), College of Health and Medical Sciences, Harar Campus. Informed, voluntary, written and signed consent was collected from heads of hospitals and health centers.The data retrieved from the Hospitals and each health center's HIV exposed infant records andPMTCT registration charts were entirely used anonymously and the files did not bear any name oridentification number. Any client information was kept confidential and was not passed to a third party. The collected data was keptstrictly confidential.

3.14 Information Dissemination

The final report is presented as a partial fulfillment of the degree of Master in General public Health for Department of Public Health, College of Health and Medical Science. Copy of the final report with specific recommendation is distributed tothe five Hospitals and Seven Health Centers. In addition to this copy of the report is submitted to Dire Dawa health Bureau.

4. RESULTS

4.1 Socio-Demographic Characteristics of the Study Participants

A total of 653 charts of mothers with positive sero status and their infants were included and studied. From a total of 653 HIV positive mothers, majority of them, 420(64.3%) were found within the age group of 25-34.The mean age of the mothers was 29.39 and standard deviation 0.6.Male infants were 319(48.9%) and 334(51.1%) were female. Majority of the mothers, 536(82.1%) were married.Among the mothers, 273(41.8%) were Orthodox, 252(38.6%) were Muslims, 116(17.8%) were protestant and few of them 12(1.8%) were Catholic. From the total, 292(44.7%) were Amharas, 188(28.8%) were Oromos, 72(11%) were Somali,63(9.6%) were Gurages,38(5.8%)were Tigray.Most mothers, 285(43.6%) had completed secondary education. Housewives took the largest share with 258(39.5%).(table 1).

Majority of mothers, 571(87.4%) live in urban and 82(12.6%) of them live in rural area. Most mothers, 530(81.2%) have up to 5 Kms distance from the health facility,123(18.8%)have distance 6-10 Kms. Social support was available for 330(50.5%) of mothers and was not for 323(49.5%) of HIV positive mothers as shown in table 1.

Table 1.Socio demographic characteristics of the HIV positive mothersin Dire Dawa Town, February, 2018.

SOCIO-DEMOGRAPHIC VARIABLES		FREQUENCY (%)
Age of the Mothers	15 - 24	118 (18.1)
	25 – 34	420 (64.3)
	≥ 35	115 (17.6)
Marital Status Of Mother	Single	27 (4.1)
	Married	536 (82.1)
	Separated	41 (6.3)
	Divorced	43 (6.6)
	Widowed	6 (0.9)
Occupation of the mother	Public Employee	114 (17.5)
	Merchant	139 (21.3)
	Daily laborer	137 (21)

	Housewife	263(40.3)
Educational Status of the Mother	No formal education	97 (14.9)
	Primary	178 (27.3)
	Secondary	285 (43.6)
	Diploma and Degree	93 (14.2)
Residence of the mother	Urban	571 (87.4)
	Rural	82 (12.6)
Sex of Infant	Male	319 (48.9)
	Female	334 (51.1)

4.2 HIV status of HIV Exposed Infants

Antibody test is done for HIV exposed infants to declare their status at 18 month and this is usually considered the main indicator of nationalPMTCT program evaluation.

According to this,theanti body test result at 18 month show, 56(8.6%), (95% CI (6.4, 11.0), infants were positive .

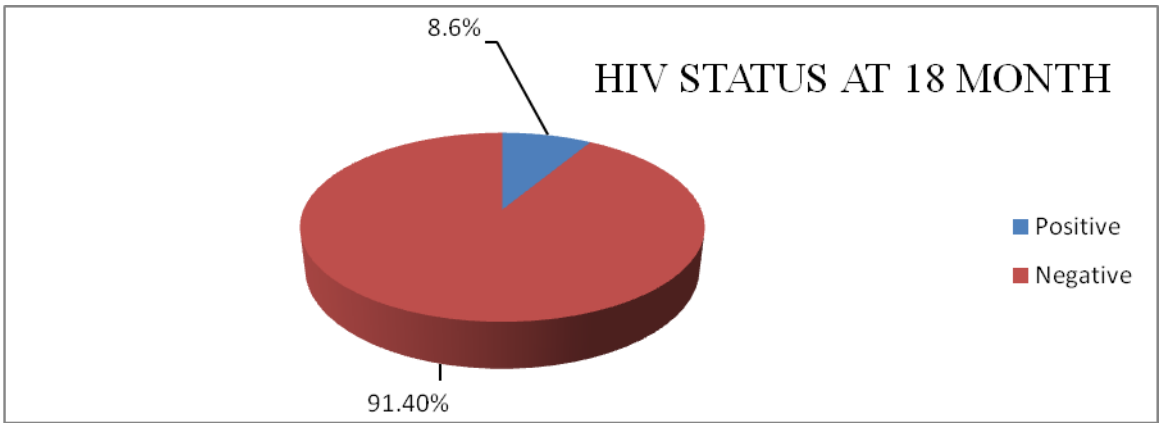


Figure 3: HIV status of exposed infants at 18 month in Dire Dawa Town, February 2018.

4.3Factors associated with HIV status of HIV exposed infants

4.3.1 Maternal Obstetric and Medical Status

Antenatal Care Follow up of mothers show that majority of them 596(91.3%) had attended ANC. From those who attended ANC, majority of them 277(46.4%) attended four times. Most of the mothers, 575(96.5%) of them had got HIV testing and counseling service while 21(3.5%) didn't .More than half, 350(53.8%) mothers were diagnosed and knew their result prior to pregnancy. In relation to partner testing practice, 444(66.2%) had been tasted but the rest 209(33.8%) did not at ANC. Generally Partners test result show 62(9.5%) were negative (discordant test result) 591(90.5%) were positive.(Table 2)

From the total 213 HIV positive mothers who were diagnosed at pregnancy,108(50.7%) were diagnosed at first trimester,97(45.5%) were diagnosed at second and 8(3.8%) were diagnosed at the third trimester. Majority of the mothers 644(98.6%) started HAART early after diagnosis.HAART was taken for above 6 months in 260(39.8%) of HIV positive mothers. Majority of the mothers 487(74.6%) had good level of adherence. The CD4 Level shows, 418(64%) of HIV positive mothers have CD4 level greater than 500. Majority of the mothers 635(97.2%) delivered at health facility.The mode of delivery of majority of the mothers 600(91.9%) was spontaneous vaginal delivery.(table 2).

Table 2. Maternal and obstetric history among HIV positive mothers in Dire DawaTown, February, 2018.

Maternal Obstetric and Medical Status		FREQUENCY (%)
Maternal ANC attendance	Yes	596(91.3)
	No	57(8.7)
How many Visits	One Time	61(9.3)
	Two-Three Times	258(39.5)
	Four Times	277(46.4)
HCT service at ANC	Yes	576(96.5)
	No	21(3.5)
Time when HIV was diagnosed	Prior to pregnancy	350(53.8)
	During Pregnancy	213(32.5)
	During L and D	72 (11)
	Post partum period	18 (2.8)
Partner Tested at ANC	Yes	444 (66.2)

	No	209 (33.8)
HAART initiated after diagnosis	Yes	644 (98.6)
	No	9 (1.4)
Duration on HAART	Below 1 month	154 (23.6)
	1-6 month	239 (36.6)
	Above 6 month	260 (39.8)
Level of Adherence	Good	487 (74.6)
	Fair	134 (20.5)
	Poor	32 (4.9)
Maternal CD4 Level during pregnancy	Below 350	104 (15.9)
	350-500	131 (20.1)
	Above 500	418 (64)
Place of delivery	Health Facility	635 (97.2)
	Home	18 (2.8)
Mode of Delivery	SVD	600 (91.9)
	Instrumental	12 (1.8)
	Cesarean Section	41 (6.3)

4.3.2 Neonatal and Infant Status

From the total neonates most of them 643(98.5%) have taken NVP after delivery. From those who took NVP, 623(96.9%) took for 6 weeks and the rest 20(3.1%) took for less than 6 weeks.Majority of the infants, 614(94%) were exclusively breastfeed. All of the infants, 653(100%) have got their DNA/PCR testdone. From the infants who got tested, 583(89.3%) tasted at 6 weeks duration,68(10.4%) tasted during six week to six month duration and 2 (0.3%) after six months. Their DNA/PCR result shows 51(7.8%) wreepositive.Majority of infants, 590(90.4%) of the infants were fully immunized. From the total infants involved, 196(30%) had been sick during the follow up period and 457(70%) didn't got sick during the follow up period. All the 653 infants (100%)have antibody test done at 9-12 months.(Table 3)

Table 3.Neonatal and Infant status of HIV exposed infants in Dire Dawa Town, February,2018.

Neonatal and Infant Status		Frequency (%)
Nevirapin After Delivery	Yes	643 (98.5)
	No	10 (1.5)
Feeding option by the mothers	Exclusive breast feeding	617 (94.5)
	Mixed Feeding	36 (5.5)
Immunization status of infant	Fully immunized	590 (90.4)
	Not fully immunized	63 (9.6)

4.4 Factors associated with HIV status among HIV exposed infants

From the above variables which have been computed in binary logistic regression, those whose P value was less than 0.25 were considered for further multivariable logistic regression analysis. With this under consideration, the following variables listed below are selected for they have been candidates for multivariable analysis. These are, Educational status, residence, social support, ANC attendance, partner test at ANC, level of adherence, CD4 level of the mother,place of delivery, mode of delivery, infant feeding option, time of DNA/PCR test, infant immunization status and sickness of infant during the follow up.

Having no any formal education has 11.7 times more risk of having an HIV infected child when compared with Higher educational status (having diploma and Degree) (COR=11.7:95% CI, 1.48-93.07).Living in rural has 2.6 timesmore risk of transmission of the virus when compared with urban residence (COR=2.59 95% CI (1.4-4.9).Those who have no social support were nearly 2 times more likely to have an infected infantwhen compared with those who have support with (COR=1.94:95% CI (1.1-3.44).Partners who were not tested at ANC were at 4.4 times more likely to have an infant who has HIV positive test result when compared to those tested (COR=4.4:95% CI, 2.4, 7.8).

Maternal level of adherence has been found to be associated with infants outcome and accordingly, mothers who had poor level of adherence were found5.2 times more likely likely to be vulnerable to have an infected infant when compared with good ones (COR=5.2:95%

CI(2.1-12.7) and mothers with fair adherence were 2.6 times more likely to have risk of infected infant (COR=2.6: 95% CI(1.4-4.8)) .The time during which DNA/PCR test was done was associated as infants who had their DNA/PCR test done at 6 week to 6 month duration were 6 times more likely to become infected with vertical transmission of HIVwhen compared with above 6 week(COR:5.9:95% CI(3.11,11) and 15 times less likely for those greater than6 months. (COR= 15.1:95% CI (4.7 ,38)).Immunization status was associated as those children who have been fully immunized were 8.7 times more likely to be predisposed to HIV infection (COR=8.7 95% CI (4.7-16.36)).Instrumental delivery increases risk of vertical transmission by 8.2 times when compared to SVD (COR=8.2 95% CI(2.51-26.8)) and CS delivery decrease risk of transmission by 10% COR 95%CI 0.9(0.27-3.05)

Table 4.Binary logistic regression analysis for the HIV status and factors associated among HIV exposed infants under PMTCT in Dire Dawatown,February, 2018.

Variables		HIV status at 18 month		Crude OR(95% CI)	P value
		Positive(%)	Negative(%)		
Educational Status*	No formal Education	11(16.8)	86(13.16)	11.77(1.48-93.07)	0.019
	Primary	19(2.9)	159(24.3)	1.07(0.48-2.35)	0.866
	Secondary	25(3.8)	260(39.8)	1.33(0.62-2.82)	0.456
	Diploma and Degree	1(0.15)	92(14.1)	1	-
Sex of neonate	Male	291(44.5)	28(4.3)	1.05(0.68-1.82)	0.86
	Female	306(46.8)	28(4.3)	1	-
Residence*	Urban	42(6.4)	529(81.)	1	-
	Rural	14(2.1)	68(10.4)	2.59(1.4-3.44)	0.004
Distance from Facility	<5 Kms	49(7.5)	481(73.6)	1	-
	6-10 Kms	7(10.7)	116(17.7)	1.69(0.75-3.82)	0.29
Social Support *	Yes	26(3.9)	310(47.5)	1	-
	No	30(4.6)	287(44)	1.94(1.1-3.44)	0.022
ANC attendance **	Yes	35(5.4)	561(85.9)	1	-
	No	21(3.2)	36(5.5)	9.35(4.9-17.4)	0.000
Partner Test at ANC **	Yes	20(3.06)	424(64.9)	1	-
	No	36(5.5)	173(26.5)	4.4(2.4-7.8)	0.000
Trimester in Diagnosis	First	11(3.5)	97(31.1)	1	-
	Second	2(0.6)	95(30.4)	0.18(0.04-0.86)	0.42
	Third	1(0.3)	7(2.2)	1.2(0.14-11.2)	0.83
HAART after diagnosis *	Yes	54(82.3)	590(90.3)	1	-
	No	2(0.3)	7(1)	3.1(0.63-15.4)	0.162

Level of adherence **	Good	29(4.4)	458(70.1)	1	-
	Fair	19(2.9)	115(17.6)	2.6(1.4-4.8)	0.002
	Poor	8(1.2)	24(3.7)	5.2(2.1-12.7)	0.000
CD4Level during pregnancy	< 350	14(2.1)	90(13.7)	1.8(0.96-3.6)	0.065
	350-500	10(1.5)	121(18.5)	0.9(0.4-2.1)	0.9
	>500	32(4.9)	381(5.8)	1	-
Place of delivery **	Health Facility	44(6.7)	591(9.05)	1	-
	Home	12(1.8)	6(0.9)	26.8(9.62-75.0)	0.000
Mode of delivery **	SVD	48(7.2)	552(84.5)	1	-
	Instrumental	5(0.7)	7(1)	8.2(2.51-26.8)	0.000
	CS	3(0.5)	38(5.9)	0.9(0.27-3.05)	0.876
Infant Feeding Option **	EBF	31(4.7)	583(89.3)	1	-
	Mixed feeding	24(3.7)	12(1.8)	36.5(16.7-79.6)	0.000
Time of DNAPCR ** Test	At 6 week	36(5.5)	547(83.7)	1	-
	6 week-6 month	19(2.9)	49(7.5)	5.9(3.1-11.0)	0.000
	After 6 month	1(0.015)	1(0.015)	15.1(0.93-1.07)	0.056
Infant fully Immunized **	Yes	34(5.2)	556(85.1)	1	-
	No	22(3.4)	41(6.3)	8.7(4.7-16.36)	0.000
Sick during follow up **	Yes	36(5.5)	160(24.5)	4.92(2.76-8.74)	-
	No	20(3.06)	437(66.9)	1	0.000

N.B -Bolded ones in the Table above represent candidates for multivariable logistic regression analyses. COR=Crude odd ratio.

-* shows association having p value below 0.05 and ** association having p value below 0.001.

The multivariable logistic regression analysis yields 5 variables to be associated with the dependent variable. These are HAART after diagnosis, CD4 level of the mother during pregnancy, Place of delivery, infant feeding option and sickness during follow up.HAART initiation after diagnosis was one of the factors associated and mothers who didn't start HAART early after diagnosis were 11.7 times more likely to have an infected child. (AOR=11.7:(95% CI,1.7,76.7). Mothers who had CD4 level below 350 were 3.1 times more likely to have an HIV infected infant when compared tothose who have CD4 level greater than 500 (AOR=3.1:95% CI: 1.5, 8.5).Mothers who delivered at home were 10.74 times more likely to have an infected infant in comparition with health facility delivery(AOR=10.74:95% CI, 2.2, 52.8).

The other factor that was associated with vertical transmission was feeding practice of the infants.Mixed feeding practice was 12.1 times more likely of having an infected child when compared with exclusive breast feedingfeeding (AOR=12.1:95% CI, 3.9, 36.4) and sickness during follow up increases transmission of the HIV virus from the mother to infant by 3.5 times(AOR=3.5:95% CI, 1.5, 8.1)). (Table 5).

Table 5.Multivariable Logistic Regression Analysis for the HIV status and factors associated among HIV exposed infants under PMTCT in Dire Dawa town, February, 2018.

VARIABLES		HIV status at 18		COR(95% CI)	AOR (95% CI)	P value
		Pos(%)	Neg(%)			
Educational Status	No formal Education	11(16.8)	86(13.16)	11.76(1.48-93.01)	6(0.62-58.5)	0.123
	Primary	19(2.9)	159(24.3)	1.07(0.48-2.3)	4(0..43-37.4)	0.221
	Secondary	25(3.8)	260(39.8)	1.3(0.628-2.8)	5.2(0.59-45.1)	0.138
	Diploma and Degree	1(0.15)	92(14.1)	1	1	-
Residence	Urban	42(6.4)	529(81.)	1	1	-
	Rural	14(2.1)	68(10.4)	2.59(1.4-3.44)	0.65(0.22-1.93)	0.438
Social Support	Yes	26(3.9)	310(47.5)	1	1	-
	No	30(4.6)	287(44)	1.94(1.1-3.44)	1.1(0.44-2.69)	0.85
ANC attendance	Yes	35(5.4)	561(85.9)	1	1	-
	No	21(3.2)	36(5.5)	9.35(4.9-17.4)	3.2(0.85-12.1)	0.086
Partner Test at ANC	Yes	20(3.06)	424(64.9)	1	1	-
	No	36(5.5)	173(26.5)	4.4(2.4-7.8)	2.01	0.11
HAART after diagnosis *	Yes	54(82.3)	590(90.3)	1	1	-
	No	2(0.3)	7(1)	3.1(0.63-15.4)	11.67(1.7-76.7)	0.01
Level of adherence	Good	29(4.4)	458(70.1)	1	1	-
	Fair	19(2.9)	115(17.6)	2.6(1.4-4.8)	0.43(0.15-1.2)	0.11
	Poor	8(1.2)	24(3.7)	5.2(2.1-12.7)	1.1(0.23-4.16)	0.91
CD4Level	< 350	14(2.1)	90(13.7)	1.8(0.96-3.6)	3.1(1.5-8.5)	0.02

during pregnancy	350-500	10(1.5)	121(18.5)	0.9(0.4-2.1)	2.04(0.7-5.7)	0.17
	>500	32(4.9)	381(5.8)	1	1	-
Place of delivery	Health Facility	44(6.7)	591(9.05)	1	1	-
	Home	12(1.8)	6(0.9)	26.8(9.62-75.0)	10.74(2.18-52.8)	0.003
Mode of delivery	SVD	48(7.2)	552(84.5)	1	1	-
	Instrumental Delivery	5(0.7)	7(1)	8.2(2.51-26.8)	1.75(0.28-10.8)	0.55
	CS	3(0.5)	38(5.9)	0.9(0.27-3.05)	1.8(0.4-8.2)	0.42
Infant Feeding Option	EBF	31(4.7)	583(89.3)	1	1	-
	Mixed feeding	24(3.7)	12(1.8)	36.5(16.7-79.6)	12.1(3.9-36.4)	<0.001
Time of DNAPCR test	At 6 week	36(5.5)	547(83.7)	1	1	-
	6 week-6month	19(2.9)	49(7.5)	5.9(3.1-11.0)	2.16(0.8-5.9)	0.133
	After 6 month	1(0.015)	1(0.015)	15.1(0.93-1.07)	1.5(0.4-51.4)	0.832
fully Immunized	Yes	34(5.2)	556(85.1)	1	1	-
	No	22(3.4)	41(6.3)	8.7(4.7-16.36)	1.7(0.63-4.6)	0.29
Sick during follow up	Yes	36(5.5)	160(24.5)	4.92(2.76-8.74)	3.5(1.5-8.1)	0.003
	No	20(3.06)	437(66.9)	1	1	-

COR=Crude Odd Ratio AOR=Adjusted Odds Ratio

5.DISCUSSION

The major aim of this study was to assess the HIV status of HIV exposed infants who had been under PMTCT program (Option B^+) follow up through determination of the outcome of HIV exposed infants at 18 month..HAART after diagnosis, CD4 level of the mother during pregnancy, place of delivery, infant feeding option and sickness during follow up were found tobe associated with risk of mother to child transmission of HIV virus.

This study reveals that positivity rate was 8.6% which is lower when compared to studies done previously. In another cross sectional study done in 17 health facilities from January to December 2012, in Amhara Region, Ethiopia, in 2014the prevalence of HIV infection among the infants bornto HIV positive mothers was 10.1% (44 out of 434 infants), with a 95% confidence interval between 7.3%and 13%.This shows that the implementation of the new option B+ is feasible and acceptable in reducing the transmission.

HAART initiation after diagnosis was one of the factors associated and mothers who didn't start HAART early after diagnosis were 11.7 times more likely to be predisposed to have an infected child. (AOR=11.7:(95% CI,1.7,76.7). In a study done by Nurilign et al, 2012 mothers who became pregnant after they knew their HIV serostatus were 0.22 times less likely to have HIV positive child compared to those who know their HIV status during ANC or post partum after delivery. Children who were born from older mothers had 5.4 times more risk; infants whose mothers didn't get PMTCT intervention were at after they were 0.22 times aware of their HIV status .Showing that early initiation of HAART decreases the maternal viral load and subsequently increases the CD4 level and there by decreases the risk of transmission.

CD4 level of the mother was associated as mothers who had CD4 level below 350 were 3.1 times more likely to have an HIV infected infact when compared to good ones(AOR=3.1:95% CI: 1.5, 8.5).In a study done by mama Abdula in Asela teaching and referral hospital,an infant born to a mother whose CD4 count is $<350mm^3$and $350\text{-}500mm^3$was 3.7and 3.1times respectively less likely to be HIV free survival compared infant born to a mother whose CD4 count >500mm3.This is clearly indicative of increament in CD4 level of the mother decreases the risk of transmission as it increases the immunity and decrease the viral load of the mother.

Home delivery is related with 10.74 times more likely for the mother to have an infected infant in comparition with health facility delivery (AOR=10.74:95% CI, 2.2, 52.8). In a retrospective crossectional study done,byZelalemBirhane et al,2014, Infants born at home were 8.8 times more likely to be DNA/PCR positive than those born in health facility.Therefore home delivery is strongly indicative of higher ris of transmission as it lacks the necessary components to prevent mother to child transmission including safe delivery,NVP prophylaxis and other care.

The other factor that was associated with vertical transmission was feeding practice of the infants.Mixed feeding practice was 12.1 times more likely of having an infected child when compared with exclusive breast feeding feeding (AOR=12.1:95% CI, 3.9, 36.4).A study on the outcome of HEI from September 2000 to August 2005 done in September 2016, in Hawassa and Yirgalem Hospitals ,according to this study, an infant with mixed feeding option was 8.23 times at higher risk of developing HIV infection than infants on exclusive breast feeding counterparts.This shows that mixed feeding practice is associated with the GI upset and laceration of the mucosal lining which further predisposes to infection and inturn facilitates the transmission of the virus.

Sickness during follow up increases transmission of the HIV virus from the mother to infant by 3.5 times (AOR=3.5:95% CI, 1.5, 8.1)).A study done in rural Kenya infants who exhibited any of the malnutrition syndrome and associated infection were twice as likely to acquire HIV infection (Eunice Wambui Nduati,2015).This is mainly due to the fact that co morbid disease conditions contribute for decreased immunity and hence increased chance of transmission of the virus.

6. LIMITATION OF THE STUDY

Due to the fact that this research used secondary data (Charts, Cards and Registration Books) that was available in the health facilities,someimportant variables were not obtained from the charts.These were average monthly income, infants nutritional status, infantweight, maternal AIDS stage near delivery and maternal Nipple status of the study participants and therefore, it has been decided not to included in description and analysis.

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusion.

In conclusion, the HIV status among the HIV exposed infants who have been under PMTCT follow up has found to be8.6%. The result is greater when compared to the national PMTCT level plan below 2%.HAART after diagnosis, CD4 level of the mother during pregnancy, place of delivery, infant feeding option and sickness during follow upwere found to be important predictors that facilitate the risk of transmission of HIV virus from mother to child.

7.2. Recommendation.

The figures that have been found in this research need the focus and consideration of ministry of health and other stake holders as they greatly contribute to the overall HIV prevalence. Therefore the following recommendations have been forwarded.

Hospitals and Health Centers in Dire Dawa:

Ante natal care service including PMTCT at pregnancy, labor and delivery and PNC should be strengthened and implemened according to the national protocol through timely provision of medication.

The CD4 level of the mothers should be collected and documented routinely and the result should be used to give decision according to the status of the clients.

Care providers should closely follow the mothers and infants regarding child care and support and options on the nutrition of the child should be determined.

Dire Dawa Health Bureau:

Home delivery should be strictly discouragedin all areas of the country, even in the presence of traditional birth attendants through Health education and promotion.

Exposed infants should be followed and mentored each month and their disease condition should be treated timely.

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9. APPENDICES

Appendix I: Information sheet andinformed voluntary consent form for Hospital/ health center head.

My Name is **NahomAbateEsayas;** I am studying General Public Health in Master's Degree in Haramaya University, Collage of health and medical Science. I have selected your institution as one of my study areas for my research. Therefore, I kindly request you to lend me your attention to explain you about the study.

Study title

HIV status and factors associated among HIV exposed infants under PMTCT follow up in health facilities in Dire Dawa town.

Study purpose

The purpose of the study is to assess the HIV status and factors associated among HIV exposed infants under PMTCT follow up in health facilities in Dire Dawatown.Besides to this it is for the fulfillment of the principals'MastersDegree in public health.

Procedure and duration

All mother infant pairs enrolled in PMTCT service registered from January 1, 2014 to December 31, 2017 in health facilities (five Hospitals and seven Health centers) in Dire Dawa town will be included. The health facilities will be selected from all health facilities based on the criteria that they are providingcomprehensive ART/PMTCT services in Dire Dawa town. A total of653 complete mother infant pair selected based on completeness of the chart in this study.There are 35 questions which will be filled by reviewing the documents.Onestudyquestionnaire will take about 20 to 25 minutes.

Risk and benefit

The risk of extracting data from the patient is minimal.There would not be any direct payment for participating in this study. Rather this study will serve as a base for future studies in detecting andidentifying problems with possible prevention and intervention activities.

Confidentiality

One important point you should remember is, any information that you will give us will be kept confidential and will not be passé to a third party. I would like to assure you that privacy will be strictly be maintained throughout the study. There is no need to put your name or ID number on the format.

Rights

It is your full right to participate or refuse in the study. If you don't want to participate in the study you can put the format on the table upside down. But note that your willingness will support success of the study.

If there are any questions or enquiries any time about the study or the procedures, please contact

Email:akuuyepom@gmail.com Phone number: 0945579927

Collage of Health and Medical Science ethical review committee (IHRERC): 0254662011 or PO BOX 235.

Declaration of informed voluntary consent

I have read the participation information sheet. I have clearly understood the purpose of the research, the procedure, the risk and benefits, issues of confidentiality, the rights of participating that may have been unclear. I am informed that the hospital has the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection procedure in the Hospitals premises. Therefore, I declare my voluntary consent on behalf of …….hospital/Health center management to allow this study to be conducted in the Hospital/health center with my initials.

Name and signature of the head of the Hospital/Health center ……

Name and signature of data collector……

Appendix II: Data abstraction Format

Part 1.MaternalSocio demographic information		
No	**Question**	**Answer**
01	Age of the mother during pregnancy	……..
02	Marital Status	1.Single 2.Married 3. Separated 4. Divorced 5. Widowed
03	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Others……
04	Ethnicity	1.Somali 2.Amhara 3.Oromo 4.Guraghe 5. Tigray 6.other…….

05	Educational Status of the mother	1.Can't read and write 2. Grade 1-6 3. Grade 7-10 4. Grade 11-12 5.Diploma and Above
06	Occupation of the mother	1. Employee 2. Merchant 3. Daily laborer 4. House wife 5. Mention if other…….
07	Average monthly income	……
08	Residence	1.Urban 2.Rural
09	How far is your home from the health facility?	…….....Kms.
10	Is there a social support for women in your area?	1.Yes 2.No

Part 2.Maternal Past Obstetric and Medical Status		
11	Did the mother attended ANC clinic?	1. Yes 2. No
12	If the answer to the above question is YES, how many times did she visit?	1.1 time 2.2-3 times 3.4 times
13.	Was she offered HTC service?	1. Yes 2. No
14.	When was the mother diagnosed to be HIV positive?	1. Prior to Pregnancy 2. During Pregnancy 3. During L&D 4. Postpartum period
15	Was the Husband (Partner) tested at ANC?	1. Yes 2. No
16	What was the testresult(Serostatus) of the husband ?	1. Reactive 2. Non Reactive
17.	If the answer to the above question is during pregnancy, which trimester?	1. First 2. Second 3. Third

18.	Did she start medication (ARV or ART) after diagnosis?	1. Yes 2. No
19	For how long did she take HAART?	1. Below 1 month 2.1-6 month 3. Above 6 month
20	What was her level of adherence?	1. Good 2. Fair 3. Poor
21	What was the CD_4 level of the mother?	……Cells/µl
22 .	Where did the mother delivered?	A. In health facility B. Home
23.	How did the mother deliver her baby?	A. Spontaneous vaginal delivery B. Instrumental Delivery C. Cesarean Section
Part 3. Neonatal and Infant status		
24	Sex of the neonate	1. Male 2. Female
25.	Did the neonate received NVP suspension after delivery?	1. Yes 2. No
26	For how long did the infant take NVP?	1. Six weeks 2. Less than 6 week

27.	What was the infant feed during the first six months?	1. Exclusive Breast Feeding 2. Mixed feeding
28.	Did the infant got DNA/PCR test?	1. Yes 2. No
29.	When did the infant got the test?	1. At six weeks duration 2. Six weeks to six month 3. After six month
30	What was the DNA/PCR test result?	1. Negative 2. Positive 3. Not determined
31	Was the infant fully immunized?	1. Yes 2. No
32	Did the infant got sick during follow up?	1. Yes 2. No
33.	Did the infant received antibody test at 9-12 months?	1. Yes 2. No
34.	What was the result?	1. Positive 2. Negative
35	What was the test result at 18 month?	1. Positive 2. Negative

Thank You!!

Appendix III-Curriculum Vitae

Personal Information

Full Name: Nahom Abate Esayas

Gender: Male

Date of Birth: December 28, 1991 G.C.

Place of Birth: Haromaya

Marital Status: Single

Address: Harar, Ethiopia

Phone Number: 0945579927

Email Adress:akuuyepom@gmail.com

Educational Background

Primary School

1-3: Haramaya Model School,Haramaya

4-5: HararRasMekonnenSchool,Harar

6-8: SOS Hermann GmeinerSchool,Harar

Secondary and Preparatory School

9-12: SOS Hermann GmeinerSchool,Harar

Higher Education

Haramaya University, Collage of Health and Medical Science, Public health officer.2003-2006.

Undergraduate Research Title: Knowledge,Attitude and Practice of Health care providers in Sharp and needle stick injury in DireDawa ,Dilchora Hospital.

Job description and Work experience

Worked at, ART, TB/LEPROCY, and Adult OPD and as a member of management at Gursum Health Center 2007-2010 E.C.

Participated in PHEM,emergency response Training

Fistula Screening and Referral Training

Post Graduate

Haramaya University, collage of Health and Medical Science, School of Graduate Studies, General public Health track candidate

.Research title:HIV status and factors associated among HIV exposed infants under PMTCT follow up in health facilities in, dire dawa town, eastern ethiopia.

Language skills

Language	speaking	Listening	reading	Writing
Amharic	Excellent	Excellent	Excellent	Excellent
Afaan Oromo	Excellent	Excellent	V. good	V. good
English	Excellent	Excellent	Excellent	Excellent

Hobbies

- ✓ Reading History books.
- ✓ Discussion with various groups.
- ✓ Playing football.

Reference

1. DrYiheyisAbebe (MD,MSc) **Phone No:0921246517**

2.Mr Ahmed Aliyi (BSc,MPH) **Phone No:0910 219318**